

Growing Oklahoma

Community Forest Planning: Emerald Ash Borer

Guide for Oklahoma Communities



Oklahoma Forestry Services
Urban & Community Forestry
www.forestry.ok.gov



“It’s safe to say that the vast majority of ashes [in North America] will surely die.”

Dr. Andrew Liebhold, USFS

Special thanks to the Texas A&M Forest Service for sharing their EAB mitigation plan.



Table of Contents

INTRODUCTION.....	1
PLAN OBJECTIVES.....	2
KEY STATE AND FEDERAL AGENCIES.....	2
PART I. COMMUNITY FOREST RESOURCE.....	3
A. COMMUNITY GEOGRAPHY AND SIZE.....	3
B. COMMUNITY FOREST RESOURCE MANAGEMENT.....	3
C. COMMUNITY FOREST RESOURCE ASSESSMENTS.....	4
D. EAB PREPAREDNESS MAP.....	7
PART II. ASH MANAGEMENT POLICY.....	8
A. ASH MANAGEMENT.....	8
B. EQUIPMENT AND SERVICES.....	9
C. DEBRIS MANAGEMENT.....	9
D. TREE RISK ASSESSMENTS.....	10
E. RECORD KEEPING.....	10
F. EAB MANAGEMENT TEAM.....	10
PART III. SURVEYING FOR EAB.....	12
A. SIGNS AND SYMPTOMS OF EAB INFESTATION.....	12
B. COMMUNICATION, INFORMATION, EDUCATION AND AWARENESS.....	15
C. RECORD KEEPING.....	16
PART IV. REFORESTATION.....	18
A. SUMMARY OF TREE LOSSES.....	18
B. INVENTORY OF POTENTIAL PLANTING SITES.....	18
C. TREE SPECIES SELECTION.....	18
D. TREE REPLACEMENT PLAN AND PARTNERS.....	19
E. INFORMATION AND EDUCATION.....	19
F. RECORD KEEPING.....	19
APPENDICES.....	20
REFERENCES AND RESOURCES.....	20

INTRODUCTION

Since its discovery in 2002, the Emerald Ash Borer (EAB) has had a dramatic impact on urban and community forests across the nation. Attempts at containment and eradication resulted in millions of ash trees being removed and destroyed at a significant cost to communities and residents.

EAB is not native to North America, but to parts of Asia. All native North American ash species are susceptible to EAB. In Texas, this includes green ash, white ash, Arizona ash, and Mexican ash. There has been no natural resistance observed in native ash populations; ash mortality is nearly 100% in heavily infested, untreated areas.

Developing, communicating and implementing an EAB Preparedness Plan will enable your community to address public and private needs in an efficient and effective manner. While each community will address its EAB infestation based on local circumstances, all communities should be prepared to manage any disease or invasive insect that threatens their urban forest resource. The reality is that once EAB is established, communities may be forced to deal with tough economic, environmental, legal and social issues. Planning in advance allows your community to be better prepared to minimize the severity of these impacts and establish a solid foundation for recovery.

The guide is divided into four (4) parts that help communities leverage their focus:

PART I. YOUR COMMUNITY FOREST RESOURCE

PART II. ASH MANAGEMENT POLICY

PART III. SURVEYING FOR EAB

PART IV. REFORESTATION

Oklahoma Forestry Services (OFS) Foresters can provide guidance in developing your plan. Visit www.forestry.ok.gov for a listing of program personnel and more information on trees and community forests.

PLAN OBJECTIVES

The objectives of a community forest EAB preparedness plan are to:

- Reduce the financial costs to manage EAB establishment in the community
- Reduce tree canopy cover losses from EAB
- Reduce the amount and severity of damage and losses to people, property, the economy and the environment that results from tree loss due to EAB
- Maintain community forest health, safety, and benefits
- Maintain and enhance confidence in elected officials, city staff and programs

KEY STATE AND FEDERAL AGENCIES

In Oklahoma, state and federal agencies have defined roles in dealing with EAB and other invasive, non-native plant pests. These roles are specified in the **Emerald Ash Borer Preparedness Plan for the State of Oklahoma**, which can be found at www.forestry.ok.gov/eab through Oklahoma Forestry Services.

Oklahoma Department of Agriculture Food and Forestry (ODAFF)
Consumer Protection Services
www.oda.state.ok.us

Oklahoma Forestry Services (OFS)
www.forestry.ok.gov

USDA Animal & Plant Health Inspection Svc., Plant Protection & Quarantine (APHIS PPQ)
www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth

USDA Forest Service, Forest Health Protection (FHP)
www.fs.fed.us/foresthealth

PART I. COMMUNITY FOREST RESOURCE

A. COMMUNITY GEOGRAPHY AND SIZE

This EAB Preparedness Plan has been developed for _____, Oklahoma.

Date of adoption: _____ Date of last update: _____

Our jurisdiction encompasses an area of _____ square miles and has _____ miles of public roadways.

Our community has a population of _____ as of the _____ census.

B. COMMUNITY FOREST RESOURCE MANAGEMENT

1. Tree Care Manager

For effective community forest resource management someone should be designated as the tree care manager and given the responsibility for coordinating both regular resource management and EAB preparedness.

Communities that do not have a forester or arborist on staff should designate an existing staff member as the tree care manager, or hire a consulting forester or arborist to fill this role.

The designated tree care manager should have technical expertise, field experience and knowledge in community forest management, tree risk assessment, tree maintenance standards and best management practices, and ideally, should be an ISA Certified Arborist®.

The Tree Care Manager is: _____

2. Management Plan

Many communities have developed a management plan to guide their community forest programs. These plans may be basic or complex, may be developed annually or have longer time frames, and include plans for administration, field operations, and information/education.

We have a community forest management plan in place (included in the appendix)

It was first adopted on _____ (date) and last revised on _____ (date).

The person responsible for administering and updating our community forest management plan is: _____

C. COMMUNITY FOREST RESOURCE ASSESSMENTS

One of the first tasks of the tree care manager in EAB preparedness planning should be to review or gather information on the community forest resource, including:

- Total amount of tree canopy cover across the community
- Number, location and size of public ash trees, especially street trees
- Number, location and size of trees at risk for failure (all species)
- Estimate of the dollar value of the benefits that trees provide
- Total annual cost of community forest management
- Benefit to cost ratio of community forest management and tree risk mitigation

Using tree canopy or inventory data and management costs information, a benefit to cost ratio can be used to justify community forest management activities.

Tools to assist in conducting your own tree canopy analysis are available at
www.itreetools.org.

1. Tree Canopy Assessment

- We have completed a tree canopy assessment, and _____% of our community is covered with tree canopy as of _____ (year)
- Previous tree canopy assessments have been made: ____% in _____ (year)
- A tree canopy goal of _____% has been set by the community.
- The assessment of our community forest includes information on species: _____% of all our trees (public and private) are **ash**, which is a total of _____ (#) **ash** trees.

2. Public Tree Inventory

- An inventory of public trees was last completed in _____ (year), and the community has the number of public trees shown below growing on:
- Street rights-of-way _____ (total # of trees); _____ (**ash** only)
 - Public parks _____ (total # of trees); _____ (**ash** only)
 - Public cemeteries _____ (total # of trees); _____ (**ash** only)
 - Public school campuses _____ (total # of trees); _____ (**ash** only)
 - Public offices and facilities _____ (total # of trees); _____ (**ash** only)

- Our public tree inventory information is available in an [Excel spreadsheet] [GIS shapefile] [hardcopy format] and is available from the tree care manager
- Our public tree inventory is included as a layer on our community’s GIS
- The percent of total public trees that are **ash** is _____%
- We have _____ (# of trees) large **ash** trees, _____ inches DBH and greater

3. Tree Benefits and Value

- We have information on the dollar value of the benefits that our trees provide: the total dollar value of the annual benefits provided by our community trees, based on our [tree canopy] [street trees] assessment, is \$_____ (A).

The dollar values of the benefits our [tree canopy] [street trees] provides include:

- \$_____ stormwater benefits \$_____ air quality benefits
- \$_____ carbon dioxide benefits \$_____ energy benefits
- \$_____ aesthetic and other benefits

The annual benefits per tree average \$_____

Tools to help calculate the value of the benefits provided by trees:

- *i-Tree Tools for Assessing & Managing the Community Forest* www.itreetools.org
- *CTLA, Guide for Plant Appraisal, 9th Edition* www.isa-arbor.com
- *National Tree Benefits Calculator*, <http://treebenefits.com/calculator/>

4. Community Forest Management Costs

- We have information on our community forest management costs: the total annual cost of managing our public [street] [park] [cemetery] [school] [facility] trees include:

- | | |
|------------------------------------------------------------------|--------------------------------|
| \$_____ Tree inventory | \$_____ Tree risk assessment |
| \$_____ Tree purchases | \$_____ Pest management |
| \$_____ Planting [staff] [contract] | \$_____ Irrigation (staff) |
| \$_____ Mulch (labor & materials) | \$_____ Inspection (staff) |
| \$_____ Pruning [staff] [contract] | \$_____ Equipment/Supplies |
| \$_____ Removal [staff] [contract] | \$_____ Infrastructure repairs |
| \$_____ Liability/claims for damages | \$_____ Leaf and limb pick-up |
| \$_____ Administration (describe) _____ | |
| \$_____ Other costs (describe) _____ | |
| \$_____ Total annual community forestry program expenditures (B) | |

5. Benefit to Cost Ratio of Community Forest Management

Divide the dollar value of the annual benefits by the total annual cost for management to arrive at *the value of benefits returned by the trees for each dollar spent* on their management.

For every \$1 our community spends on community forest management, we receive \$_____ back in benefits from our [tree canopy] [street trees] (A divided by B, Sec C.3&4).

6. Tree Risk Assessment

An assessment of tree risk can be completed during inventory of public trees or as a separate activity focusing specifically on identifying trees with an elevated risk of failure. Tree risk assessment procedures should conform to the following standards and best management practices published by the International Society of Arboriculture:

- *ANSI A300 (Part 9) – American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Management—Standard Practices (Tree Risk Assessment a. Tree Structure Assessment)*
- *Tree Risk Assessment Best Management Practices* (companion publication to the ANSI A300 Part 9 standard practices)

Using methodology described in the ANSI standards, a Level 1 tree risk assessment should be performed on all street trees and in high use areas within the community.

Tree risk mitigation may require:

- Pruning to remove deadwood or structurally weak branches, or increase clearance
- Supplemental support
- Further inspections (Level 2 or 3)
- Removal if in irreversible decline or their risk of failure cannot be otherwise mitigated

Once the need is identified, basic activities should be completed as soon as possible to mitigate tree risk and should also become routine activities within the community forest program.

- Our community has on file in the tree care manager's office a copy of the ANSI standards and best management practices for tree risk assessment.
- Our community has a tree risk assessment program or plan.
- A Level 1 tree risk assessment is conducted every _____ [months][years].

The date of the most recent Level 1 tree risk assessment is _____

To facilitate assessments, Texas A&M Forest Service (TFS) has developed a *Level 1 Tree Risk Assessment mobile app* available through app stores and <http://texasforestinfo.com/mobileapps>.

7. Rapid Ash Assessment

If your community has not yet completed a community forest inventory or tree canopy assessment, a rapid assessment may be performed to provide a quick estimate of percent total street trees that are ash species. This assessment will help determine your community’s ash management policy.

Rapid assessment procedures: select a minimum of 5% (of the total miles) of your community’s public roadway segments. Utilizing Google Streetview, pan each selected segment and tally both the total street trees and the number of street trees that are ash. Total the count for all segments and divide by the sample percentage to determine the approximate number of ash street trees.



- We have completed a rapid ash assessment and ash comprises _____% of our community street trees, which is a total of _____ ash trees.

D. EAB PREPAREDNESS MAP

An EAB preparedness map (GIS or paper) that includes the locations of public ash trees (especially very large trees and trees at risk), and debris storage areas is an essential tool for EAB preparedness and response.

- An EAB preparedness map has been developed and is included as part of our plan.
- Copies of the EAB Preparedness Plan and map are available in the office(s) of the:
 - Tree Care Manager
 - Other _____
 - [Public Works Director]/[Engineer]

Our EAB preparedness map includes the following information:

- All public trees
- Large public ash trees
- Personnel/equipment staging areas
- Debris staging and storage area

PART II. ASH MANAGEMENT POLICY

Each community must make its own decisions on policies to adopt in management of ash trees in public areas. The goal of an effective community program is to keep the rate of ash mortality relatively low by holding the beetle population at low levels. At minimum, prior to EAB establishment, identify poor condition ash trees that should be removed as part of normal risk management. Also, note large high-value ash trees; when EAB is known to be a minimum of ten miles from the community, treating these trees becomes a viable alternative (for treatment options, see [www.emeraldashborer.info/documents/Multistate EAB Insecticide Fact Sheet.pdf](http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf)) Once EAB becomes established, tree mortality across the community may occur simultaneously and as such debris areas should already be in place.

A. ASH MANAGEMENT

1. Management Approach

A decade of dealing with the pest in the Midwest has shown that it is likely more economical to protect ash trees than to replace them. Removing all affected trees, treating all, or a combination of both are different approaches to managing EAB.

Our management approach is to _____

Purdue University has developed an online tool that allows resource managers to enter information about their resource and return cost estimates for different management approaches: <http://extension.entm.purdue.edu/treecomputer/>.

2. Ordinances

Communities without tree health ordinance clauses should amend their existing tree ordinance to state what authority the city has regarding diseased or infested trees on private property as well as who is responsible for their treatment or removal. Communities will have to determine a trigger point at which infested trees must be removed and the wood properly disposed.

Our ordinance addresses tree health, city authority and homeowner responsibilities.

The person responsible for determining when trees must be treated or removed is:

B. EQUIPMENT AND SERVICES

The available equipment (inventoried annually) for EAB management by the department or source committed to supply the equipment (rental, contractor, or other).

EQUIPMENT DESCRIPTION	NUMBER OF UNITS NEEDED/AVAILABLE	DEPARTMENT/SOURCE OF SUPPLY
Certified Pesticide Applicators	/	
Pesticide Application Equip	/	
Aerial Lift Trucks	/	
Chippers	/	
Refuse Packers	/	
Dump Trucks	/	
Barricades & Safety Cones	/	
Chain Saws	/	
Hand Saws	/	
Computers/Tablets	/	
GPS Units	/	
DBH Tapes	/	
Safety Vests	/	
Hardhats	/	
Eye & Ear Protection	/	
First Aid Kits	/	
Other	/	

C. DEBRIS MANAGEMENT

- One or more debris storage sites that will accommodate large volumes of woody debris and logs have been established.
- The community [will][will not] pick up trees from private property.

Debris storage sites have been established in the following locations:

The person responsible for coordinating debris staging and storage is:

D. TREE RISK ASSESSMENTS

- Tree risk assessments (Section I.C.6.) will be performed on an ongoing basis by:
- City staff
 - Trained volunteers
 - Consultants

And coordinated by: _____

Find the *Level 1 Tree Risk Assessment* app at app stores and <http://texasforestinfo.com/mobileapps>.

E. RECORD KEEPING

In order to estimate the cost of EAB to the community, the following records will be retained:

- Tree and debris removal call log
- Debris removal costs & volume estimates
- Number and location of trees removed and/or treated with pesticide
- Pesticide costs
- Contractor invoices
- Staff hours by person
- Equipment hours by piece of equipment
- Volunteer hours by person and activity; volunteer contact information
- Tree survey assessment data and costs

F. EAB MANAGEMENT TEAM

Assemble a team of individuals that can contribute not only to preparation for EAB, but also to response and recovery. Include individuals from the agencies, departments, organizations and companies listed below, as applicable to your community. Your tree care manager should coordinate and lead the team.

1. City Staff

[City Manager] [County Administrator]

Name: _____

Phone: _____

E-Mail: _____

Public Information Officer

Name: _____

Phone: _____

E-Mail: _____

Public Works Director

Name: _____

Phone: _____

E-Mail: _____

Tree Care Manager

Name: _____

Phone: _____

E-Mail: _____

2. State/Federal Agencies

Oklahoma Forestry Services

Name: _____

Title: _____

Phone: _____

E-Mail: _____

3. Contractors

Tree Service Contractor(s)

Name: _____

Phone: _____

E-Mail: _____

4. Other Organizations

Tree Board Chair

Name: _____

Phone: _____

E-Mail: _____

Reforestation Sponsor(s)

Name: _____

Organization: _____

Phone: _____

E-Mail: _____

Parks and Recreation Director

Name: _____

Phone: _____

E-Mail: _____

[GIS Manager][Other City Staff]

Name: _____

Phone: _____

E-Mail: _____

Other State/Federal Agencies

Name: _____

Agency: _____

Phone: _____

E-Mail: _____

Pesticide Application Contractor(s)

Name: _____

Phone: _____

E-Mail: _____

Local Agency or Non-profit

Name: _____

Phone: _____

E-Mail: _____

Other

Name: _____

Organization: _____

Phone: _____

E-Mail: _____

PART III. SURVEYING FOR EAB

A. SIGNS AND SYMPTOMS OF EAB INFESTATION

With current technology, it is impossible to detect emerald ash borer as they actually invade individual trees or communities. Often new infestations are not detected until several years after the initial infestation.

Once a new infestation has been identified, state and federal agencies must be notified and may follow-up with intensive surveys to determine the extent of the infestation. Community cooperation will be critical for this effort. Communities should be ready to contribute staff time for survey and communication with the public.

Since symptoms seen in ash trees when infested by EAB are similar to symptoms caused by other pests and diseases it is important to look for a combination of at least two of the following signs or symptoms when evaluating trees. Oklahoma State University produced an extension fact sheet describing signs and symptoms of EAB.

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-9236/L-443%20Emerald%20Ash%20Borer.pdf>

Signs:

Adult borer



Larva



Adult is bright, metallic green, ½ inch long with flattened back and purple abdominal segment beneath wing covers.

Larva is creamy white, legless, with flattened, bell-shaped body segments. The terminal segment bears a pair of small appendages.

D-shaped emergence holes



1/8 inch diameter exit holes in bark.

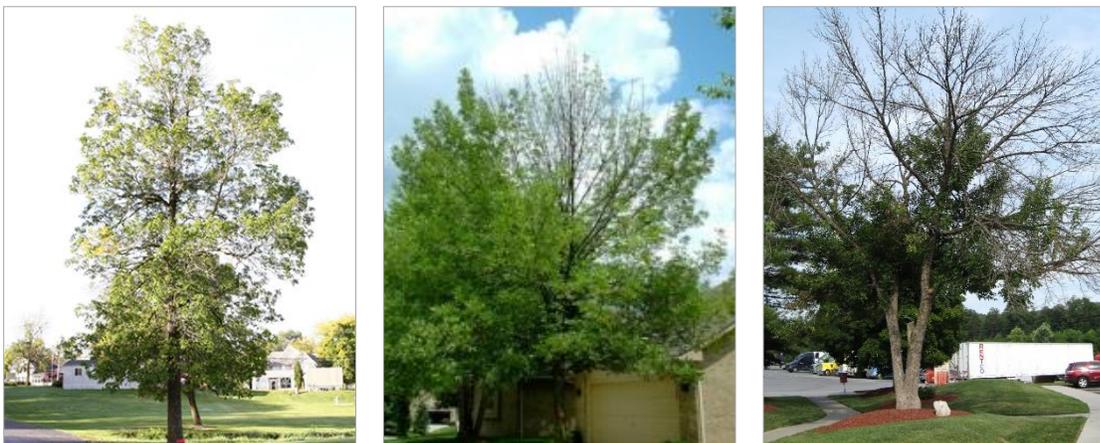


S-shaped larval galleries

Typically serpentine, weaving back and forth across woodgrain, often packed with frass.

Symptoms:

Crown dieback



Begins in the top third of canopy and progresses until tree is bare.

Epicormic sprouting



Sprouts grow from roots and trunk. Leaves on sprouts often larger than normal.



Bark splits

Vertical fissures on bark due to callous tissue formation. Galleries exposed under bark split.



Woodpecker damage

Woodpeckers peck outer bark while foraging and create large holes when extracting insects.

B. COMMUNICATION, INFORMATION, EDUCATION AND AWARENESS

1. Communication

Removing public trees that appear healthy will be controversial. Resource managers must be very clear in public communications on why trees are being removed and what criteria are used to select individual trees.

Once EAB has arrived, calls to come and evaluate declining trees may increase dramatically. Decisions on whether the city will pick up residential trees must be made and debris staging areas must be large enough to handle large volumes of trees.

We have a designated call center established for notification of dead/declining trees.

Name of Call Center: _____

Address: _____

Phone: _____ E-Mail _____

Website: _____

Call Center Director/Contact: _____

We have designated a debris staging area that will accept both public and private trees.

Address: _____

Phone: _____ E-Mail _____

Website: _____

Debris staging area contact person: _____

2. Information and Education

Internal Information Sharing

The person responsible for coordinating internal information sharing is:

External Information Sharing

City/Community forestry program website _____

Neighborhood association websites _____

Social media _____

Cloud-based storage site _____

Pamphlets and brochures

The person responsible for coordinating external information sharing is:

Information and Education Topics

- The community has information readily available to disseminate to the public on EAB identification, signs and symptoms of ash infested by the borer, and treatment options.

The information available by topic and format is indicated in the chart below.

TOPIC	WRITTEN SCRIPT	RECORDED PSA	ARTICLE/ PRESS RELEASE	WEBSITE/ SOCIAL MEDIA	BROCHURE/ PAMPHLET/ HANDOUT
What is EAB; signs and symptoms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Treatment options	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When and how to hire an arborist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tree maintenance standards/BMPs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Debris pick-up schedule/procedure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Benefits of trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tree selection and planting BMPs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The outlets that will be used for disseminating information on EAB is:

- Websites
- Social media
- Radio stations
- Television stations
- Newspapers
- Public meetings

The person responsible for distributing information to the public and the media is:

The person responsible for coordinating educational opportunities for the public is:

C. RECORD KEEPING

The following records are maintained and kept in the tree care manager’s office and online in a cloud-based storage service as appropriate.

- Oklahoma Emerald Ash Borer State Preparedness Plan
- Community Forest EAB Preparedness Plan

- Community EAB Preparedness Map
- Data and cost information for community forestry management activities (Section I.C.4)
- Public information scripts, public service announcements and press releases

PART IV. REFORESTATION

As response efforts to EAB establishment are completed, long-term recovery of the community forest begins. This effort focuses on the replanting of trees lost and restoration of the community’s tree canopy. Planting projects provide the community with opportunities to work together and build long-term partnerships. The city can also assist private property owners in their replanting efforts by facilitating partnerships and providing information and education.

A. SUMMARY OF TREE LOSSES

An accounting of the total number of trees lost to EAB should be made using assessment data and subsequent inventories of public trees.

A summary of the number of trees lost by DBH category:

	Number of Trees by DBH Category						
	< 6"	7-12"	13-18"	19-24"	25-30"	31-36"	>36"
Public Trees							
Private Trees							
TOTAL							

B. INVENTORY OF POTENTIAL PLANTING SITES

Public trees lost should be replaced as resources permit on a one-to-one or greater basis, with trees equal to or greater in mature size, to maintain no net loss of tree canopy cover.

Our community will inventory the location and type of available public planting sites.

C. TREE SPECIES SELECTION

Tree species selected for replacement planting on a site should be compatible with the site conditions, including above and below ground growing space. Mature size, crown shape, form, compatibility with the area’s soils and climate should also be considered during tree selection.

Our community has adopted an official list of trees recommended for planting in our area that is used as a guide for selecting trees for planting on public property.

D. TREE REPLACEMENT PLAN AND PARTNERS

Replacement planting for heavy tree losses should be spread over multiple years. The recommended season for planting trees in Oklahoma is December through March.

- We have developed a written 3-year maintenance plan that includes mulching, watering, pest management, training pruning and inspection of all newly planted trees.

The person responsible for developing and coordinating the tree replacement plan is:

Financial, labor, and material assistance for large scale and multi-year public tree replacement projects should be solicited from local companies, non-profit organizations, and citizens.

The person(s) responsible for soliciting financial, labor and material assistance are:

- Tree care manager Tree Board or Advocacy Group

Tree replacement program partners include:

E. INFORMATION AND EDUCATION

Moving forward, our community forest information and education program will focus on:

- Tree planting programs and grants Recommended species for planting
 Hire an ISA Certified Arborist® Tree planting techniques
 Tree health maintenance Tree benefits

Pathways to communicate with the public will include:

- Neighborhood workshops Website / Newspaper articles / PSAs

F. RECORD KEEPING

Accurate records on community forest management and reforestation activities will provide the basis for gaining additional program capacity and improving existing programs.

- Staff / Volunteer / Equipment hours Tree purchase data and costs
 Contractor invoices Tree planting data and costs
 Donations by source Tree survival data

APPENDICES

Additional supplemental information and documents included as part of our *Community Forest EAB Preparedness Plan* are located in the appendices that follow.

- Appendix A _____
- Appendix B _____
- Appendix C _____
- Appendix D _____
- Appendix E _____
- Appendix F _____
- Appendix G _____
- Appendix H _____
- Appendix I _____
- Appendix J _____

References and Resources:

- **Oklahoma Forestry Services (OFS)**
www.forestry.ok.gov for information on forests and trees of Oklahoma, community forestry, and a listing of forestry program personnel.
 - ***Emerald Ash Borer Information***
www.forestry.ok.gov/eab
- **Oklahoma Department of Agriculture Food and Forestry (ODAFF)**
www.ag.ok.gov
- **Oklahoma Cooperative Extension Services (OCES)**
www.oces.okstate.edu
- **USDA Animal & Plant Health Inspection Svc., Plant Protection & Quarantine (APHIS PPQ)**
<https://www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth>
- **USDA Forest Service, Forest Health Protection (FHP)**
<http://www.fs.fed.us/foresthealth/>
- **Level 1 Tree Risk Assessment mobile app** available through app stores and
<http://texasforestinfo.com/mobileapps>
- **i-Tree Tools for Assessing & Managing the Community Forest**
www.itreetools.org
- **International Society of Arboriculture**
www.isa-arbor.com
Guide for Plant Appraisal (Council of Tree and Landscape Appraisers)
Find a Certified Arborist
- **Emerald Ash Borer Information Network**
www.emeraldashborer.info/
- **Emerald Ash Borer Cost Calculator**
<http://int.entm.purdue.edu/ext/treecomputer/>

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