

5 –YEAR EMERALD ASH BORER IMPLEMENTATION PLAN

FOR THE

Village of Menomonee Falls, WI



Emerald Ash Borer Adult



D-shaped Exit Hole



S-shaped Tunnels



Treatments Do Work

**PREPARED BY:
WACHTEL TREE SCIENCE, INC.
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Ash trees before EAB devastation – Belvedere Dr. – Toledo, Ohio – June 2006



Untreated Ash trees after EAB Peak – Belvedere Dr. – Toledo, Ohio – June 2009



**Dead Ash trees at the first detection area near Newburg, WI
Detection Date July 2008 Photo taken July 31, 2012**



Aerial view of the same area one year later - August 2013

This is the outcome in heavy ash population forested areas where treatment options are not feasible.

Figure 1. EAB Detection in North America as of October 1st, 2018.

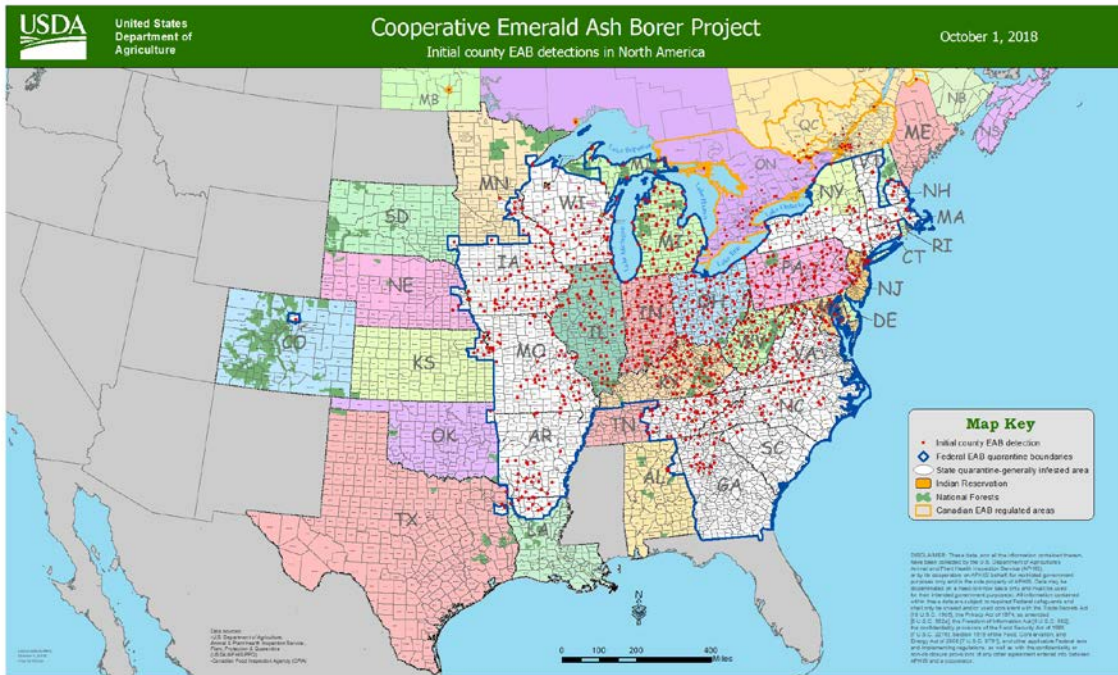
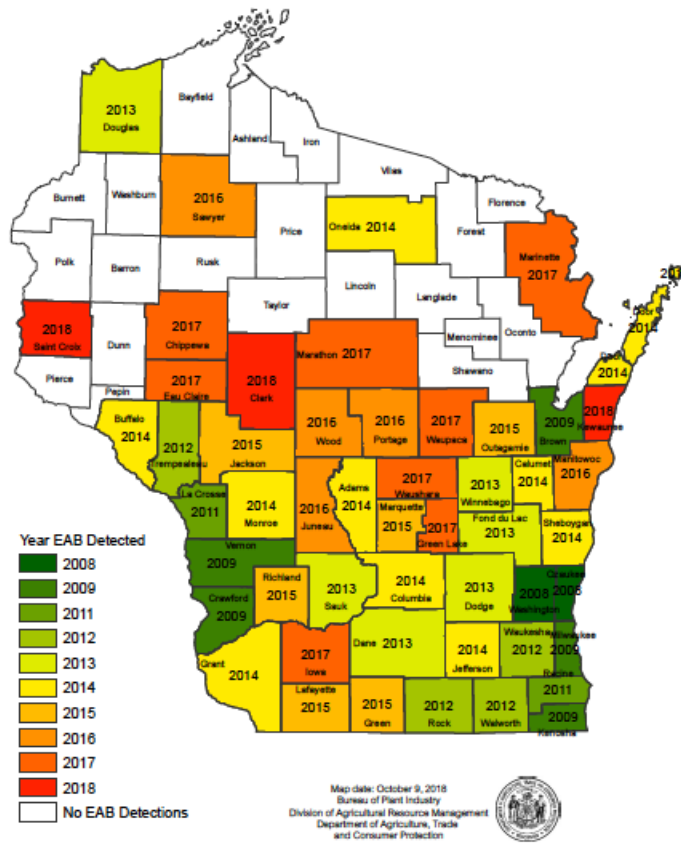


Figure 2. EAB Detection in Wisconsin as of October 9, 2018.

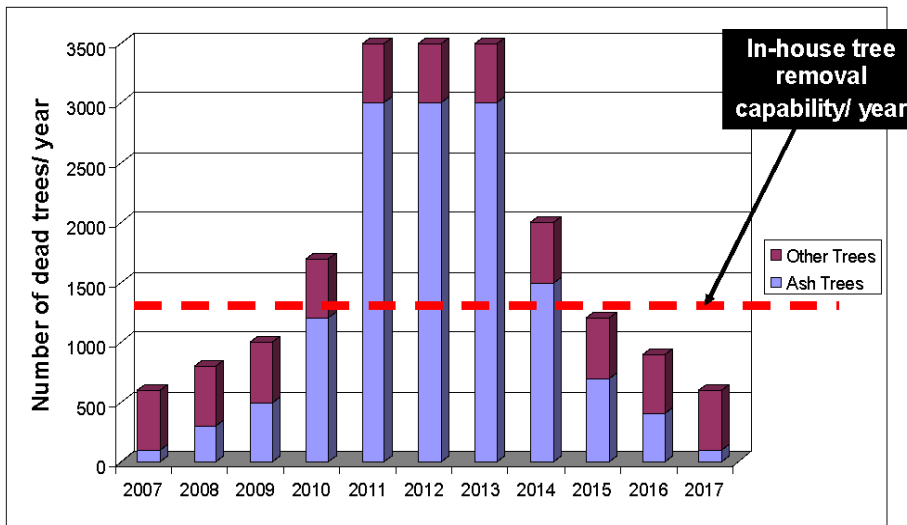


Graph Depicting How Community Resources Can Be Overwhelmed When EAB Population Explodes

No Treatment Option

Ash Tree Death Projection (2010)

Fort Wayne, IN



Courtesy Chad Tinkel - City Forester Fort Wayne, IN

The above graph shows that 3 to 4 years after EAB was discovered in the City of Fort Wayne, there is an exponential cost increase to the City as more contractors had to be hired above and beyond what the City could remove.

Below is another perspective from a City Forester in eastern Michigan, approximately 30 miles from the original discovery of EAB in Detroit.

“We had to use staff from other departments because we didn’t have the money upfront to contract out tree removals or to hire extra staff.” Tom Wilson, from Westland, Michigan, stressed how important and challenging it was to assign enough personnel to the task of facing EAB. He reassigned 4 people from his 18-person streets department and sent them over to work on tree removals full-time. It was only when these additionally-staffed Village crews fell behind that contracting was used to keep up with the work. A word of warning from his experience: “When contracting, keep in mind sudden; urgent, high-volume demand for service can make contracted removals more expensive and less available. Disreputable firms commonly appear.” Other municipalities shared an experience similar to

Westland's. These and other communities affected by EAB were left with many tasks and services undone and major purchases deferred.

Like all trees, ash trees are valuable resources for communities. They provide numerous ecosystem services and benefits such as energy savings, increased air quality, storm water management, aesthetic value, recreational opportunities and more. Being such a large portion of urban forests, the potential removal and loss of trees will have a serious impact over the overall value and benefits gained from a community's urban forest.

Additionally, listed below are three websites with current information on EAB:

- <http://emeraldashborer.wi.gov/>
 - EAB internet portal for Wisconsin sponsored by Wisconsin Department of Agriculture, Trade and Consumer Protection, the Wisconsin Department of Natural Resources and the University of Wisconsin – Madison
 - Contains information from a Wisconsin perspective on EAB biology, management, survey activities, publications and provides related links
- <http://www.emeraldashborer.info/>
 - Official emerald ash borer web page administered by Michigan State University
 - Contains information on EAB biology, distribution, control measures, current research and links to various EAB infested state's web sites
 - management, survey activities, publications and provides related links
- <http://www.emeraldashborer.info/>
<http://dnr.wi.gov/topic/UrbanForests/EABToolBox.html>
 - Wisconsin DNR EAB Toolbox for Wisconsin Communities
 - Designed for the planning and response needs of municipal governments, including such topics as: "Is Your Community Ready for EAB (video)", "EAB: The Opportunity of a Lifetime", "Readiness Checklist", "What Will Happen if EAB is Found in Your Community?" and "EAB University"

IMPLEMENTATION OPTIONS

Given EAB's impact on ash trees, no management is not an option. Left unmanaged, ash trees will die and become extreme hazards to the community which not an option. The use of different management plans depends on the number or size of the ash tree population, location of relevant ash trees and the health or condition of the trees.

Different management strategies usually always involve the removal of ash trees, some incorporate treatment of viable trees and the replacement of removed trees.

Treatment plans can reduce long term removal costs and or maintain a portion of the ash tree population for species diversity and urban forest benefits. Some communities that have incorporated treatment into their EAB management plans include Oak Creek, Franklin, Milwaukee, West Allis, Wauwatosa, Shorewood, Whitefish Bay, Glendale, Fox Point,

Racine, Kenosha, Janesville, Madison, Green Bay, Port Washington, Slinger, Brown Deer, Baraboo and Butler.

Until recently, the treatment of ash trees has been an essential tool for communities addressing EAB and managing ash tree populations, but the success of treatment is based on the overall health of the tree being treated.

Considerations such as tree location, size and overall health should be taken into account before treating a tree. Ash trees in poor locations, such as trees next to or under power lines are not worth treating. Larger trees provide significant value to the community, but they can pose a larger risk and can cost more to maintain especially ash trees. It may not be cost effective to treat trees above a certain diameter class. Trees in poor health, especially those showing signs or symptoms of EAB are not ideal treatment candidates. Research suggests that trees with over 50% canopy decline do not recover even with the most effective treatment options.

EAB is widely distributed throughout Southeast Wisconsin. It is approaching a high enough population that it has begun to severely impact the health of a large number of ash trees in the region. We are starting to see a large number of untreated trees with over 50% canopy decline. Under these conditions, the tree is not healthy enough to treat and treatment is no longer a viable option.

The replacement of removed trees is an essential component of EAB management. With the removal of ash trees, a large amount of ecosystem services and benefits will be lost. Planting new trees and increasing species diversity will ensure a healthy urban forest for generations to come.

The Village of Menomonee Falls confirmed the presence of Emerald Ash Borer (EAB) in March 22, 2016. The Village needs to take the lead on managing the public ash population and cannot simply let EAB run its course. The long term effects are too costly, and the short term effects without treatment and removal detract from the Village's credibility.

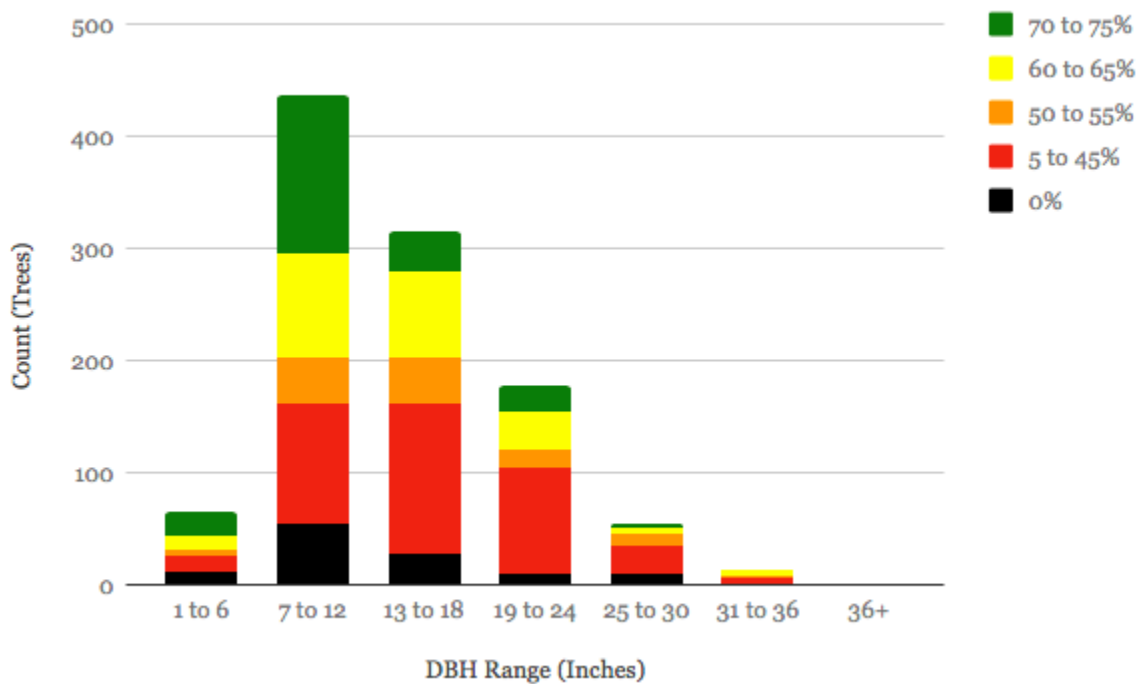
The Village of Menomonee Falls is responsible for the management of all trees on its property. The Menomonee Falls Department of Public works is responsible for all trees in the public right of way (ROW), public park and municipal properties. These trees include the following breakdown of the ash component:

- 1,064 total ash trees were identified and placed on the Village GIS database.
- Of the 1,064 Ash there are 798 Green Ash, 263 White Ash, and 3 European Ash.
- 795 are located in the street ROW and 269 are located in parks and on municipal properties.
- The ash trees make up 12.11% of the public tree species mix; 12.42% of street trees and 11.27% of park and municipal property trees.

The EAB is an exotic wood borer that was found attacking and killing ash trees in Michigan during 2002. Since its detection, EAB has killed millions of ash trees and is now found in Arkansas, Connecticut, Colorado, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Minnesota, Missouri, Nebraska, New Hampshire, New York, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia, West Virginia, Wisconsin and the Quebec and Ontario provinces of Canada. EAB is easily spread through the movement of firewood, logs and nursery stock and is why people have been the greatest cause for the rapid spread of EAB over the past decade.

It was first found in Southeast Wisconsin in July of 2008. It has been detected in numerous counties throughout Wisconsin. As of March 30, 2018 the entire state is under quarantine.

Figure 3. Condition Ratings and Size Distribution, Ash Trees.



The majority of ash trees (57.52%, 612 trees) have condition ratings less than 60%. There are 225 trees (21.15%) in the 60 to 65% condition classes and 227 (21.33%) in the 70 to 75% condition classes. Trees with a condition rating less than 60% are not ideal candidates for treatment. These trees are likely already infected and not healthy enough to be worth treating.

EAB around Menomonee Falls

Table 1. EAB Detection in Municipalities Surrounding Menomonee Falls.

Municipality	Municipality Type	Date Confirmed
Butler	Village	6/15/2016
Brookfield	City	3/3/2016
Brookfield	Town	3/3/2016
Pewaukee	City	2/12/2016
Lisbon	Town	N/A
Sussex	Village	N/A
Lannon	Village	N/A
Milwaukee	City	7/12/2012
Mequon	City	4/1/2014
Germantown	Village	6/16/2015

EAB is a very destructive pest. This insect attacks and kills white, green, blue, black and all horticultural varieties of ash. This insect attacks not only stressed ash trees but healthy and vigorous ash trees as well. The larvae of this insect feed under the bark undetected, disrupting the flow of nutrients and water between the roots and crown of ash trees. The first visible signs are usually crown dieback. By this time it is usually too late to save trees. Once infected, it can take between two and five years for trees to die. Following death, these trees are structurally compromised and become extremely hazardous. This requires an immediate and costly removal.

In urban areas, ash trees often can make up approximately 20% of the urban forest. This is a large portion of the urban forest and amounts to more money and resources needed to remove or manage the ash tree population.

Benefits of Emamectin Benzoate Trunk Injection

- 2-year control for Emerald Ash Borer
- Affects only insects that are targeted and will not harm beneficial insects
- Can be applied in a wide variety of weather conditions
- No drift or runoff
- Can be used on larger trees that maybe difficult to spray
- Safe to use, mix and apply
- A wide time frame in which to make effective applications (late-May to mid-September in most seasons)

It is recommended that the Village continue the contracted treatments to help prevent the infestation of EAB on 57 Ash trees within Rotary Park with a condition rating of 60% or greater, and consider the treatment of other public Ash trees that were assessed with a condition rating of 70% or greater.

Outdated Messages About EAB

Courtesy of J. Bradford Bonham, Certified Arborist from SW Ohio. Dr. Bonham has been a major public education spokesperson about EAB throughout the Midwest.

The following is a run-down of the most entrenched and problematic of the outdated messages that are still out there. If one or more of these points of conventional wisdom form the foundation of your management strategy, it's time for an update.

"Treatment doesn't work," or "Treatment is not 100%."

Leaving aside federal management of isolated infestations (like Maryland), federal funds for attempting eradication of this pest were pulled early in 2006. Prior to that, if you wanted to treat a tree to spare it from the eradication chainsaws, you would have had to prove that treatment consistently resulted in 100% larval kill in the treated tree (i. e., zero potential for adult emergence from the treated tree). The chance of re-infestation could not be tolerated.

"Treatment will lead to an insecticide-resistant population."

The population dynamics of EAB will not support resistance development. The vast numbers of insecticide-naïve beetles emerging from natural areas and breeding with any insecticide-exposed-but-not-dead beetles will override any trend toward resistance.

"Treatment isn't guaranteed!"

Neither are the antibiotics prescribed to treat pneumonia. University testing of products currently available has established that street-side ash up to 25" diameter at breast height (dbh) can be reliably brought through peak infestation. Testing is underway and is showing positive results on ash up to 55 inches dbh.

"Treatment is not environmentally sound."

Usually sourced to the internet, this claim sometimes alleges specific danger, while other times it is a moving target of vague, amorphous allegations. This recently released document should inject some well-tempered wisdom and reason into these discussions to dispel persistent myths.

http://www.emeraldashborer.info/files/Potential_Side_Effects_of_EAB_Insecticides_FAQ.pdf

"You will have to treat forever!"

Frankly in a municipal setting, you're simply talking service life. Pre-EAB, the average service life for ash in the Midwest was 25 - 40 years. Reliability of currently-available treatments suggests this service life can be preserved with confidence.

"Treatment is not cost-effective"

Early in the history of EAB, with what little was known about short or long-term reliability of treatment, this was true. Annual cost to treat in the commercial arena was in the range of \$12 - \$15 per inch dbh, and confidence in success was reserved for smaller trees. Even on a municipal scale, treatment could not be justified at the time.

However, research has progressed and market forces have caused annual treatment cost per inch dbh to drop drastically. Some communities are beginning to say, "Wait a minute, the budget consideration for this is not just the cost to remove ash trees, you have to add in stump grinding + cost of replacement trees + cost of installations, over a 6 to 10-year time frame. Not only will we be creating an even-aged stand of replacement trees with the attendant burden of first-decade care, we will lose property value, infrastructure value, ecosystem value, and in many neighborhoods, a sense of place."

Depending on the local removal and nursery market, the total cost for a remove/replace program (without considering the burden of creating an even-aged stand) may be somewhat more or less than the total cost of removing the decrepit stock and treating the remaining healthy inventory until they age out naturally. You must run your own numbers to assess this, but the prospect of spreading what would otherwise be short-term catastrophic costs out over several decades (and shifting removals back under normal management costs) has great appeal to finance committees, even if they don't understand the "conservation of services" which treatment ensures.

Resetting the Message

Conservation of healthy ash canopy is not only achievable, it is cost-effective. As such, it should be part of integrated forestry management plans. If your plan is outdated, give it an overhaul, and when you do, send out a press release to help reset the message. Many homeowners with ash trees will follow your lead for sensible decision-making.

"Reset" the information posted at your Village website. Anything related to treatment options which is more than 2 years old should be pulled because it's freshness-dating has expired. Convey to your readers that anything they see touted on the internet as a "best" or effective treatment, but relying on old Extension fact sheets should be considered suspect. Currently, "old" is pre-2015.

Research on the reliability of treatment continues to improve. New products are under investigation and the work on bio-controls is very active. Take a moment every 6 - 12 months to seek out research updates, and "reset" your own professional knowledge base.

MENOMONEE FALLS ACTION PLAN (Five Year Projection)

Plan Components

1. Over the five year period, begin by removing and replacing, with a diversity of species, all public ash trees with diameters less than 6" dbh. The total trees in this grouping are 66. These trees should be able to be removed by in-house staff. This work should be completed by spring 2019.

Option: If the public sentiment is there, an abutting property owner with ash trees in the terrace that are 5" DBH or less could have the option to have the trees treated by the Village at their expense. The property owner would pay the Village for the material cost and the Village would cover the cost of the labor.
2. After Item #1 is completed, there are 793 ash trees with a condition rating less than 70% that are 6" and greater dbh. These trees should be removed by poorest condition and largest diameters first. The recommended schedule is:
 - 268 trees by spring of 2020 (all less than 70% condition rating)
 - 125 trees for each of the following years 2021, 2022, and 2023.
3. Replanting is an important component of the overall plan. Increasing species diversity is the desired goal. All 646 planned removals (all diameters, 60% condition or less) may not produce appropriate replanting sites. Some sites may be under overhead utilities, too close to driveway approaches or intersections or conflict with a mature yard tree. A realistic number of appropriate replanting sites are set at 400. Based on available funding, the planting of replacement trees may have to be spread out over multiple years beyond the five year plan. It will need to be determined if replanting can be accomplished with Village Staff, or because of time constraints, contract planting will be required.
4. Selectively, chemically treat with Emamectin benzoate 103 trees having a condition rating of 70% or greater based on size, location and significance. Treatment of these 103 trees should begin no later than the 2019 growing season. In 2020, treat 102 trees having a condition rating of greater than 70%. Trees require alternate year treatments so the trees treated in 2019 will be re-treated in 2021 and 2023. The trees treated in 2020 will be retreated in 2021.

Results, Costs and Discussion Points

- Following this 5-year plan will reduce the public ash tree population to 205 trees under treatment and 0 ash trees not under treatment from the starting inventory of 1,064 ash trees. This plan reduces the ash component to 2.3% of the total public tree population and retains a proportion of the urban street tree canopy that currently exists. As trees are removed, treated trees continue to grow and replacement trees begin putting on new growth.
- Cost of implementation of the 5 year Action Plan - **\$730,265 or approximately \$146,053 per year (Option 1 - Contract); \$418,873 or approximately \$83,775 per year (Option 2 - Hybrid)**. The cost will vary from year to year due to the number and size of trees removed; the number of replacements and alternating years for treatment.
- Overall projected costs can be reduced if Village Staff are able to perform half the removals for trees over 6” dbh, and perform the replanting. **(Option 2)** There are discussions that will need to be held between staff and the Village Board. There are (2) 5-year proposed budgets at the end of this section; the first is primarily contracted services, while the second is a hybrid of contracted services and in-house staff.
- After 5 years there will still be approximately 205 treated public Ash and 0 untreated public Ash. At that point it should be determined, based on the level of EAB activity, if these trees should continue to be treated indefinitely on an every other year basis (1/2 of remaining ash population per year) or removed and replaced.
- The Department of Public Works “Miller Slab Property” is an ideal location to establish a yarding area for ash logs. This area is currently used for storage of various building materials and wood waste, and will be adequate in size to handle an influx of wood residue from removal operations. It is recommended that logs be stored here and wood utilization opportunities be investigated.

Menomonee Falls has a unique opportunity that could provide a creative way for ash tree lumber utilization. There currently is one sawmill located within a reasonable distance of the Village, Kettle Moraine Hardwoods, Inc. Other independent sawyers operate in Southeast WI.

There will be viable wood available from Ash removals that can be processed into lumber. The challenge is identifying acceptable logs and determining how to keep costs of transportation to a minimum. Due to the close proximity of this mill to the Ash tree population, an opportunity exists where both the Village and the mill in the area could reach a mutually beneficial agreement for the handling and transportation of ash logs.

There is a movement in Wisconsin to reclaim urban wood that is a result of urban tree removal activities. WI Urban Wood strives to provide connections between all partners involved in urban forestry operations. They can provide a link between two partners that otherwise would not have happened. The goal is to develop mutually beneficial partnerships that can utilize lumber from tree removals that would otherwise be a waste product. It is recommended that open communications begin between the Village and this organization to brainstorm creative solutions that will handle the future influx of ash logs.

Contacts:

Kettle Moraine Hardwoods North
5261 Aurora Rd.
Hartford, WI 53027
(262) 644-8119
info@kmhardwoods.org

WI Urban Wood
Madison WI, 53704
(608)622-7212
info@wisconsinurbanwood.org

- Village staff needs to assess availability of qualified outside tree care firms for contractual work, additional training and equipment needs for removals and treatment, plus determine which programs may need to be reduced or curtailed if the EAB infestation becomes dramatic.

TREE REPLACEMENT

Contract replacement tree planting costs for a 2" caliper B&B (balled and burlaped) tree with a 1-year guarantee can vary from \$250 to \$350 per tree. For budgeting purposes, **an average of \$300 per tree** is being recommended. The Village should consider contracting with the tree installer to provide supplemental watering of at least two times during the growing season if the Village is not equipped to perform this task. If Village Staff are used to perform the planting and purchases trees directly from wholesale nurseries, the average cost per tree planting would be approximately \$250. Labor cost from General Operating budget.

Project Administration

Administration costs are roughly \$17,753 per year using an outside consulting firm. The Village could reduce this budget to approximately \$8,462 per year if they would take care of administration. They should understand that a considerable amount of additional time will be needed to plan and administer yearly EAB management operations. Pursuing in-house administration would be another justification to hire the part time Village Forester recommended in the Urban Forest Management Plan.

RECOMMENDED FUNDING NEEDS

Five Year Total = \$730,265 (Option 1) Average Yearly Allocation = \$146,053

Five Year Total = \$418,873 (Option 2) Average Yearly Allocation = \$83,775

Treatments (Contract) –

Trunk Injection; 103 trees (currently 1,653 DBH inches) @ \$7.00/DBH inch beginning Spring 2019 for trees with a condition rating of **70%-75%** and continuing every other year for a minimum of three cycles = \$11,571 in 2019, 2021 and 2023. Alternate year trunk injection; 102 trees (currently 1,600 DBH inches) @ \$7.00/DBH inch beginning Spring 2020 for trees with a condition rating of **70%-75%** and continuing every other year for a minimum of two cycles = \$11,200 in 2020, and 2021.

Total 5-years = \$57,113

Treatments (In-House) –

Spring 2019 - 103 trees (1,653 DBH inches) @ 7 ml/dbh inch = 11,571 ml.
Chemical cost per milliliter = \$0.56 or \$3.92/dbh inch
Total chemical cost = \$6,479.76 times three cycles = \$19,439.28

Treatments (In-House) -

Spring 2020 - 102 trees (1,600 DBH inches) @ 7 ml/dbh inch = 11,200 ml.
Chemical cost per milliliter = \$0.56 or \$3.92/dbh inch
Total chemical cost = \$6,272.00 times two cycles = \$12,544.00

Total 5-year chemical cost = \$31,983.28 (Does not
include cost of in-house labor)

Removals (Contract) –

(6" and greater DBH poor condition trees that are not recommended for treatment) – 643 trees = \$413,000

Removals (In-House) –

If one half of the 643 removals are performed using Village forces, then the overall contract removal total cost would be reduced to approximately \$206,500

Note: Ash that are less than 6" in diameter (66 trees) are proposed to be removed by DPW staff under the General Operating budget.

Replacement Tree Planting (Contract) – 400 trees @ \$300/tree = \$120,000

Replacement Tree Planting (In-House) – 400 trees @ \$250/tree = \$100,000

Project Administration = \$73,764 (Contract); \$42,310 (In-house); if outside consultant is required

Contingency = \$66,388 (Contract); \$38,079 (In-house)

VILLAGE OF Menomonee Falls - EAB INITIATIVE						
5-YEAR PROPOSED BUDGET - Contract Services						
YEAR	Maintenance Activity			ADMINISTRATION	CONTINGENCY	BUDGET/YEAR
	REMOVALS	PLANTING	TREATMENT			
2019	in-house	\$24,000.00	\$11,571.00	\$4,446.38	\$4,001.74	\$44,019.11
2020	\$103,250.00	\$24,000.00	\$11,200.00	\$17,306.25	\$15,575.63	\$171,331.88
2021	\$103,250.00	\$24,000.00	\$11,571.00	\$17,352.63	\$15,617.36	\$171,790.99
2022	\$103,250.00	\$24,000.00	\$11,200.00	\$17,306.25	\$15,575.63	\$171,331.88
2023	\$103,250.00	\$24,000.00	\$11,571.00	\$17,352.63	\$15,617.36	\$171,790.99
TOTALS	\$413,000.00	\$120,000.00	\$57,113.00	\$73,764.13	\$66,387.71	\$730,264.84

Assumptions:

2019 (66) ash, 6" or less DBH removed by in-house staff; funding through general operation budget
 2020 (268) ash, 7" or greater DBH and 65% or less condition removed by contract
 2021, 2022, 2023 (125) ash per year, 7" or greater DBH and 65% or less condition removed by contract
 2019 (103) ash, 7" or greater and 70%-75% condition treated by contract, retreat in 2019 and 2021
 2020 (102) ash, 7" or greater and 70%-75% condition treated by contract; retreat in 2022
 Replacement planting (\$300/tree); will vary from year to year based on appropriate replanting sites; 80 trees/year

VILLAGE OF Menomonee Falls - EAB INITIATIVE						
5-YEAR PROPOSED BUDGET - Hybrid Contract Services/In-house Staff						
YEAR	Maintenance Activity			ADMINISTRATION	CONTINGENCY	BUDGET/YEAR
	REMOVALS	PLANTING	TREATMENT			
2017	in-house	\$20,000.00	\$6,479.76	\$3,309.97	\$2,978.97	\$32,768.70
2018	\$51,625.00	\$20,000.00	\$6,272.00	\$9,737.13	\$8,763.41	\$96,397.54
2019	\$51,625.00	\$20,000.00	\$6,479.76	\$9,763.10	\$8,786.79	\$96,654.64
2020	\$51,625.00	\$20,000.00	\$6,272.00	\$9,737.13	\$8,763.41	\$96,397.54
2021	\$51,625.00	\$20,000.00	\$6,479.76	\$9,763.10	\$8,786.79	\$96,654.64
TOTALS	\$206,500.00	\$100,000.00	\$31,983.28	\$42,310.41	\$38,079.37	\$418,873.06

Assumptions:

2019 (66) ash, 5" or less DBH removed by in-house staff; funding through general operation budget
 2020 (134) ash, 7" or greater DBH and 65% or less condition removed by contract; (134) removed in-house
 2021, 2022, 2023 (63) ash per year, 7" or greater DBH and 65% or less condition removed by contract; (62) removed in-house
 2019 (103) ash, 7" or greater and 70%-75% condition treated in-house, re-treat in 2021 and 2023
 2020 (87) ash, 7" or greater and 70%-75% condition treated in-house; re-treat in 2022
 Replacement planting in-house (\$250/tree); will vary from year to year based on appropriate replanting sites; 80 trees/year
 Administration and Contingency costs reduced due to greater reliance on the use of City forces

RECOMMENDED REPLACEMENT SPECIES

Larger Maturing - No Overhead Utilities or Mature Overstory Trees Present *X- Ideal in Park Settings			
COMMON NAME	SCIENTIFIC NAME	MATURE HEIGHT	PARKS
Ft. McNair Red Horsechestnut	Aesculus x carnea 'Ft. McNair'	35' -40'	X
Yellow Buckeye	Aesculus octandra	60' -75'	
Bitternut Hickory	Carya cordiformis	60'	X

Northern Catalpa	Catalpa speciosa	40'-60'	X
Chicagoland Hackberry	Celtis occidentalis 'Chicagoland'	40'-60'	
Katsuratree	Cercidiphyllum japonicum	40'-60'	
Turkish Filbert	Corylus colurna	40'-50'	
Ginkgo	Ginkgo biloba cultivar (male only)	50'-80'	
Skyline Honeylocust	Gleditsia triacanthos 'Skycole' PP 1619	50'-60'	
Kentucky Coffeetree	Gymnocladus dioica	50'-60'	
London Planetree	Platanus x acerifolia 'Ovation' or 'Morton Circle'	70'-100'	
Eye Stopper Corktree	Phellodendron lavallei 'Longnecker'	45'	
Swamp White Oak	Quercus bicolor	75'	
Bur Oak	Quercus macrocarpa	60'-80'	X
Hybrid Swamp x Bur Oak	Quercus x schuettei	75'	
Triumph Elm	Ulmus 'Morton Glossy'	55'	
Accolade Elm	Ulmus japonica x wilsoniana 'Morton'	70'	

Small Maturing - Overhead Utilities and/or Mature Overstory Trees Present *X- Ideal in Park Settings

COMMON NAME	SCIENTIFIC NAME	MATURE HEIGHT	PARKS
Ohio Buckeye	Aesculus glabra	35'	X
Robin Hill Serviceberry	Amelanchier x grandiflora 'Robin Hill'	20'-25'	X
Cumulus Serviceberry	Amelanchier x lamarckii 'Cumulus'	20'-25'	X
Musclewood	Carpinus caroliniana	25'-30'	X
Amur Maackia	Maackia amurensis	20'-30'	X
Adirondak Crabapple	Malus 'Adirondak'	20'	
Jackii Crabapple	Malus baccata 'Jackii'	25'-30'	
Royal Raindrops Crab	Malus 'JFS-KW5'	20'	
Redbud Crabapple	Malus x zumi calocarpa	20'	
Ironwood	Ostrya virginiana	25'	
Ivory Silk Tree Lilac	Syringa reticulata 'Ivory Silk'	25'	