

# Emerald Ash Borer Management Plan

City of Ash Grove, Pennsylvania



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**City Forester:**

Bruce Paxton

May 20, 2012



## Administration

The City of Ash Grove Emerald Ash Borer Management Plan is administrated by the City EAB Task Force. The Task Force reports to the City Council on this subject matter. City residents are encouraged to contact members of the task force for any questions or concerns related to this program.

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## Executive Summary

The city of Ash Grove recognizes the benefits of urban trees to the quality of life, air pollution reduction, energy conservation, storm water mitigation, and property value for its residents. Ash is an integral part of our urban forests, with 6,589 street and park trees citywide. An additional 160,000 ash trees are found in public natural areas, woodlots, as well as private properties. The emergence of the emerald ash borer in recent years, however, threatens the health of these trees.

To protect our precious forest resources and to mitigate potential damages, we have adopted an aggressive approach toward the management of this invasive pest in the next 10 years (2012-2021) within the city limits. A total of 687 high-value ash trees on public streets and parks will be protected through chemical treatment with Tree-äge. The remaining 5,902 street and parks trees will be removed and replaced with non-host tree species gradually in the next 10 years to reduce safety risks and to prevent sudden loss of canopy cover in the community. Minimum tree removal is also planned in public natural areas and woodlots when dead or dying trees along popular trails and property boundaries become hazardous. Working with DCNR scientists, biological control with parasitoids will also be attempted in The John Nature Area for the potential long term management of this pest.

The total cost for this program is estimated at \$5,084,017 over 10 years, with an annual cost of \$381,980 to 672,894. This represents about 1/3 of the total compensatory value of all ash trees and includes total cost for chemical treatment, tree removal, and replanting. Awards and grants from federal, state, and local agencies, organizations, and institutions will be actively sought by the City to offset a portion of the cost for this program.

Ash trees on private properties are the responsibilities of the property owners. However, the City is offering a \$20/tree one time incentive to those who choose to protect their trees with chemical treatment. The total cost of this offering will be determined later based on public interest.

The program is administrated by the City's EAB Task Force led by the mayor. Annual auditing of the program will be conducted by the City Council. Necessary adjustments will be recommended each year based on progress reports on the status of forest conditions and EAB infestations within the city.

Activities of community outreach will be carried out throughout the program period as public support is the key to the success of this kind of program. The City will inform the public about the progress of the program on a timely fashion. Recommendations and suggestions on how to deal with this natural disaster of the ash forests are welcome. Furthermore, city residents are encouraged to be part of this program through cooperation and volunteering and other types of involvement.

## Authority

**1. Declaration of policy.** The health of the ash trees in the city is threatened by the emerald ash borer. Damages to those trees will have a negative impact on public safety and quality of life for city residents. Federal and state regulations provide local authority to manage this pest and mitigate its damage in Pennsylvania.

**2. Jurisdiction.** The City shall have control of all street trees, shrubs, and other plantings now or hereafter in any street, park, public right-of-way or easement, or other public place within the city limits, and shall have the power to plant, care for, maintain, remove, and replace such trees, shrubs, and other plantings. Private trees may fall under city jurisdiction when they become concerns of public safety.

**3. Declaration Public Nuisance.** The City has determined that the health of ash trees are threatened by the destructive emerald ash borer and hereby declares the following to be a public nuisance:

Any living or standing tree or part thereof infested by this pest;

Any dead tree or part thereof, including infested logs, branches, stumps, or other materials;

Any infested firewood or solid wooden packing or shipping materials infested with this pest.

**4. Nuisance Prohibited.** No person, firm, or corporation shall permit any public nuisance as defined in section 3 to remain on any premises owned or controlled by him/her/it within the City.

**5. Inspection.** The City Forester shall inspect or cause to be inspected all premises and places within the City to determine whether any public nuisance as defined herein exists thereon and shall also inspect or cause to be inspected any trees or materials reported or suspected to be infested with the insect listed in section 3.

**6. Abatement of Nuisance.** If the City Forester upon inspection or examination determines that any public nuisance as herein defined exists in or upon any public street, alley, park, or other public place; or private premises within the city, and that the danger to public safety is imminent, he/she shall:

Immediately cause it to be treated or removed;

Otherwise abate the nuisance in such a manner as to destroy/prevent the spread of this pest.

**7. Cost of Abatement.** The cost of abatement of any public nuisance may be chargeable and assessed against the parcel or lot upon which such tree or material stands. The city shall bear the cost of such abatement.

**8. Transporting of Wood Prohibited.** No person, firm, corporation shall transport within the city any infested materials without first securing the written permission of the City Forester.

**9. Interference with City Forester Prohibited.** No person, firm, or corporation shall prevent, delay or interfere with the City Forester or his/her staff while they are engaging in the performance of their duties.

**10. Violations.** Any person who violates this ordinance shall be subjected to a penalty as prescribed by S. 28.29 of the City Code.

## Introduction

Ash Grove, Pennsylvania is proudly known as the “Jewel of the Allegheny Plateau” because of its breath-taking landscape and exceptional natural beauties. Trees are an integral part of the City’s infrastructure and identity, with 40% canopy cover in its urban area. A recent tree inventory indicates there are more than 50,000 trees along city streets, park trails, golf courses, and natural areas, including 6,589 ash trees. At least 20 times more trees are found in woodlands and private properties within the City.

The emerald ash borer (EAB), *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae), an exotic wood-borer from northeast Asia, was first discovered attacking ash trees in Michigan in 2002. Since then, it has been found in 14 additional U. S. states and two Canadian provinces across the Great Lakes region and beyond. Larval feeding in the cambial region disrupts water and nutrient transportation inside the tree, resulting in 99% tree mortality within 4-5 years. An estimated 20 to 55 million ash trees have been killed by this pest in the infested areas. The potential economic damage may exceed \$10 billion in 25 states expected to be affected within in the next 10 years.

The first EAB infestation in Ash Grove was confirmed in April 2011 when damage and EAB larvae were found on a green ash tree in the parking lot of the Venus Bank on Maple Street. Parkway trees at properties within half a mile were surveyed after the initial discovery and a total of 5 additional ash trees were found infested. The City removed the initial 6 infested trees in May 2011. New infestations have been confirmed in the surrounding Violet Heights and Ivy Circle neighborhoods during subsequent surveys. A management plan is urgently needed for the City to protect its ash trees from EAB damage in the future.

The City of Ash Grove is committed to preserve its urban forest resources as a designated “Tree City USA” community. The *Emerald Ash Management Plan* is to serve as the master plan for the city to manage its urban ash trees on public lands over the next 10 years. Property owners are encouraged to manage their ash trees according to the guidelines set by this document. An incentive is offered to property owners who choose to carry out management activities on their lands.

There are three goals for this plan:

- △ Protect urban ash trees for its economic, social, and environmental benefits;
- △ Minimize public safety and liability risk from EAB infestation within the community;
- △ Replace canopy cover that will be lost to EAB infestation.

The Following actions will be carried out in the next 10 years:

- Maintain an updated ash inventory within the City;
- Monitor EAB infestation on city trees yearly;
- Remove dead or dying ash trees from roadways and public areas;
- Utilize ash wood from tree removal activities;
- Dispose ash-related material properly;
- Treat valuable ash trees with chemical insecticides;
- Introduce parasitoids for long term EAB biological control in selected natural areas;
- Replant non-host tree species at locations where ash trees were removed;
- Conduct outreach and public education;
- Involve private property owners.

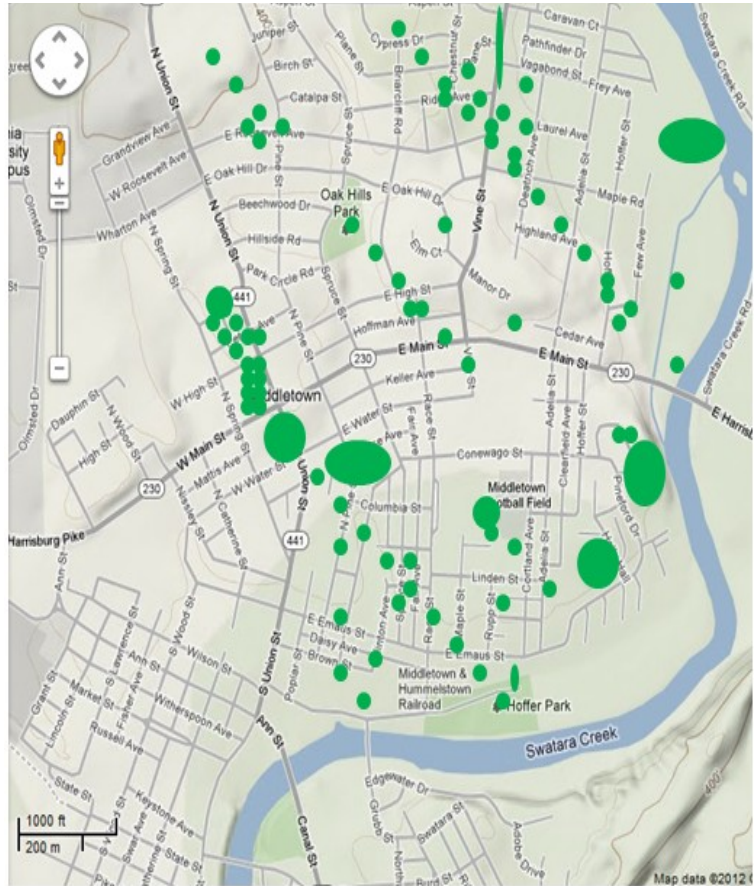
## Ash Resources

An ash inventory in the City was conducted by the city forester in May 2012. A total of 6,589 ash trees are recorded from city streets and parks trails, with a total diameter-at-breast-height (DBH) of 72,479 inches, ranging from 4.5 to 48.7 inches for individual trees (Table 1). The majority of trees are less than 20 inches in diameter, while 17.5% are between 20-30 inches. Most (92%) ash trees are in excellent (<5% crown dieback) or good conditions (5-25%), whereas 7.4% in fair (25-50%) or poor (>50%) conditions. The total compensatory value of the street ash trees is estimated at \$14.8 million based on the landscape tree valuation formula developed by the Council of Tree & Landscape Appraisers (CTLA). On average, a 12-inch green ash is valued \$2,250 in Ash Grove.

Ash makes up 12% of all trees in our three nature areas (John, Jack, and Jane), with at least 100,000 trees found in the woodlots. The average basal area ranged from 5.6 to 9.8 m<sup>2</sup>/ha in those areas.

An estimated 60,000 ash trees are found on private properties in Ash Grove. No inventory was conducted by the city. However, property owners are strongly encouraged to survey ash trees on their lands for better management. Contact your city forester for assistance in species identification, inventory, and tree health evaluation (See Map 1).

**Map 1. Distribution of public ash trees in Ash Grove**



**Table 1. Diameter and condition of street and park ash trees in Ash Grove**

Tree Conditions	Diameter class (inches)					Total
	0<10	10-20	20-30	30-40	>40	
Excellent	1589	1085	790	80	10	<b>3544</b>
Good	1298	880	238	72	24	<b>2512</b>
Fair	166	96	124	8	17	<b>411</b>
Poor	25	54	3	6	2	<b>90</b>
Dead	2	15	1	2	2	<b>22</b>
<b>Total</b>	<b>3080</b>	<b>2130</b>	<b>1156</b>	<b>168</b>	<b>55</b>	<b>6589</b>



## EAB Infestation

EAB is currently found in the neighborhoods of Maple Street, Violet Heights and Ivy Circle, with a total of 10, 5, and 2 infested trees, respectively. Ash trees in these neighborhoods will be intensively surveyed using pest signs and symptoms during this summer for additional infestations. In addition, trees in surrounding neighborhoods will be actively monitored for potential spread of this pest. All ash trees on city streets, parks trails, day use areas, and golf courses will be examined at least once each year. A pest status component will be added to routine maintenance and sanitation operations for the Departments of Public Works and Parks & Recreation.

The general health and EAB infestation on ash trees in the natural areas and the woodlots within the parks will be monitored by the city forester on yearly basis. Branch sampling may be used on tall trees in the woodlots. Private citizens are encouraged to report suspicious pest activities on their ash trees to the city forester.

## Management Approaches

An aggressive management option was adopted by the City after careful consultation with experts at the Department of Conservation and Natural Resources (DCNR) and intense discussions among city administrators, professional staff, related departments, businesses, organizations, and private citizens. As a result, three major management tools including chemical treatment, tree removal, and biological control will be implemented.

### Chemical Treatment

High-value ash trees in the city will be treated with Tree-age (Map 2). This pesticide provides 99% protection against EAB larvae for 2-3 years with a single application. Only trees in excellent and good conditions are considered for this treatment since they are better positioned to survive the pest onslaught. Large diameter trees are favored over small diameter trees as they typically have higher value and provide more benefits to the community. Other factors such as cost, location, logistics, and local support are also considered during the process. A total of 687 trees with an accumulative total DBH of 17,175 inches were selected to receive five treatments for the next 10 years (year 1, 3, 5, 8, and 10) (Table 2).

**Table 2. Proposed ash trees for chemical treatment in Ash Grove**

Tree Conditions	No. of treated (total) trees in different diameter class (inches)					<b>Total</b>
	0<10	10-20	20-30	30-40	>40	
Excellent	0 (1589)	180 (1085)	250 (790)	60 (80)	5 (10)	<b>495 (3544)</b>
Good	0 (1298)	70 (880)	80 (238)	30 (72)	12 (24)	<b>192 (2512)</b>
Fair	0 (166)	0 (96)	0 (124)	0 (8)	0 (17)	<b>0 (411)</b>
Poor	0 (25)	0 (54)	0 (3)	0 (6)	0 (2)	<b>0 (90)</b>
Dead	0 (2)	0 (15)	0 (1)	0 (2)	0 (2)	<b>0 (22)</b>
<b>Total</b>	<b>0 (3080)</b>	<b>250 (2130)</b>	<b>330 (1156)</b>	<b>90 (168)</b>	<b>17 (55)</b>	<b>687 (6589)</b>

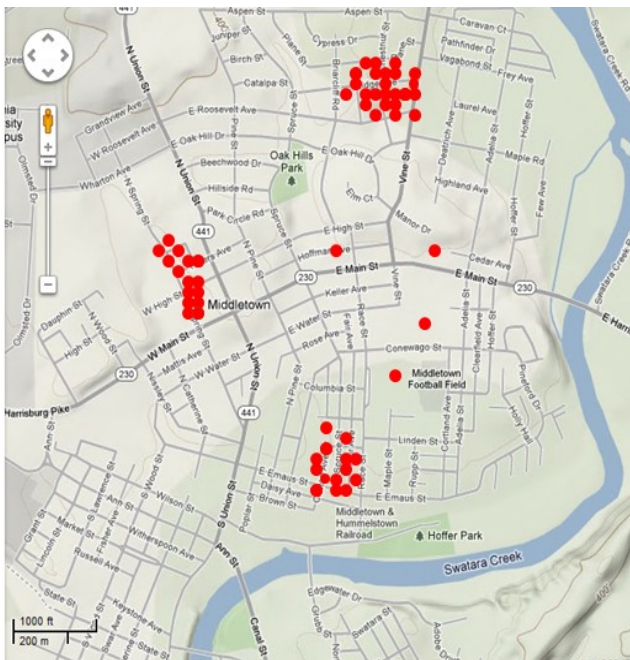


Trunk injection

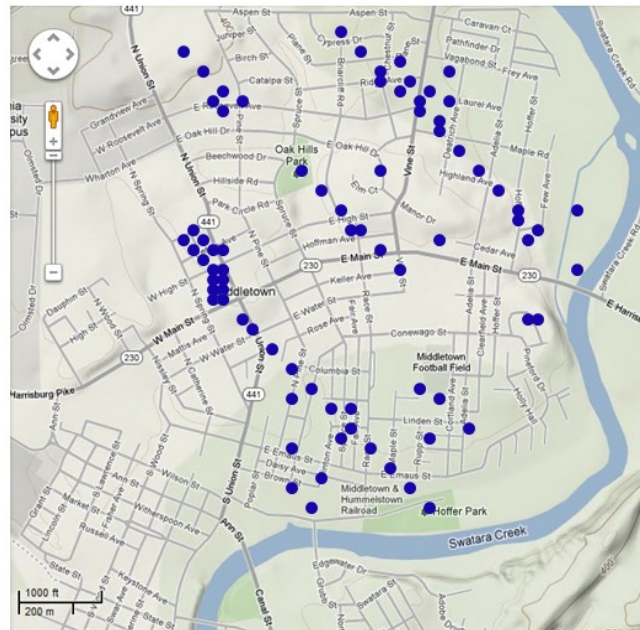
## Tree Removal

EAB kills 99% of ash trees after several years of infestation. Assuming all untreated ash trees in the city will be dead or dying within the next decade, a total of 5,902 remaining trees on streets and in parks will need to be removed to protect public safety and reduce liability. To accomplish this goal, an average of 590 trees will be removed each year over the next 10 years (Map 3). However, preemptive removal of healthy trees is not recommended by this plan. Only trees that are dead, or in poor or fair conditions will be selected for removal each year. Removal of other trees that are currently in good or excellent condition in the following years will be determined by city staff based on the progression of the infestation at the beginning of each year. Priorities are given to trees in areas

**Map 3. Distribution of to-be-removed ash trees**



**Map 2. Distribution of to-be-treated ash trees**



where heavy EAB infestations are located, trees with potential high hazard, and trees with small diameters. A block-by-block tree removal strategy may be adopted to improve efficacy.



Tree removal

Tree removal in the woodlots of city parks and natural areas will be minimal given the number of ash trees found in those areas. Dead or dying ash trees along trails or boundary lines are hazardous to trail users and neighboring properties. An estimated 5,000 ash trees (5% of all trees) will need to be cut or removed to reduce risk in the next 10 years.



## Biological Control

Biological control with parasitoids is considered the long term approach for the management of the EAB although its effectiveness is still under investigation by scientists from university and government agencies. The City has determined it is an alternative management approach worth pursuing. Therefore, the City decided to assist DCNR scientists in this endeavor by establish a parasitoid release site in The John Nature Area. Three hymenopteran parasitoids, including one egg parasitoid, *Oobius agrili* Zhang and Huang (Encyrtidae), and two larval parasitoids, *Tetrastichus planipennisi* Yang (Eulophidae) and *Spathius agrili* Yang (Braconidae) will be released in 2013 and 2014. Parasitoid establishment and their impact on EAB population at the study site will be monitored and evaluated in 2015.

## Wood Utilization & Material Disposal

The 5,902 ash trees to be removed from city streets and parks have value as timber and landscape mulch. The City has entered into contracts with Gallian's Mill for ash wood and Bob's Landscape for wooden branches and debris. Residue value recovered from these trees by the city will be used for re-planting efforts each year.

The city marshall yard at Marsh Road obtained a compliance agreement from USDA APHIS and PA Department of Agriculture to properly dispose ash related materials year around. Ash material from the city will be disposed at this site according to established guidelines. City residents may also use this site to dispose ash and other materials from their property for a nominal fee.

## Replanting

All removed ash trees will be replace for canopy cover in the community. A 1:1 replacement ratio will be used in all neighborhoods. Temporary reduction of canopy cover is expected in affected streets and parks as replacement trees are usually small and not guaranteed at 100% survival rate. The City will work with Arbor Day Foundation, Tree City USA, TreeVitalize, Master Gardeners, Neighborhood Greens, other nonprofit organizations, and private citizens for the replanting efforts.

## Community Outreach

Information about EAB, ash trees, quarantine regulations, tree removal, chemical control, biological control, wood utilization, replanting, and other program activities will be disseminated through news conferences, seminars, public hearings, trainings, demonstrations, community events, neighborhood meetings, and awareness campaigns throughout the program period. Interested individuals are encouraged to contact the city forester or other administrators for more information.

Ash trees on private properties are the responsibility of the property owners. It's up to the property owner to decide whether he/she wants to treat his/her ash trees, or to remove and replace their hazardous trees. However, the city will make the technical staff available to assist property owners on EAB and ash related problems. Furthermore, the city will provide a one time financial incentive of \$20/tree to those who wish to treat their trees with Tree-age. Contact the city forester for application details. If determined by the city forester that certain dead or dying ash trees on private property pose imminent danger to public safety, the city has the authority to remove such trees with proper advance notice. No charge for tree removal will be applied to the property owner under such circumstances.

## Cost/Benefit Analysis

The total cost for this program is estimated at \$5,084,017 over 10 years, about 1/3 of the total compensatory value of all ash trees. It is assumed that all management activities will be conducted by contracted commercial companies under city supervision, including \$983,821 for chemical treatment, \$2,486,016 for tree removal, and \$1,614,180 for replanting. The city can choose to pull its resources together and train its staff to carry out all tasks to save money. However, this may result in added costs from new hiring and delay or cancellation of other tasks previously assigned to city workers.

### Chemical Treatment

A total of five treatments (year 1, 3, 5, 8, and 10) are needed for the project period since Tree-äge is effective against EAB larvae for at least two years (up to three years). The total cost for chemical treatment is estimated at \$793,339, with \$171,750 (2012), \$182,187 (2014), \$192,974 (2016), \$211,646 (2019), and \$225,264 (2021) for each treatment, respectively (Table 3). A public bidding process will be conducted to select a tree care company with the lowest reasonable bid for this activity.



**Table 3. Cost of chemical treatment of ash trees in Ashville for 10 years**

Year	No. trees	Total DBH (inch) *	Unit price (\$) *	Cost (\$)
2012	687	17,175	10	<b>171,750</b>
2013	0	0		<b>0</b>
2014	687	17,518	10.4	<b>182,187</b>
2015	0	0		<b>0</b>
2016	687	17,868	10.8	<b>192,974</b>
2017	0	0		<b>0</b>
2018	0	0		<b>0</b>
2019	687	18,404	11.5	<b>211,646</b>
2020	0	0		<b>0</b>
2021	687	18,772	12.0	<b>225,264</b>
<b>Total</b>	<b>687</b>			<b>983,821</b>

\* 1% annual increase is assumed to the total diameters of ash trees and 2% annual increase for cost of treatment.

### Tree Removal

A total of 10,902 trees (5,902 street and park trees, and 5,000 woodlot trees) will be removed within the next 10 years (2012-2021). About 590 trees on city streets and parks will be removed each year at the cost ranging from \$177,000-211,220 per year. Whereas about 500 hazardous trees in public woodlots will be removed each year at a cost of \$50,000-60,000 per year. The total cost of tree removal is estimated at \$2,484,016, with an average of \$248,402 per year (Table 4).

**Table 4. Cost of tree removal in Ash Grove for 10 years (2012-2021) \***

Year	Street and Park Trees			Woodlot Trees			<b>Total Cost</b> <i>(US dollars)</i>
	No. trees	Unit Price (\$)	Cost (\$)	No. Trees	Unit Price (\$)	Cost (\$)	
2012	590	300	177,000	500	100	50,000	<b>227,000</b>
2013	590	306	180,540	500	102	51,000	<b>231,540</b>
2014	590	312	184,080	500	104	52,000	<b>236,080</b>
2015	592	318	188,256	500	107	53,500	<b>241,756</b>
2016	590	324	191,160	500	109	54,500	<b>245,660</b>
2017	590	331	195,290	500	111	55,500	<b>250,790</b>
2018	590	338	199,420	500	113	56,500	<b>255,920</b>
2019	590	344	202,960	500	115	57,500	<b>260,460</b>
2020	590	351	207,090	500	117	58,500	<b>265,590</b>
2021	590	358	211,220	500	120	60,000	<b>271,220</b>
<b>Total</b>	<b>5,902</b>		<b>1,937,016</b>	<b>5,000</b>		<b>549,000</b>	<b>2,486,016</b>

\* 2% annual increase in removal cost is assumed.

## Replanting

A total of 5,902 trees will be replanted with non-host species to replace the lost ash trees, with a total cost of \$1,614,180 over 10 years, ranging from \$147,500 to \$176,410 per year (Table 5). Replanting cost includes cost of seedlings and labor (e.g. \$75 for seedling and \$175 for labor in 2012).

**Table 5. Cost of replanting in Ash Grove for 10 years (2012-2021)**

Year	No. trees	Average DBH (inch)	Unit price (\$) *	Cost (\$)
2012	590	2-3	250	<b>147,500</b>
2013	590	2-3	255	<b>150,450</b>
2014	590	2-3	260	<b>153,400</b>
2015	592	2-3	265	<b>156,880</b>
2016	590	2-3	270	<b>159,300</b>
2017	590	2-3	275	<b>162,250</b>
2018	590	2-3	281	<b>165,790</b>
2019	590	2-3	287	<b>169,330</b>
2020	590	2-3	293	<b>172,870</b>
2021	590	2-3	300	<b>176,410</b>
<b>Total</b>	<b>5,902</b>			<b>1,614,180</b>

\* 2% annual increase in replanting cost is assumed.

## Fiscal Planning

To support the EAB management plan, the City of Ash Grove will create a new line item in its budget for this program, with an estimated annual cost of \$381,990 to 672,894 (Table 6). The City will aggressively explore potential cost saving measures such as public bidding and auction, inhouse absorption and service, corporate and private donations, volunteering, etc. to lower the fiscal burden. In addition, the City will work diligently with federal, state, and local government agencies, organizations, and institutions to secure awards and grants to fund a portion or an entire project in chemical treatment, tree removal, or replanting.

**Table 6. Annual cost of Ash Grove EAB management plan for 10 years 12-2021)**

Year	Chemical treatment	Tree removal	Replanting	<i><b>Total</b></i>
2012	171,750	227,000	147,500	<b>546,250</b>
2013	0	231,540	150,450	<b>381,990</b>
2014	182,187	236,080	153,400	<b>571,667</b>
2015	0	241,756	156,880	<b>398,636</b>
2016	192,974	245,660	159,300	<b>597,934</b>
2017	0	250,790	162,250	<b>413,040</b>
2018	0	255,920	165,790	<b>421,710</b>
2019	211,646	260,460	169,330	<b>641,436</b>
2020	0	265,590	172,870	<b>438,460</b>
2021	225,264	271,220	176,410	<b>672,894</b>
<b>Total</b>	<b>983,821</b>	<b>2,486,016</b>	<b>1,614,180</b>	<b>5,084,017</b>

## Time Table

A 10-year time table is developed to specify program objectives and procedures for each year. Activities such as tree inventory, EAB monitoring, chemical treatment, tree removal, parasitoid release, replanting, efficacy evaluation, etc. will be included. Necessary adjustments will be made at the beginning of each year to reflect the changes of the field situation.

## Data Collection & Reporting

All data from the program are collected according to established guidelines and entered electronically into a centralized database. Status reports are required for all aspects of the program. An annual report is used to summarize the progress of the program for the current year. A final report will be issued by the end of the program.