



WILDFIRE READY
A U S T I N

BEFORE AND AFTER THE FIRE

**Environmental Best Management Practices for
Wildfire Risk Reduction and Recovery**



A wildfire is an incident of uncontrolled burning, normally occurring in wildlands such as grasslands, brush or woodlands, but which can sometimes spread to urban areas and consume homes, commercial structures and infrastructure. Wildfires can be extremely destructive events; however, their power is an important and necessary part of nature that is, and always has been, an essential component of many Central Texas ecosystems. Driven by natural forces like lightning and dry winds, wildfire periodically burned the hills, canyons and forests, shaping Austin's landscape long before we settled here.

Wildland fire, including prescribed fire, provides numerous environmental benefits. Fire replenishes and rejuvenates wildlands by reducing hazardous levels of brush and other vegetative fuels; controlling undesirable plant species, various plant diseases, and pest insects; and returning nutrients from plants back to the earth. After a fire, emerging vegetation uses newly-enriched soils to grow rapidly, providing ideal food sources for returning wildlife. Over the course of many centuries, native plants and animals have adapted to fire, and today, some actually depend on the effects of fire for habitat, growth and reproduction.

Wildfire management policies over the last century have focused on large-scale fire suppression. Consequently, many fire-dependent ecosystems have not been allowed to undergo the natural, cyclical fire processes that aid ecological revitalization, resulting in the accumulation of hazardous fuel in the form of fallen leaves, branches, and excessive plant overgrowth. While fire suppression is certainly appropriate when necessary to protect human life and property, applying suppression tactics across-the-map postpones the

inevitable outcome of a growing risk, and can eventually result in a high-intensity wildfire that becomes larger, spreads faster, is more difficult to control, and inflicts more damage to people and development.

As population growth and urban sprawl continue in Central Texas, residents are moving farther into natural areas to take advantage of natural beauty, privacy, recreational opportunities and affordable living. Therefore, understanding the difference between a wildfire that promotes ecological health and a wildfire that threatens human communities is essential. As noted by the Texas A&M Forest Service, eighty percent of Texas wildfires occur within two miles of a community (*2011 Texas Wildfires* 9), indicating that wildfires are not just a concern for rural homeowners. Areas where structures, subdivisions and other human development meet or intermingle with undeveloped wildland and vegetative fuels are called the wildland/urban interface. These areas usually represent the highest risk due to the close proximity of wildland fuels and the large number of human-caused ignitions. Forty-five percent of Austin's population now lives in the wildland/urban interface and many have not fully considered the potential impacts of a wildfire (Smith). Fire officials consider wildland/urban interface areas to be the fastest growing fire problem in the country.

Although wildfires are natural occurrences in many wildlands, only a small portion of fires are ignited by nature today. The Texas A&M Forest Service reports that people cause more than 95 percent of wildfires in Texas ("Mitigation"). Careless burning of household trash and brush piles, sparks produced by welding and grinding equipment, improperly discarding smoking materials, hot vehicle exhaust

systems, and arson are frequent sources of ignition. As communities continue to expand into these high-risk areas, the danger only increases.

Since natural areas are deeply valued by the community and critical to our well-being, it is important that they remain natural. Consequently, we must learn to live with wildfire by becoming fire-adapted, just as Central Texas plants and animals have. A fire-adapted community is comprised of informed and prepared residents who understand the potential for wildfire and collaboratively take action to safely co-exist with it. Wildfires can, and will occur in Central Texas; but in a fire-adapted community, they do not have to be catastrophic.

Although the risk of wildfire impacts to human life and property can't be eliminated, the probability of harm can be greatly reduced through applied knowledge, sound decision-making and responsible actions. To achieve the mutual goals of wildfire risk reduction and responsible stewardship of natural areas, Environmental Best Management Practices should be implemented **before** a wildfire occurs.

Given that fire is important to the health and integrity of many ecosystems, in most cases, no human intervention is needed after a fire. However, some wildfires can impact human development, accelerate erosion, degrade water quality, and generate waste and debris that requires special handling and disposal. In these situations, Environmental Best Management Practices employed **after** a wildfire can prevent further damage, expedite recovery, and reduce future risk.

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BEFORE THE WILDFIRE

UNDERSTAND YOUR RISK, IDENTIFY RESOURCES AND KNOW YOUR LIMITATIONS

Take Responsibility

Do not assume that emergency service providers will be able to save you and your property – you must be proactive and take responsibility for the protection of your life and property!

In a severe wildfire event, there are typically more homes that need protection than there are firefighting resources available. Some homes may be lost simply due to a lack of resources. With limited resources to protect structures, firefighters are trained to conduct structural triage to try and save as many homes as possible. Some homes just need monitoring, some can be saved easily, some will need extensive effort and some will not make it. If a home has poor access, lack of escape routes and safety zones, or no safe place to fight the fire, then firefighters may decide not to protect that home because it puts their lives at too great of a risk and consumes their limited resources. Conversely, properties that are well-prepared are typically prioritized as the first to save. There are lots of things you can do to prepare for a wildfire event – read further for more information.

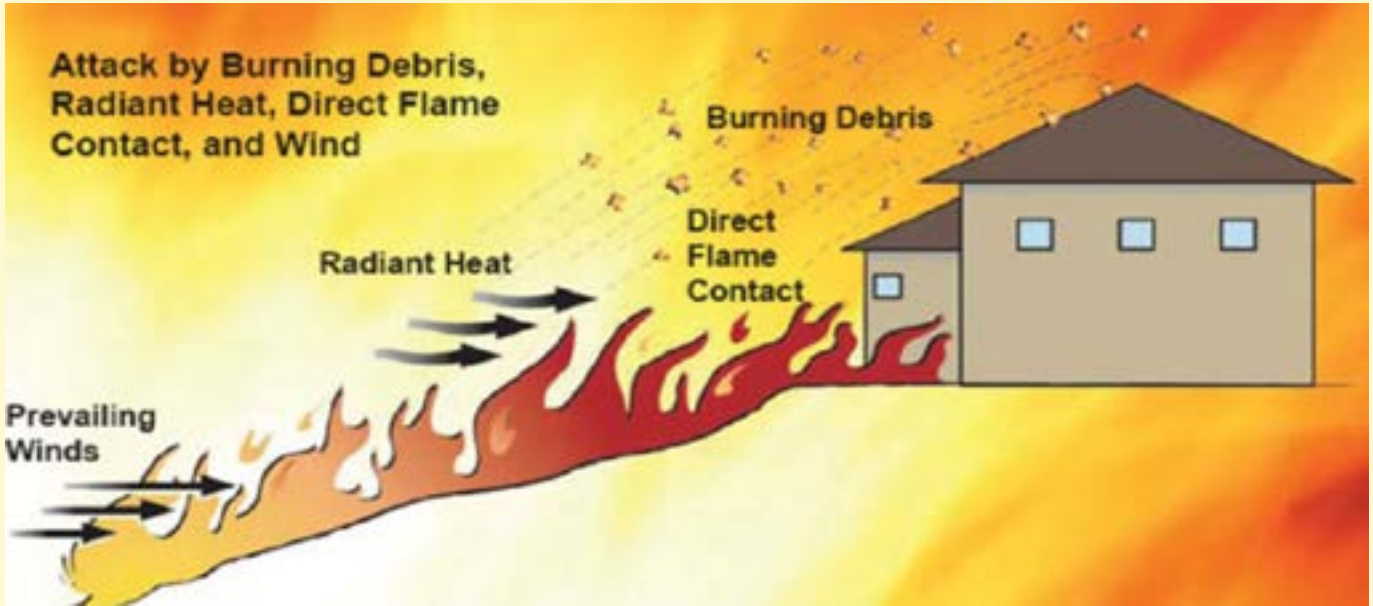
Seek Training

Before conducting wildfire management activities on your property, seek training. Factors that contribute to home ignitions during wildfire events are not always intuitive. It is essential to have an accurate understanding of a property's wildfire risk that is based on sound science, rather than fear alone. Do not act prematurely. Some proper training and instruction is often necessary to correctly identify and mitigate wildfire hazards on your property. Without proper education, many well-intentioned actions can actually increase fire hazards and result in environmental damage. In addition, some actions may even be illegal and could result in fines or additional costs to mitigate hazardous debris, environmental harm or other property damage. For additional educational resources, see the list of websites at the end of this publication.



Upon request, the City of Austin and Texas A&M Forest Service will visit your neighborhood and offer training on ways to reduce wildfire risk.

Understand How Fire Behavior Threatens Your Home



Wildfire can threaten structures in three ways: radiant heat, direct flame contact, and burning embers.

Contact by Flames:

This type of threat occurs when vegetation and other fuels burning near the house produce flames that come in contact with the home and ignite it. Often it happens when fire burns through a uniform layer of vegetation right up to the house. Defensible space around the home is the most effective way to reduce this threat.



Direct flame contact occurs when vegetation, adjacent structures, or other fuels burning near the house produce flames that come in contact with the home and ignite it.

Radiated Heat:

Radiated heat is produced by electromagnetic waves that travel outward in all directions from a flame. When a house receives enough radiated heat for a sufficient amount of time, it will ignite. Sometimes radiated heat can burst windows and allow fire to enter the house. Constructing homes with fire resistant materials is the most effective way to reduce this threat.

Right: The vinyl siding and window frame on this home melted when exposed to radiant heat. When a structure receives enough radiated heat for sufficient time, it will ignite.



Flying Embers:

Embers, also known as fire brands, pose the single greatest wildfire threat to a structure. In severe fire conditions, embers can be lofted high into the air and transported more than a mile by fast moving air currents. A high-intensity fire can produce a virtual blizzard of embers. You can't control where embers land, but you can control what happens when they do. Don't give hot embers the chance to land on easily-ignitable materials and start a new fire. Wood shake roofs and accumulated leaf litter inside rain gutters are especially vulnerable to ember ignition. Also, embers can easily intrude your home through unscreened pathways, like attic vents. Removing easily-ignitable materials and restricting potential pathways for embers to enter a structure are the most effective methods to reduce this threat.



It's the little things that count. Embers, also known as firebrands, pose the greatest threat to a home. In some fire conditions, embers can be lofted high into the air and transported more than a mile. If burning embers land in easily ignitable materials, a new fire can start.

Collaborate with your Community



Neighborhoods can be much more successful at reducing wildfire risk when working together and utilizing programs like Firewise Communities.

Action (or lack of action) on an individual property will affect the survivability of other properties nearby. By collaborating with neighbors, fire protection authorities and other community stakeholders, residents can make their own property – and their neighborhood – much safer from wildfire. Participate in a localized Community Wildfire Protection Plan to collectively identify community hazards and ways to improve wildfire preparedness. Consider pursuing recognition as a “Firewise Community” through the National Fire Protection Association’s Firewise Communities/USA® program, which encourages and acknowledges citizen involvement in reducing wildfire risk by working together. To learn more about Community Wildfire Protection Plans and the Firewise Communities/USA program, please refer to the following resources:

- NFPA Firewise Communities/USA website: <http://www.firewise.org/usa-recognition-program.aspx>
- Austin Fire Department - Firewise Program Coordinator: (512) 974-0298
- Texas A&M Forest Service - Wildland Urban Interface Specialist: (512) 339-4118

To find information about your local Austin or Travis County fire department, including where the nearest fire station is, visit the following websites:

- Travis County Emergency Service Districts and Fire Stations:
http://www.co.travis.tx.us/fire_marshall/esd.asp.
- Austin Fire Department Fire Station Map:
<http://austintexas.gov/sites/default/files/files/Fire/station-mapall.pdf>
- Fire Station Addresses:
<http://austintexas.gov/page/index-afd-stations-addresses>

Plan Access and Escape Routes

When propelled by strong winds, a wildfire can move as fast as 60 miles per hour! Proactive home defense measures can significantly increase a home's likelihood of survival, but these measures cannot guarantee personal safety in the face of a catastrophic fire. It is paramount to have a family disaster plan and exit strategy in place before an event that necessitates evacuation. Know the configuration of your neighborhood and identify

multiple emergency escape routes in your area. If you have concerns regarding limited entrances and exits to and from your neighborhood, contact your local fire department. When told to evacuate by authorities, leave the area immediately and choose a route that leads away from the fire. Stay alert to changes in the speed and direction of fire and smoke.



By evacuating early, you can avoid being caught in fire, smoke or road congestion and give your family the best chance of surviving a wildfire.

Remember that your safe way out, is the fire department's way in. Keep vegetation maintained so that driveways and private roads are clear and ready for an emergency exit by your family, and for emergency access by responders. The 2012 International Wildland Urban Interface Code (under consider-

ation for adoption in Austin) calls for an unobstructed driveway clearance of at least 12 feet wide by 13 feet 6 inches high. Keep fire hydrants clearly visible and accessible. Identify your home and neighborhood with clear and easily readable street names and numbers.

Practice Situational Awareness

Wildfire can occur at any time throughout the year, but the risk increases during dry and windy conditions and in periods of extended drought. During "high-alert" or "red-flag" fire days, pay close attention to conditions and locations of flammable materials on your property. Take extra precautions on these days with measures such as moving straw mats and wicker patio furniture inside, sweeping leaf litter off the patio, and mowing with a manual mower or string trimmer to avoid potentially dangerous sparks and fuel leaks.



Take extra precautions when conditions bring heightened wildfire risk.

Register for the regional Emergency Notification System, which uses a "reverse dialing" telephone method to notify individual members of the public of critical emergency information in situations where property or human life is in danger. Citizens can link their land-line and/or cell phones to multiple Central Texas locations, including their homes, businesses, and homes of loved ones. If a public safety agency activates the system in a particular location, the system will attempt to send an emergency message to phones registered for that area. To register for this service, visit: <http://alertregistration.com/capcog/>. If you would like to receive a cell phone



Prepare an exit strategy with multiple escape routes before emergency strikes.



Captain Portie with the Austin Fire Department Wildfire Mitigation Division assisting homeowners by identifying hazards and assessing wildfire risk

text message when the Travis County burn ban status changes (i.e. when a burn ban has been lifted or a new ban put in place), sign up at: http://www.co.travis.tx.us/fire_marshal/news/burn_ban_alerts.asp.

Identify Wildfire Hazards, Assess your Risk, and Plan Action Items

Identify and prioritize the potential fire hazards of your structures, landscape, and surrounding areas before taking risk mitigation actions. You can contact your local fire department or the Texas A&M Forest Service to request a wildfire risk assessment.

Visit <http://www.Prepared.ly> to review current conditions and understand how they relate to your area's wildfire risk, schedule an on-site consultation for your home and neighborhood with local wildfire prevention experts, and stay informed and proactive about the threat of wildfires in your area by signing up for fire alert notifications. To learn more about specific wildfire risk levels in your geographic area, access the Texas Wildfire Risk Assessment Portal (TxWRAP) at <http://www.Texas-WildfireRisk.com>.

When planning actions to take in response to the hazards identified, keep in mind, structure protection efforts are generally less effective the farther they occur from the structure. A helpful strategy when evaluating your risks and prioritizing action items is to start from the ridgeline of the roof and move outward.

Stay within Your Property Boundaries

Your property alteration and management activities are limited to **your property** - so identify your property boundaries! Risk mitigation actions on your own property are the most effective in protecting your property from wildfire, and should always be implemented before considering potential hazards on adjacent properties. You could be liable for costs of mitigating the damage you cause to other property, in addition to other legal action for trespassing. If you have concerns about potential hazards outside of your property boundaries, contact the respective property owner to discuss the situation. Again, this is where having a localized Community Wildfire Protection Plan can help.

To discuss wildfire concerns on public land, contact the appropriate management authority. Common wildland management agencies in the Austin area include:

- City of Austin Balcones Canyonland Preserve and Water Quality Protection Lands
Austin Water Utility, Wildland Conservation Division:
(512) 972-1662
- City of Austin Parks and Natural Spaces, City of Austin Parks and Recreation Department, Park Rangers:
(512) 978-2600
- City of Austin Electric Utility Easements, Austin Energy:
(512) 494-9400
- City of Austin Drainage Easements, City of Austin Watershed Protection Department:
(512) 974-2550
- Travis County Preserve Lands
Travis County Natural Resources Program Manager:
(512) 854-7214
- Travis County Parks
Travis County Park Rangers:
(512) 263-9114
- Balcones Canyonland National Wildlife Refuge
United States Fish and Wildlife Service, Balcones Canyonland National Wildlife Refuge Office:
(512) 339-9432
- Texas State Parks
Texas Parks and Wildlife Department: **(512) 389-4800**
- Lower Colorado River Authority
Parks, Recreational Areas and Natural Resource Centers
Lower Colorado River Authority:
(512) 473-3200
- The Nature Conservancy Lands and Conservation Easements
The Nature Conservancy, Texas Field Office: **(210) 224-8774**



Trees and other vegetation are valuable natural resources that offer a wealth of benefits.

Recognize Natural Resources

Identify important environmental resources on your property. Central Texas is a unique place with abundant natural resources. Pay special attention to water bodies such as creeks, rivers and ponds. Some natural areas may include protected “Critical Environmental Features,” such as wetlands, springs, caves, sinkholes, bluffs, and certain rock formations. Knowing what these features are and where they are located on your property will allow you to plan for their protection. Establish a buffer of natural vegetation, such as native grasses, around these critical features.

Appreciate the Value of Vegetation

Austin’s urban forest is a healthy and sustainable mix of trees and other vegetation that comprise a thriving ecosystem valued, protected and cared for by the City and its citizens as an essential environmental, economic, social and community asset. In 2013, Austin ranked as one of the 10 best urban forests in the country (American Forests, “American Forests Names the 10 Best U.S. Cities for Urban Forests”). Trees offer us a multitude of benefits, many of which are discussed below.

Environmental Benefits

Trees improve the environment in which we live by moderating climate, reducing erosion, treating stormwater runoff, cleansing the air, and harboring wildlife.

Vegetation moderates the sun and wind that can be extreme in our local climate. Radiant energy from the sun is absorbed or deflected by leaves on deciduous trees in the summer and only filtered by branches of deciduous trees in winter. Trees also lower air temperature by evaporating water in their leaves. The larger the tree, the greater the cooling effect. Trees in cities moderate the heat-island effect caused by pavement and buildings in commercial areas. Shade trees can make buildings up to 20 degrees cooler in the summer (“Trees and the Environment”). Wind speed and direction is also affected by trees. The more compact the foliage on the tree or group of trees, the more effective the windbreak.

Tree canopies intercept and slow the erosive forces of rainfall, sleet, and hail, providing protection for valuable topsoil. Root systems stabilize soil and further reduce erosion potential. Trees and other vegetation absorb water during a storm event and decrease the velocity of damaging runoff peaks in a watershed. Vegetation improves water quality by filtering sediment and other pollutants from stormwater before it enters creeks, rivers and aquifers.

Trees and other vegetation improve air quality by absorbing air pollutants such as carbon dioxide (a major greenhouse gas), ozone, carbon monoxide, and sulfur dioxide - and producing precious oxygen. A mature tree removes 60 to 70 times more pollution than a newly planted tree (Missouri). A two-acre stand of trees can remove a quantity of carbon dioxide that is emitted by a typical passenger vehicle, and produce enough oxygen to support 36 people ("Trees and the Environment").

Trees are critical for wildlife. As a tree moves through its life-cycle from seed, to seedling, to tree, to snag, to decaying log, to dirt, wildlife depends on it all along the way. Living trees are used by wildlife for food, shelter and reproduction sites. Many animals also use trees for resting, nesting and for places from which to hunt or capture prey. When trees mature, animals are able to enjoy delicious fruits and foraging opportunities. During times of extreme heat or precipitation, animals can seek shade and shelter under the trees without being away from their food source.

Economic Benefits

Individual trees and shrubs have value, but the variability of species, size, condition and function makes determining their economic value difficult. The economic benefits of trees are both direct and indirect.

Direct economic benefits are usually associated with energy costs. According to the United States Department of Agriculture Forest Service, trees properly placed around buildings can reduce air conditioning needs by 30 percent and save 20-50 percent in energy used for heating. Annual energy cost reductions in U.S. homes that can be attributed to trees are said to be around two billion dollars (United States 6). As components of a well maintained landscape, trees can add value to your home. Property values of landscaped residences are 5 to 20 percent higher than those of non-landscaped homes (International).

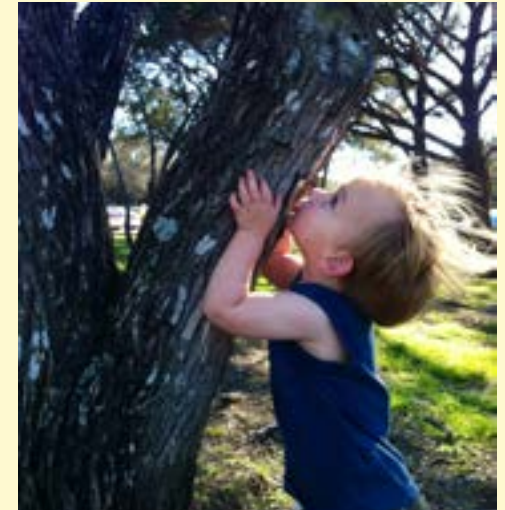
The indirect economic benefits of trees within a community are even greater. Customers pay lower electricity bills when power companies build fewer new facilities to meet peak demands, use reduced amounts of fossil fuel in their furnaces, and use fewer measures to control air pollution. Communities can also save money if fewer facilities are needed for regional stormwater controls. To the individual, these savings may seem small, but to the community as a whole, reductions in these expenses can be substantial.

Social and Communal Benefits

Trees and other vegetation offer a natural component in our urban landscape that beautifies our surroundings and provides a sense of serenity. The calming effect of urban forests have been documented to reduce workplace stress levels and fatigue, calm traffic, and even decrease the recovery time needed after surgery. Trees can also reduce crime. Apartment buildings with large amounts of landscaping and greenspace have statistically lower crime rates than nearby apartments without trees. Because of their potential for long life, trees are frequently planted as living memorials. We often become personally attached to trees that we, or those we love, have planted. The strong tie between Austin's citizens and trees is often evident when community residents speak out against the removal of trees for development or rally to save a particularly large or historic tree.

Even when located on a private lot, the benefits provided by trees can reach well out into the surrounding community. Likewise, large-growing trees can come in conflict with utilities, views, and structures that are beyond the bounds of the owner's property. With proper selection and maintenance, trees can enhance and function on one property without infringing on the rights and privileges of neighbors. Trees often serve several

architectural and engineering functions. They can offer privacy, emphasize views, screen out objectionable views, reduce glare and reflection, act as sound barriers, and direct pedestrian traffic. Trees also provide background to and soften, complement, or enhance architecture. Trees bring natural elements into urban surroundings and increase the quality of life for residents of the community.



While trees provide much prosperity, they also incur some costs. Investing in a tree's maintenance will help to return the benefits you desire. The costs associated with large tree removal and replacement can be significant. In addition, the economic and environmental benefits produced by a young replacement tree are minimal when compared to those of a mature specimen. Extending the functional lifespan of large, mature trees with routine maintenance can delay these expenses and maximize returns. An informed home owner can be responsible for many tree maintenance practices. Corrective pruning and mulching gives young trees a good start. Shade trees, however, quickly grow to a size that may require the services of a professional arborist. Arborists have the knowledge and equipment needed to prune, treat, fertilize, and otherwise maintain a large tree. To find a qualified arborist that can answer questions about tree maintenance and implement recommended treatments, visit: <http://www.treesaregood.com/find-treeservices/FindTreeCareService.aspx>.

Preserve Critical Habitat

Some natural areas may contain habitat that supports threatened and endangered species. In Travis County, 25 animal and plant species, including the golden-cheeked warbler, black-capped vireo, texas-horned lizard, several salamanders, numerous cave-dwelling species and freshwater mussels are listed (or candidates to be listed) as threatened or endangered by state and federal authorities (Texas Parks and Wildlife). Threatened and endangered species habitat is protected by federal, state, and local regulations, **even on private property**. The Texas Parks and Wildlife Department provides management guidelines for several of the threatened and endangered species that occur in the Austin area, found at:

https://www.tpwd.state.tx.us/hunt-wild/wild/wildlife_diversity/nongame/management/

The Golden-cheeked Warbler could be particularly susceptible to adverse impacts resulting from poorly implemented wildfire risk reduction activities. The songbird breeds in only one location in the world: Central Texas. Habitat loss results from urban encroachment, widespread clearing of Ashe juniper as a range management practice, and other threats such as oak wilt. High quality breeding habitat for these birds is characterized by mature woodlands of Ashe juniper and a mix of oaks and other broad-leaved species with dense canopy cover. Some of this habitat can be found in western Travis County nature preserves, often extending outside preserve boundaries onto private property. The United States Fish and Wildlife Service published Best Management Practices for treating vegetation that may be associated with



Unique and diverse ecosystems in Travis County are home to many threatened and endangered species, including the Golden-cheeked Warbler (*Setophaga chrysoparia*). Poorly implemented wildfire risk reduction activities may result in adverse impacts to protected wildlife habitat.

endangered golden-cheeked warbler habitat, available online at:

http://www.fws.gov/southwest/es/Documents/R2ES/AUES_GCWA_FINAL_BMP.pdf

The guidelines aim to reduce the intensity of wildland fire while minimizing potential impacts to the bird.

For additional assistance with identifying and managing protected habitats, contact:

- Texas Parks and Wildlife Department: (512) 389-4800
- United States Fish and Wildlife Service, Austin Ecological Services Office: (512) 490-0057

Observe the City of Austin Tree Protection Ordinance



The City of Austin's Tree Protection Ordinance regulates the removal and major pruning of large trees – those that are 19 inches and greater in diameter (measured 4.5 feet above ground surface). Most trees this size are hundreds of years old, so it is important to carefully evaluate the need to remove them and consider alternatives. Protected-size trees require a permit from the City Arborist for tree removal, pruning more than 25 percent of the canopy,



The Austin Fire Department carefully manages a prescribed burn.

or impacts the critical root zone (i.e. constructing a utility trench, sidewalk, driveway, irrigation lines, or foundation near the tree). Trees smaller than 19 inches in diameter are not regulated. For more information on Austin's Tree Protection Ordinance, visit the City Arborist website at: <http://austintexas.gov/departments/city-arborist>, or contact the City Arborist at: (512) 974-1876.

Know Regulations and Permitting

Identify other federal, state, and local codes and regulations that may apply to your wildfire preparedness activities, including rules enforced by homeowners associations or other local governing jurisdictions. Obtain necessary permits or authorization before performing significant activities such as land grading, building a retaining wall, constructing a permanent erosion or sediment control structure, or performing work near streams, wetlands, or other protected environmental features. Be aware of the City of Austin Hill Country Roadway Ordinance, which requires properties within designated geographic corridors to preserve vegetation in a natural state on portions of the property, including along the roadway. For properties subject to

this ordinance, refer to the property's approved site development plan to determine where the protected natural areas are located before performing vegetation management activities. For additional information about permitting and other regulatory requirements in the City of Austin, contact the Development Assistance Center at: (512) 974-6370.

Understand Prescribed Fire

Did you know that fire can be good for people and the land? Prescribed fire (sometimes referred to as prescribed burning, controlled burning, or good fire) is a land management tool that can be used to:

- Restore fire to the landscape, simulating natural processes;
- Reduce unnaturally high accumulations of vegetation;
- Decrease the risk and severity of unwanted wildfires in the future;
- Lessen the potential loss of life and property;
- Control many undesirable plant species, plant diseases and pest insects;

- Create and enhance wildlife habitat and increase availability of forage;
- Promote the growth of native trees, wildflowers and other plants
- Expose mineral-rich soil and recycle plant nutrients back to the soil.

When utilized correctly by professionals, prescribed fire is applied only after developing a written plan that identifies land management goals and specific fire use strategies to be used to safely achieve those goals. Prescribed fire plans address characteristics of the land being treated (like topography and vegetation type) and include carefully-defined parameters for temperature, humidity, wind, moisture of the vegetation, and conditions for the dispersal of smoke. The plans also specify how the fire will be applied, by whom, and what fire control people and equipment must be on-scene before the burn can commence. After the plan is complete and conditions are right, a prescribed burn can proceed under the supervision of a qualified burn manager. Low intensity fire is skillfully applied to selectively burn fuels like dead wood, brush, forest understories, and grassland. The smoke from a prescribed fire can be a nuisance, but when prescribed fire is planned and executed by professionals, smoke impacts can be greatly reduced.

Prescribed fire is usually the ideal wildland fuel treatment method. It is very compatible with environmental goals and a cost-effective alternative to more labor intensive and time



Application of prescribed fire can result in less intense, and fewer wildfires.

consuming methods like mechanical or hand-clearing of vegetation. The Wildland Conservation Division of the Austin Water Utility commonly uses prescribed fire on City of Austin wildlands. On Water Quality Protection Lands, where the management goal is to return the land to an oak-juniper savannah, it effectively reduces invasive plants and invigorates native grasses. On Balcones Canyonland Preserve properties, prescribed fire creates and

maintains habitat for an endangered songbird, the Black-capped vireo. City staff works closely with local fire departments and natural resource partners to ensure that adequate planning and resources are in place to conduct prescribed fires safely.

Periodic fire events have always played an integral role in many Central Texas ecosystems, and they will continue to occur. Therefore, it's not a question of

if the land will burn again, but *when* and under what conditions - controlled or uncontrolled? Application of prescribed fire can result in less intense, and fewer wildfires.

Residents are not allowed to conduct prescribed burns, including brush pile burns, inside Austin city limits. If you have questions about using fire as a management tool, contact your local fire department.

EVALUATE AND MODIFY YOUR PROPERTY

Harden the Home

A “hardened home” has reduced wildfire risk because it uses many non-combustible building materials and is maintained in a fire-resistant condition. The Firewise approach begins with a hardened home as the primary fire protection method, and moves outward. The farther you move away from a structure, the less effective efforts are at mitigating the wildfire risk.



Falling embers from a wildfire can easily ignite leaves and dry debris collected in rain gutters.



A hardened home constructed with non-combustible building materials is the best defense against falling embers, and greatly improves a home's chances of survival.

Individuals planning a new construction or renovation project should take advantage of the opportunity and

maximize the structure's fire-resistant qualities by incorporating the following design elements and building materials. Others who are not building a new home or planning a major renovation can still integrate many home hardening measures at no or little cost.

- Large roof surfaces are capable of catching burning embers, making them one of the most vulnerable components of a house. Wood shake roofs are especially prone to ignition and should be avoided, even when treated with a fire-retardant sealant. Embers can set a roof on fire by getting lodged between shingles or igniting collected leaf litter and debris. Use ignition-resistant, Class A-rated roofing materials such as composition, metal or tile (with bird stops) and keep roof surfaces clear of debris. Roof fea-

tures such as dormers and split-level roofs create inside corners and other nooks that are more likely to accumulate leaf litter and other ignitable material. Where possible, cover those corners with metal roof flashing.

- Embers can find their way into your attic through unscreened vents. From inside the attic, install a 1/8-inch metal screen over vent openings to create a barrier and restrict ember intrusion. Over time, 1/8-inch screening may become clogged with debris. Routine maintenance should be completed to keep the vent clean and effective.
- Eaves protect a home from rainwater, but during a wildfire event, they can be vulnerable to direct flame contact and embers

entering through soffit vents. Eaves that are boxed in with non-combustible materials can withstand flames better than open eave configurations. Install angle flashing along the roof edge and screen soffit vents to prevent embers from entering the attic area.

- Equip chimneys with a spark arrestor screen covering the opening. The screen should have openings no smaller than 3/8-inch and no larger than 1/2-inch.
- Check your gutters to ensure they are clear. Consider installing gutter guards or screening to prevent leaves and other ignitable material from building up. Maintain the roof where the gutter connects so that debris does not accumulate between the installed gutter guard and roof. Metal gutters equipped with angle flashing for edge protection are recommended.
- To increase a home's resistance to radiant heat and direct flame contact, exterior walls should be made of ignition-resistant materials. Insulated concrete forms, or ICFs, are polystyrene blocks that fit together to form a home's shell and then filled with concrete creating solid walls that can reportedly withstand fire up to four hours. Other siding materials that offer fire protection include cement siding, stucco or fire-retardant treated wood.
- Windows should be double-paned, with one of the panes made of tempered glass. This will reduce the potential for radiant heat to break the window and spread fire inside the home.
- Remove debris and other flammable material from exterior crawl spaces, including under your deck or balcony. Then screen the open area using 1/8-inch metal screen reinforced with non-combustible skirting to create a barrier for embers. Don't store firewood in these locations.
- Think about other areas where leaves and fine debris normally gather when the wind blows. During a fire, these same places are also where embers will likely collect and could start a fire.
- Keep fire from gaining a foothold on your deck by using fire-resistant, Class A-rated deck and framing materials. Pressure-treated deck boards that contain fire-retardants are an economical choice for good fire protection, but tend to leach toxins over time, degrading both the environment and the



Wooden privacy fences can act as a wick and carry fire directly to your home.



Use ignition-resistant, Class A-rated roofing materials and keep roof surfaces clear of debris.



Non-combustible building materials and design, and the quality of defensible space surrounding the structure are key factors that give your home the best chance of surviving a wildfire.

- stability of the wood. Toxin free alternatives that offer equal or better fire protection include composite decking (made from PVC and wood fiber), and wood-and-glass boards (created by soaking lumber in liquid glass and then baking it).
- Wooden privacy fences can act like a wick and can carry fire directly to a structure. Interrupt this conduit for fire by inserting sections of fence made of noncombustible materials such as stone or wrought iron, especially for the sections of fence that attach to the home or run under eaves.
- Consider having multiple garden hoses that are long enough to reach any area of your home and any structure on your property.
- If your home is dependent on a well for water, install a backup generator so that water is still available if the electricity goes out.



Effective defensible space helped save this home during the Steiner Ranch wildfire in September 2011.

For more detailed information on Firewise home construction, renovation and maintenance visit:

<http://texasforestservice.tamu.edu/uploadedFiles/Edited%202012materials%5B1%5D.pdf>

Create and Maintain a Defensible Space

Defensible space around a home is one of the most effective fire protection tools. Defensible space is a specially designed protective buffer around a building where potential fuels (vegetation and other materials) have been modified, reduced, or cleared to:

- Produce a barrier that impedes wildfire from reaching your home,
- Prevent a house fire from spreading into a wildland or to neighboring properties,

- Reduce exposure to radiant heat,
- Limit flammable materials where an ember could land and start a new fire, and
- In the event of a fire, provide maneuvering space for emergency responders to safely conduct fire suppression operations.



With some careful planning, you can achieve a landscape that is aesthetically pleasing and helps protect your home from wildfire.

Firewise landscape designs have a bad reputation of being unattractive; however, with some careful planning, you can achieve a landscape that is aesthetically pleasing and contains fire rather than fuels it. A common misconception is that defensible landscape design calls for the stripping of trees and plants, leaving a barren wasteland of a yard. Reduction of plant fuels is a key component, but defensible space does not require the removal of all vegetation to be effective. In fact, improper or poorly-conceived clearing can actually make the area more fire-prone. Keep in mind, defensible space does not necessarily eliminate fire, but rather changes the behavior of fire in a way that reduces flame length, fire intensity and ember production. Choosing the right plants, spacing them strategically to provide enough distance between plant groups and structures, and maintaining a healthy landscape will have a dramatic effect on fire behavior.



This Bastrop home had an attached wooden deck surrounded by dense vegetation. These types of conditions often result in home loss during a wildfire event.

The size and shape of your defensible space depends on many factors. Developers, homeowners, insurance providers and architects search for a specified setback distance for defensible space. What's the magic number? Through the research of multiple agencies and scientists, a value of 30 feet was determined and is still a common standard. Over time, the idea of defensible space has evolved and changed, introducing new terms like "inner and outer protection areas," "Zones 1-3," and the "home-ignition zone." These methods are an attempt to simplify complex concepts of defensible space and seek a "one-size-fits-all" answer. The result has confused many homeowners and caused them to misunderstand the true intent of defensible space. **A standard buffer distance should not be applied universally to every structure.** Homeowners and developers should be aware that standard defensible space recommendations, including those provided in this publication, require adjustments based on the structure's unique footprint, location on the topography, property size, proximity to wildlands, surrounding vegetation, and local climate. Fuels and site conditions need to be assessed beyond "standard" distances around homes to fully account for real wildfire threats in a site-specific context. In an urban setting like Austin, the size of defensible space is often limited by the property boundaries of small lots. Surrounding properties can be a significant threat if ignited by fire. Members of a fire-adaptive community must work in unison to reduce the risk of structure-to-structure burning, which can cause extensive damage to entire neighborhoods.



A retaining wall constructed with noncombustible materials can help prevent a fire from moving up a slope, and provides key defense to homes located on steep topography.

The landscape within a defensible space is a dynamic, constantly changing system which must be diligently maintained. The following list provides ideas on how to keep your defensible space in a fire-resistant condition.

- Be aware of the growth habits of the plants on your land and the changes that occur seasonally. Keep a watchful eye for the need to reduce fuel volumes and fuel continuity.
- Timely pruning is critical. In addition to reducing fuel volume, it also promotes healthier plants.
- Do not allow material that can serve as fire kindling to accumulate around your property. Rake and remove leaves, dead branches and other litter as it builds up.
- Remove annual, herbaceous plants after they have gone to seed or when the stems become overly dry.
- Mow or trim grasses to a low height within your defensible space. This is especially important as they cure and dry.
- When clearing and treating vegetation for fuel reduction, target plants that are undesirable (such as exotic invasive species), overgrown, considered "highly-flammable" species, dead, dying, or damaged.
- Do not store yard waste or firewood inside the defensible space.
- Be aware, when vegetation is removed to bare soil, it will eventually be replaced, often by fast-growing grasses or invasive plant species that are even more difficult to manage.
- Replant with fire-resistant natives after significant vegetation removal.

Account for Topography

The Texas Hill Country is known for its canyons, hilltops and valleys, but these beautiful features can put structures at increased risk of wildfire. The topography around buildings is a major consideration in assessing wildfire risk exposure. Fires generally tend to burn uphill where they can produce more flaming embers that are capable of travelling longer distances, have longer flame lengths, and travel much faster and more intensely than fires moving along flat ground. Therefore, structures built on vegetated hillsides or at the edge of a ridge or bluff are at greater risk and warrant extra precautions.

- For new construction, or when making future improvements, incorporate ignition-resistant materials and design features into the building plans;
- Where possible, extend the downslope defensible space distance and implement a more aggressive vegetation management plan in that area;
- Consider building a noncombustible retaining wall downslope to bolster the effectiveness of your defensible space and prevent fire from spreading farther upslope.

Limit Fuel Continuity

To restrict a fire's ability to travel via direct flame contact and radiant heat, plant clusters must be well-spaced with adequate horizontal and vertical separation between one another, and to structures. When adding plants to your landscape, follow the general rule, "Put the right plant in the right place." Arrange plants in small groups and islands, not in large masses.

For the area immediately around your home, practice the "fire-free three" technique: within the first three feet of structures and attachments such as decks and porches, avoid the use of flowerbeds, shrubbery and bark mulch.



Austin's Firewise Program Coordinator evaluates a steep vegetated canyon slope and the associated risk to homes above.

Instead, use non-flammable landscaping materials in this area, such as gravel and decorative pavers. If plants are strongly desired in this critical space, choose perennial plants with high-moisture content.



Island landscaping allows for space between fuels and will slow the spread of fire.

Further reduce horizontal fuel continuity inside the defensible space by identifying and correcting hazards like dry grass growing up against or leading to the foundation, or a woodpile next to the home or deck. Organic wood mulch is often used in home landscapes. If mulch becomes dry, it can be easily ignited and potentially convey fire to your home. If wood mulch is used in your defensible space, exercise caution and keep it moist to prevent possible ignition. Stop or slow the lateral movement of fire by creating fire-breaks with non-combustible features such as rock pathways and stone walls weaving through your landscape, boulderscapes, driveways, and healthy lawns.



These fine grasses and shrubs provide continuous fuel and will allow a fire to spread uphill to the wooden deck and home.

Break the vertical continuity between surface vegetation, tree canopies, and structures by removing “ladder fuels” in the defensible space. Ladder fuels enable fire to spread upward from low-level vegetation into tree canopies or structures. Do not plant potentially large trees and shrubs under utility lines or roof eaves, and place small trees and shrubs away from larger trees to avoid creating ladder fuels. Remove dead vegetation underneath bushes and shrubs.



Closed tree canopies can suppress highly flammable grasses and other surface fuels. Removal of intermediate ladder fuels results in a “shaded fuel break” which can be effective in slowing or stopping the spread of fire.

Choose Fire-Resistant Plants that are Native or Adapted to Central Texas



Left: Plants with high moisture content, such as succulents, are generally less flammable.

There are no “fire-proof” plants. All vegetation - naturally occurring and ornamental, native and exotic - can burn during intense wildfire. But, some vegetation is more flammable than others and can greatly increase the speed with which a fire spreads.

Select native and adapted plant species for your defensible space that are high in moisture content and can be easily pruned and maintained. Plants

that are native or adapted to Central Texas are usually resilient to extreme seasonal temperatures and generally require less water to survive, making them the best-suited plants to tolerate the local climate. This may become important during extended drought when water resources are limited by watering restrictions. Additionally, many native species are fire-adapted, which means that their tops may burn off in a fire, but the roots develop to such an extent that they are typically the first

to regenerate after a fire. The robust root systems of natives also reduce the potential for property damage from post-fire erosion. For guidance on specific native and adapted plant species, refer to the City of Austin Grow Green Gardening Education Program (www.growgreen.org) and Recommended Native and Adapted Plant Guide (www.austintexas.gov/department/grow-green/plant-guide). Do not be confused when consulting the plant guide resources - not all native and adapted plants are fire-resistant.

Exotic and invasive plants can lead to property conditions that are more susceptible to fire. Exotic species that are not drought-resistant are prone to dying during a drought, thereby creating additional fuel. Invasive plant species grow and spread rapidly, creating unmanageable fuel.

General concepts to keep in mind when choosing and maintaining fire-resistant plant species include:

- A plant's moisture content is the single most important factor governing its flammability. Keep your landscape plants well-irrigated, as allowed by watering restrictions. Current information on City of Austin watering restrictions can be found at www.austintexas.gov/department/water-conservation.
- Plants with high concentrations of oil, wax, resin, terpenes, or pitch (usually indicated by leaves/needles and sap that are sticky or gummy and have a strong odor) are generally more volatile, even when well-watered. For example, conifers, cedars, junipers, holly, rosemary, yaupon holly, and agarita are considered highly flammable. If you desire to use these types of plants in your landscape, place it outside of defensible space and ensure there is adequate vertical and horizontal separation from other potential fuels.
- Fire-resistant plants do not accumulate or shed large amounts of combustible materials (litter, fine branches, twigs, needles or leaves), which burn readily when dry.
- Deciduous plants tend to be more fire resistant because their leaves have higher moisture content and their basic chemistry is less flammable. Also, when deciduous trees are dormant, there is less fuel to carry fire through their canopies.
- Plants with an open and loose branch/stem configuration have a lower volume of total biomass that could potentially become fuel.
- Plants that grow slowly and require less pruning will make it easier to maintain your landscape in a fire-resistant condition.
- In some cases, there is a strong correlation between drought tolerance and fire resistance.

- During periods of extreme drought and irrigation restrictions, prioritize the plants you wish to save. Provide supplemental water to those nearest your home first.

- Suppressing the growth of natural grasses and other fine surface fuels - the primary carriers of wildfire in Central Texas.

In addition to wildfire suppression, riparian vegetation offers a wealth of other environmental benefits including stabilizing creek banks and reducing erosion, filtering and sequestering pollutants, purifying water, creating shade, regulating water temperature, and providing excellent wildlife habitat.

When coupled with Firewise strategies around the home, preservation of riparian vegetation serves the mutually beneficial long-term goals of increased environmental integrity and reduced threat of property damage by wildfire.

Recognize Streamside Vegetation Benefits

Although it may seem counterintuitive, some types of vegetation – particularly riparian woodlands along creeks, streams, and rivers – have low ignition potential. Riparian vegetation can inhibit ignition, diminish fire intensity, and halt or slow the spread of fire by:

- Reducing wind and air temperature;
- Maintaining higher soil moisture and humidity; and



Riparian vegetation can inhibit ignition, diminish fire intensity, and stop or slow the spread of fire, along with a wealth of other environmental benefits.

Consider Snags and Brush Piles

Although the removal of dead and dying vegetation is important in your defensible space, understand that the presence of this material in the environment benefits wildlife and soil. By some estimates, the removal of dead organic material results in a loss of habitat for up to one-fifth of the animals in the ecosystem! Standing dead trees (also known as “snags”), logs, brush piles, downed woody debris, and stacks of firewood provide wildlife with protection from predators, shelter from inclement weather, a source of habitat, and feeding places. Snags occurring along streams and shorelines may eventually fall into the water, adding important woody debris to aquatic habitat. Decaying logs retain moisture and nutrients that aid in new plant growth and support wildlife such as soil organisms (earthworms, beetles and other insects). These fuel sources usually do not pose a significant hazard when located outside of the defensible space and away from structures, roadways, and other commonly occupied areas.



The Red-bellied woodpecker (*Melanerpes carolinus*), a prevalent cavity-dweller in Central Texas, uses a snag.

Practice Proper Tree Care and Management

Excessively dense tree canopies can facilitate crown fire spread and produce large quantities of flaming embers. Additionally, continuous trees canopies in close proximity to homes can carry fire to the structure.

Remove dead tree limbs, branches making contact with roofing and siding, and branches overhanging structures and decks. Trim the lower branches of trees to at least six feet above the ground. Prune trees to decrease canopy density while maintaining canopy closure. Shade provided by closed tree canopies reduces the potential for fire by limiting ignition-prone surface fuels (such as dry grass), reducing air temperatures, and maintaining higher humidity.

Right: If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 12 to 18 inches from the limb's point of attachment. Make a second cut from the top, directly above or a few inches farther out on the limb. Doing so removes the limb, leaving the 12- to 18-inch stub. Remove the stub by cutting back to the branch collar. This technique reduces the possibility of tearing the bark.

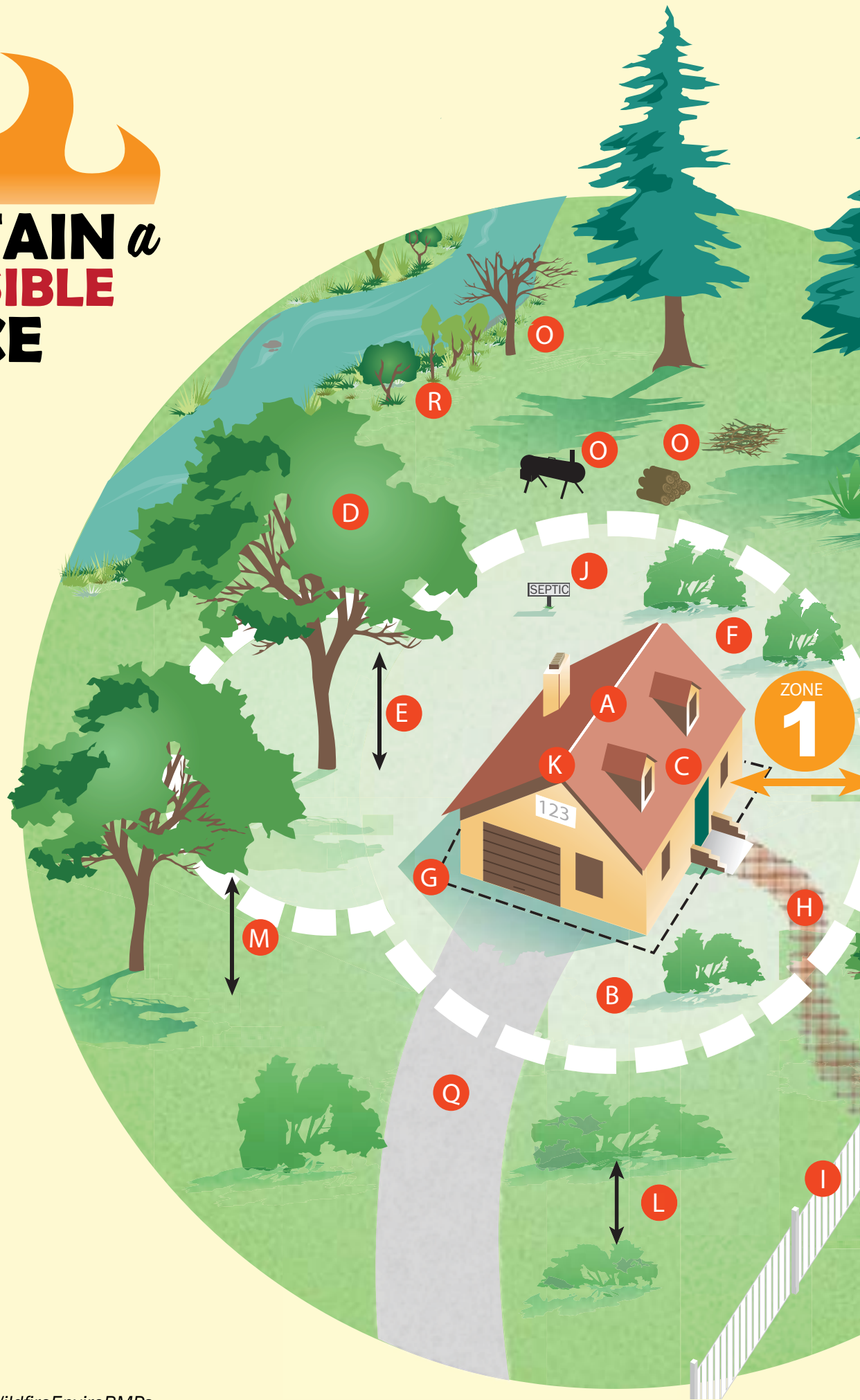


Practice proper tree pruning techniques. To learn how much of a tree should be pruned, and where cuts should be made, visit <http://www.treesaregood.com/>.

If desired, trees that are near the home can be preserved by incorporating them into the footprint of the home



MAINTAIN *a* DEFENSIBLE SPACE

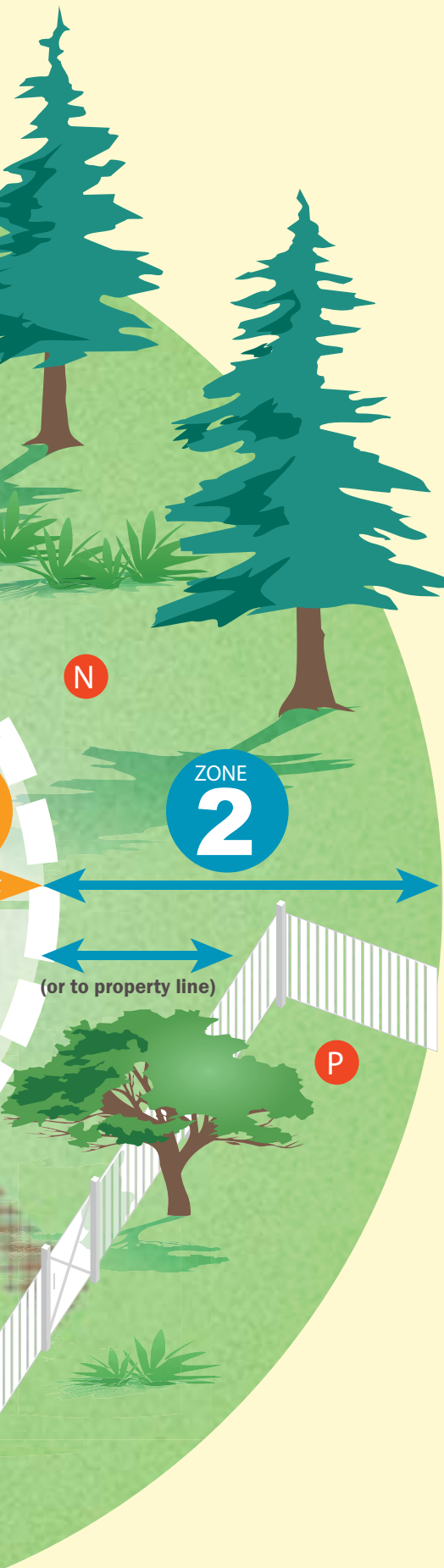


Zone One (Lean, Clean, Green Zone)

- A** A Firewise property starts with the structure and moves outward. A home constructed with fire resistant building materials should always be considered the primary method of protecting the structure from fire.
- B** Water lawn, plants, and trees regularly (as allowed by watering restrictions) to ensure that they are healthy, especially during fire season. Mow the lawn regularly.
- C** Remove dead, dying, or dry vegetation, leaf litter, and other debris from yard, roof surfaces, gutters, and other locations where it accumulates.
- D** If you have big beautiful shade trees you want to keep, you can incorporate them into your home's footprint. Then, defensible space will extend around your home and those chosen trees. Prune trees so the lowest limbs are at least 6 feet from the ground, and limbs have adequate clearance from structures.
- E** Eliminate ladder fuels and accumulations of woody debris. Remove dense understory layers and thin tree canopies. Prune trees so the lowest limbs are at least 6 feet from the ground.
- F** Plants in Zone 1 should be carefully spaced, mostly low-growing, and low in resins, oils and waxes that burn easily.
- G** Within the first 3 feet of the home, use nonflammable landscaping materials, such as rock and pavers. If plants are desired in this space, choose perennial plants with high-moisture content.
- H** Add protection with "fuel breaks," such as driveways, gravel walkways and healthy lawns.
- I** Consider using nonflammable material for fencing, at least for the sections of fence that connect to your home.
- J** Clearly mark septic tank locations. The weight of fire trucks can collapse them, immobilize the truck, and endanger personnel.
- K** Identify your home and neighborhood with clear and easily readable street names and numbers.

Zone Two (Reduced Fuel Zone)

- L** This area should be thinned out as well, though less space between potential fuels is needed than in Zone 1.
- M** Create separation between low-level vegetation and tree branches by removing ladder fuels, reducing the height of low-level vegetation, and/or trimming low tree branches.
- N** Don't allow grass and other surface fuels to become overgrown in Zone 2. Typically, surface vegetation in this area should be maintained at a height no greater than 4 inches.
- O** Locate any propane tanks, firewood stacks, brush piles, and snags in Zone 2, at least 30 feet from the home.
- P** Collaborate with your neighbors for a more effective, community-based approach to wildfire protection.
- Q** Provide adequate emergency vehicle access by maintaining a driveway clearance of at least 12 feet wide by 13 feet 6 inches high.
- R** Preserve natural vegetation along creeks, streams, and rivers. The higher moisture content of riparian corridors reduces fire intensity and can serve as a fire break.



and redefining defensible space zones accordingly. Then, defensible space setbacks will extend around your home and those chosen trees. While this is a gratifying option that may allow valued trees to be kept, diligent maintenance becomes even more critical. Ensure there is no pathway for potential fire to reach the incorporated trees and your home, and tree litter is routinely removed from roof surfaces, gutters, and other areas where it accumulates.

If you're concerned by a tree on an adjacent property that has limbs extending over your property line, contact the respective property owner. This is a civil issue and tree limbs should never be arbitrarily cut at the property line without regard for proper tree pruning techniques and tree health.

Pruning large trees can be dangerous. If pruning involves working above the ground or using power equipment, it is best to hire a professional arborist. An arborist can provide the services of a trained crew to improve the health, appearance, and safety of your trees with the necessary safety equipment and liability insurance. To find a tree care service professional, visit: <http://www.treesaregood.com/find-treeservices/FindTreeCareService.aspx>. Seek those with experience in vegetation management for wildfire risk reduction.

Prevent Oak Wilt

Austin is losing one of its most treasured assets - the beautiful live oak and red oak trees that form a shady, green canopy over the city. These oak trees are being threatened by oak wilt, a contagious tree disease caused by a fungus.

Over the past twenty years, Austin has lost more than 10,000 oaks to the incurable disease, many of which had existed in our landscape for a century or more ("Oak Wilt Suppression"). For both, individuals and the City as a whole, the deaths of such majestic trees are felt by reduced property val-

ues, increased utility bills, and a sense of devastation.

The fungus infects the vascular system of a tree, which contains vessels that transport moisture throughout the tree. The vessels of an infected tree effectively become blocked by the fungal infection, and cannot transport adequate moisture to sustain a healthy or living tree. In most cases, the end result is tree mortality.

Trees infected with oak wilt can spread the disease to surrounding oaks via their interconnected root systems. When that happens, the only way to stop further spread is by digging trenches to break the root connections. The deadly fungus can also be spread by insects, which strike primarily from February through June. Sap-feeding beetles are attracted to oak wound sap and the sweet-smelling spore mats produced by infected red oaks. The disease is spread when those insects fly from an infected tree to feed on a healthy red oak or a live oak with a fresh wound.

You don't want to manage oak wilt - that means you have it, and it is very difficult to stop. Preventing oak wilt is the key. While caring for your trees, protect live oaks and red oaks from transmission of oak wilt fungus by adhering to the following guidelines:

- Avoid pruning or wounding oaks during the spring (February 1 through June 30).
- Always seal fresh wounds on oaks, including pruning cuts and stumps, with wound dressing or latex paint immediately, at all times of the year. A wound is created any time bark is removed and wood is exposed. That can happen with the simplest of tasks - pruning limbs, clearing brush, tree removal, or even pushing a lawn mower over a bare tree root.
- Clean all pruning tools with 10 percent bleach solution between trees.



Left: Leaves on diseased live oaks often develop yellow veins that eventually turn brown, a symptom called veinal necrosis. Most live oaks defoliate and die in 1-6 months.

Right: Foliar symptoms of oak wilt on red oaks are less distinct. In early spring, young leaves simply wilt, turning pale green and brown, usually remaining attached for a period of time. Mature leaves develop dark green water soaking symptoms or turn pale green or bronze, starting at the leaf margins and progressing inward. This can begin on one branch and quickly engulf the entire tree. Red oaks generally die within 3-6 weeks.



Bottom: Oak wilt fungal mat exposed.

- Consider consulting with a professional if you suspect that you have infected trees on your property. Oaks that are confirmed to be diseased should be destroyed.
- Debris from diseased oaks should be immediately chipped, burned or buried.

To learn more about oak wilt please refer to: <http://texasoakwilt.org>.

Avoid Using Herbicides

When removing vegetation for wildfire preparedness, avoid the use of chemical herbicides and opt for more environmentally-friendly, manual removal methods. Herbicides negatively impact the water quality of our local streams and aquifers. Chemicals used in popular herbicides are showing up in groundwater and surface water monitoring sites across Austin. When herbicide use is determined to be necessary, always follow manufacturer's instructions.

Dispose of Trimmings and Brush Properly

Mounds of tree branches and debris are the inevitable result of vegetation management activities. Before you start cutting, figure out what you are going to do with your slash. Once cut, this material can present an even greater fire hazard and should be disposed of promptly and appropriately. Consider coordinating with your neighbors so that trimmings can be disposed of collectively during a community clean up event. If you must store slash on your property temporarily, locate piles away from structures, outside of the defensible space. Do not illegally burn or dump vegetation waste. Disposing of yard waste over your fence, a seemingly innocent act, is usually illegal dumping and can create a fire hazard. Never place brush or clippings in a water channel (wet or dry, natural or manmade), cave, sinkhole or other environmental feature.



Austin Resource Recovery collects large brush from residential customers twice a year. Plan your vegetation management activities accordingly.

Some disposal options for your yard trimmings and brush include:

- **Outdoor Burning:**
If you are interested in using fire as a management tool, contact your local fire department first. Open burning of brush or other waste on private property is not allowed in the City of Austin. For Travis County residents outside the corporate boundaries of a municipality, on-site burning of trees, brush, grass, leaves, branch trimmings, or other plant growth, by the owner of the property or other person authorized by the owner, is allowed during certain times of year, when a burn ban is not in effect and when the material is generated only from that property. Such burning is subject to the Texas Outdoor Burning Rule and structures containing sensitive receptors must not be negatively affected by the burn. For more information on the Texas Outdoor Burning Rule, visit:

http://www.tceq.texas.gov/publications/rg/rg-049.html/at_download/file.

Before burning, notify and obtain permission from:

- Neighbors (“sensitive receptors”),
- Local fire department, Travis County Fire Marshal: (512) 854-4621, and
- Texas Commission on Environmental Quality Regional Office: (512) 339-2929

When burning slash, follow these basic rules:

- Always make sure your burn pile is completely burned or put out before dark.
- Have fire suppression tools on hand such as garden hoses, shovels and rakes.
- Make sure that the area is completely clear around and above the burn pile. Check for overhanging tree limbs and utilities.
- Do not burn garbage with vegetative material.
- Someone should be pres

Prevent Combustion of Home Compost Piles

During dry, hot, or windy weather conditions, carefully monitor compost piles which can potentially combust. Compost piles heat up when microorganisms, such as bacteria and fungi, reproduce and break down organic material at a rapid pace. If materials in a very large compost pile are relatively dry, the pile may self-heat to a temperature high enough to spontaneously combust.

To reduce fire risks associated with compost piles, follow these safety measures during hot summer months.

- Compost piles should be no larger than 1 cubic yard.
- Turn piles weekly during high temperatures.
- Keep piles moist.
- A compost thermometer may be used but is not essential. If a thermometer is used, turn the pile when internal temperatures reach 160 degrees Fahrenheit.



Very large compost piles may self-heat and spontaneously combust.

fine of \$2,000 and one year in jail. To protect yourself from this liability, consider opting for the services of a licensed organic material hauler and ask them for a receipt verifying where it will be discarded. A list of licensed haulers can be found online at: <http://www.austintexas.gov/department/austin-private-waste-hauler-licensing>.

• Landfill:

You can haul vegetative waste to a Type IV or Type I Municipal Solid Waste landfill and pay the disposal fee. Several of these landfills are located around Austin:

- Austin Community Landfill
9900 Giles Road, Austin
(512) 272-4329
- Texas Disposal Systems Landfill
3016 FM 1327, Buda
(512) 421-1363
- IESI Travis County Landfill
9600 FM 812, Austin
(512) 243-6300



Dumping vegetation waste over your fence is illegal and can present an extreme fire hazard.

- Someone should be present to monitor the fire. Never leave a burn pile unattended.
 - Do not burn on windy or excessively dry days.
 - Rake all material together.
 - Keep your piles small and manageable!
- **Recycle On-site:**
Rent or hire the services of a chipper and turn your clippings into mulch for use on site in your landscape beds, as protective ground cover on your property, or in your compost mix. Perhaps your neighbors or homeowners association will share the cost. Keep in mind that organic mulch can be flammable too, so don't place it immediately around structures or let it become too dry, and use cautiously within your defensible space.
- **Recycle by Third-party:**
For residents inside Austin city limits, Austin Resource Recovery provides weekly yard trimmings collection (grass clippings, leaves and small branches or limbs that are no longer than 5 feet and no thicker than 3 inches in diameter), and twice-per-year large brush collection. Trimmings and brush collected by Austin Resource Recovery are composted and turned into Dillo Dirt. For more information, including your curbside collection schedule, visit: <http://www.austintexas.gov/department/residential-curbside-collection-schedule>. Additionally, many local recycling and composting companies will accept your yard trimmings for a small fee.
- **Private Waste Hauler Disposal:**
If you hire the services of a private waste hauler, be sure the waste is disposed of legally. The City of Austin licenses private waste haulers. If an unlicensed contractor illegally dumps your waste, you may face a maximum

AFTER THE WILDFIRE

EVALUATE POST-FIRE CONDITIONS AND IMMEDIATE NEEDS

Identify Immediate Threats and Develop a Recovery Plan

Once authorities have determined that it is safe to return to your property, evaluate post-fire conditions to identify immediate threats to people, structures or the environment. This evaluation will assist you in developing a recovery plan. Recovery plan components may include the following:

- Identify and mitigate safety hazards, such as damaged trees and structures.
- Assess and remediate pollutant releases to the environment and other adverse impacts to natural resources.
- Characterize, segregate and determine proper disposal methods for debris and waste.
- Clean-up and dispose of ash, soot, fire-retardant and debris.
- Design and implement erosion and sedimentation controls and revegetate, where needed.
- Repair damaged drainage structures to reduce impacts from potential post-fire flooding.
- Restore wildlife habitat.



Evaluate post-fire conditions to identify immediate threats to people, structures and the environment.

Realize the Potential for Contamination

Some items impacted by fire can pose a threat of contaminant release to the environment, such as chemicals or fuel in aboveground storage tanks or other containers. If a spill of unmanageable volume or a material of concern is found, call the City of Austin 24-Hour Pollution Hotline at (512) 974-2550. If the spill poses a threat to public health and safety, call 9-1-1 first.

In addition to obvious pollutants like containers of chemicals, building materials can also contribute pollutants. For example, burned pressure-treated lumber can be a source of toxic metals like arsenic, and burned PVC materials may release chemicals like dioxins. Treat ash and debris resulting from burned structures as a contaminated waste (as

opposed to ash resulting from burned vegetation). Exercise extra caution and wear appropriate protective equipment when removing ash and debris from burned structures. Older buildings in particular may contain hazards such as asbestos and lead. If you suspect that asbestos-containing building materials or lead-based paints were damaged during the fire, contact an industrial hygiene professional.



Chemicals, petroleum products and building materials can pollute the environment following a wildfire.

Assess Impacts to Natural Resources

Identify specific environmental resources impacted by the fire. Contact the City of Austin Watershed Protection Department or your local jurisdiction for recommendations on restoration of lands in or near sensitive natural features such as creeks, rivers, ponds, lakes, wetlands, springs, or groundwater recharge features.

Follow Regulatory Requirements

Be aware of code limitations and obtain necessary permits before cutting down trees, performing major land-grading activities, building a retaining wall, constructing a permanent erosion or sediment control structure, or performing work in a riparian area, wetland, stream, or other natural area. Contact your local jurisdiction with questions regarding permitting. Before performing excavation activities, locate your underground utility lines for free by calling (800) 545-6005.

Consider Obtaining Professional Assessments

Acquire professional damage assessments for the private and public utilities that are connected to your home such as gas lines, wastewater lines, septic systems, water wells, irrigation systems, storm drain inlets and culverts. Utility infrastructure, such as PVC piping, may have melted or otherwise been destroyed in the fire or by firefighting operations. Repairs may be necessary to stop contaminant releases or to reestablish proper drainage for stormwater management. You may also want to consider hiring a professional to assess the natural resources on your property.



Creeks and other natural features are susceptible to damage when post-fire stormwater runoff transports ash, debris and pollutants.



Land management professionals can determine if treatments are necessary to restore natural areas.

Clean-Up Ash and Soot

Clean wildfire ash and soot from decks, porches, sidewalks, and around your home. Direct the ash and soot from burned vegetation (not burned structures) to landscaped areas. Light applications of ash can be beneficial to your landscape by acting as a nutrient-rich fertilizer and providing a seed bed for revegetation. If your property does not have suitable landscape to accept ash at the surface, alternative disposal options are available:

- **Bury the ash in a pit or trench on your property. Be sure to:**
 - Call (800) 545-6005 to confirm locations of underground utilities before excavating,
 - Find an area away from planned or likely future structures, and
 - Bury only ash from your own property.
- **Take the ash to a landfill. Be sure to:**
 - Contain and cover the ash so it will not disperse during transport,
 - Clean up any ash that does disperse, and
 - Keep the disposal receipt from the landfill.

If any of your building materials are chemically-treated (i.e. pressure-treated lumber), the ash can contain toxic constituents and will likely require special disposal through a hazardous waste disposal service company. Contact the City of Austin Watershed Protection Department for a list of local hazardous waste disposal companies.



A Texas Forest Service C-130 airplane drops red-tinted fire retardant near homes in Oak Hill during the 2011 Pinnacle Fire.



Ash from chemically-treated building materials, such as pressure treated lumber, can be toxic and require special disposal.

Never direct ash or soot towards a water course, including curb gutters, storm drains, creeks and lakes, where it can degrade water quality. Do not use clean-up methods that can cause ash to become airborne and create respiratory hazards. Wear protective gear, including long sleeves, eye protection, and a respirator when handling ash and soot.

If you are concerned about the ash, soot or debris on your property, call the Texas Commission on Environmental Quality Debris Hotline at: (800) 687-7057.

Clean-Up Fire Retardant

Usually seen on the evening news as red cloud being sprayed out of an airplane, fire retardants have been widely used since the late 1950s and are extremely helpful in suppressing wildfire.

There are three classes of fire retardants and clean-up methods vary accordingly:

- Long-term retardants are usually applied with a rotary or fixed-winged aircraft. They are 85 percent water, with 10 percent fertilizer and 5 percent coloring, usually iron oxide. The retardant is dyed for higher visibility over the drop zone. Long-term retardants can usually be removed with plain water but if dried, may require the use of a power washer. The iron oxide coloring can penetrate some materials and be difficult to remove, requiring additional solvents. The average pH of a long-term, aerially applied retardant is 5.5 to 7.5. Because of this and the high concentrations of nutri

- ents that make up the products, landscape plants coated with fire retardant should be washed as soon as possible to prevent chemical burns to foliage.
- Foams are typically applied with ground equipment. Foams are mostly uncolored, concentrated dish detergents and are 99 percent water, 1 percent surfactant, foaming agents, corrosion agents and dispersants. They can be removed by thoroughly rinsing the area with water.
- Gels also are typically applied from the ground. They consist of 95 percent to 98 percent water and 2 percent to 5 percent thickeners and stabilizers. They come in two forms that can be identified by color:
 - Orange or clear gels, which can be removed by rinsing with water or citric acid, and
 - Blue gels, which must be treated as an oil-based clean-up.



Although most fire retardants are not considered toxic, do not rinse the retardant off your property or into a storm drain. Recover cleaning wastewater with a sponge, mop, or pump so that it can be properly disposed to the sanitary sewer system.

Do not allow fire retardants or cleaning agents to enter a watercourse, including curb gutters, storm drains, creeks, and lakes. Retardants can have adverse impacts on water quality and ultimately on fish and other aquatic life. Create a berm downslope from cleaning activities to capture wastewater

before it leaves your property. Wastewater can be recovered with a pump or wet-vacuum, and properly disposed to the sanitary sewer system.

At no time should chlorine bleach, or bleach-based products be used to clean up any type of retardant, as this could produce harmful and explosive gases. As retardant products are mostly water, they will eventually evaporate. The remaining ingredients can cause eye irritation and cuts, scratches, or chapped skin to sting. Wear protective gear, including long sleeves, eye protection and a respirator when cleaning fire retardant. Clean-up of interior spaces should be done by professionals trained in fire restoration work.

Although modern retardants are not considered toxic, it is a good idea to avoid making puddles when cleaning so that pets and wildlife do not ingest this material. Pets should be shampooed to remove any material that is on them, although the main effect is just a temporary drying of skin.

Perform Post-Fire Tree Risk Assessments and Treatments

Safety is the primary concern during post-fire tree assessment and care. Standing dead trees, particularly fire-damaged trees, are dangerous and unpredictable. If they fall, they can cause serious damage and even death. While it is possible for property owners to perform assessments and remedial work themselves, it is also important to recognize your limits. Strongly consider hiring the services of a certified, experienced and insured arborist to safely assess tree conditions and risks, and complete any consequent pruning or removal. Whoever does the work should wear appropriate protective equipment and avoid climbing into trees or working on large trees from a ladder.



Greg Creacy of the Texas Parks and Wildlife Department evaluates impacts to the Lost Pines following the 2011 Bastrop Complex Wildfire.

The initial step is to identify and remove standing trees that present a safety hazard. Property owners are liable for any losses or damages that are the result of a tree or limb falling from their land. Questionable trees near structures, overhead electrical lines, roadways, paths, or other commonly occupied areas should be assessed and removed promptly if compromised. In the City of Austin, protected-size trees (19 inches and greater in diameter, measured 4½ feet above ground surface) that are dead or otherwise hazardous still require a permit from the City Arborist before removing the tree or pruning more than 25 percent of its canopy.

Don't assume that damaged and scorched trees are completely dead. Many native plants are adapted to wildfire and can survive severe burns. Healthy deciduous trees, such as native oaks, can be resilient after being burned and may produce new leaves and stems, as well as sprouts at the base of the tree. Evergreen trees may also survive, if more than 10 percent of their foliage is still green (Skelly 2). Young trees can sustain a lot of damage and still recover. Prune severely burned limbs and defer the decision on whether to remove the entire tree until the following growing season, when you can better assess the health of the tree.

Resist the urge to remove all dead or burned vegetation. Fire-damaged trees that are located far from normal human activity usually do not necessitate



Standing trees impacted by wildfire can present a serious safety hazard when located near human activity. A certified arborist can safely assess tree conditions and risks.

tree removal. Leaving some standing dead trees in low risk areas can be beneficial to the environment by adding structure to the ground, giving wildlife and insects habitat, and returning valuable nutrients to the ground when they eventually do fall.

Evaluate Soils and Irrigate Survivor Trees

Sometimes after a fire, soils can become water-repellant (hydrophobic). First, determine if the soil will absorb water. To test for hydrophobic soils, pour a cup of water on the soil. If the soil does not absorb it and the water beads up on the surface, scrape off the top inch or two of soil and try again. If the water still will not penetrate the top couple of inches of soil, rake the ground to loosen the impermeable layer. Mulch the area with a thin layer of weed-free straw after raking to help it absorb water. Twenty percent of the soil should show through the straw when finished. It may be necessary to lightly push the straw into the soil (crimp)



High intensity fire can make some soils repel water, or hydrophobic.

When water will soak into the soil, start irrigating your trees (as local watering restrictions allow). The goal is to soak the entire area under the dripline (from the trunk to the branch tips) and a few feet past the dripline, to a depth of 12 inches to 15 inches. Water-absorbing roots are in the top 12 inches to 15 inches of soil. It is not necessary to water more deeply.

A soaker hose that slowly releases water into the soil works well. Place the hose in a circle a few feet away from the tree trunk. After watering for an hour, check the depth of water penetration by digging a small hole in the soil. After it has soaked the necessary 12 inches to 15 inches, move the hose out another two to three feet and water that area. Continue to move the soaker hose outward until the dripline and two to three feet outside the dripline have been watered.

If the trees are irrigated by a drip system, it may have to be expanded to wet a larger area. A few emitters will not be enough to water the entire area under a big tree.

Where sprinklers are used, make sure they provide full coverage under the tree and out past the dripline a few feet. Manage the sprinklers with an on/off/on schedule to prevent runoff and soil erosion and to wet the soil slowly, but thoroughly.

Check trees weekly and water when the soil dries to six inches deep, not only in the summer, but also through the fall and winter, unless there is sufficient precipitation to maintain adequate soil moisture. It is critical to water slowly to allow water to soak in and avoid runoff.

Characterize, Segregate, and Choose Proper Disposal Methods for Wastes

During cleanup and recovery efforts, large volumes of various types of debris may need to be disposed. Different types of waste will require different methods of disposal and will therefore need to be segregated accordingly. Refer to the following table for waste segregation categories and corresponding disposal options.

Although most materials are not recyclable if damaged by fire, much of the metal, brick and other debris might be. Before you haul anything to a third party recycling center, call to find out:

- Which materials are accepted.
- Whether fire-damaged materials are accepted.
- Whether they charge a fee for recycling. (This usually depends on the material and its condition. If the material is valuable enough, they might pay you for it).

Contact your local jurisdiction for guidance on disposal of household hazardous waste items. For Austin residents, these items can normally be disposed

<i>Waste Type</i>	<i>Examples</i>	<i>Disposal Options</i>
Vegetation	Yard waste, trees, brush	<ul style="list-style-type: none"> • Recycle/compost on-site • Recycle by third party • Haul to Type IV or Type I Municipal Solid Waste Landfill
Clean Lumber	Lumber that is not painted, stained, or chemically treated	<ul style="list-style-type: none"> • Recycle on-site • Recycle by third party • Haul to Type IV or Type I Municipal Solid Waste Landfill
Animal carcasses	Deceased pets, livestock, wildlife	<ul style="list-style-type: none"> • In the City of Austin, call 3-1-1 for collection by Austin Resource Recovery • Burial on-site (contact TCEQ for guidance on burial location requirements) • Haul to Type I Municipal Solid Waste Landfill
Household / Commercial Waste	Paper, cardboard, plastic, clothes, food	<ul style="list-style-type: none"> • Haul to Type I Municipal Solid Waste Landfill • Recycle by third party
White goods	Refrigerators, stoves, washers and dryers	<ul style="list-style-type: none"> • Recycle by third party • Haul to Type I Municipal Solid Waste Landfill
Construction / demolition waste	Painted/stained/treated wood, sheet rock, roof shingles	<ul style="list-style-type: none"> • Haul to Type IV or Type I Municipal Solid Waste Landfill • Recycle by third party
Household hazardous waste	Cleaning products, paints, solvents, pesticides, automotive products, compressed gas cylinders, batteries, air conditioners, electronics	<ul style="list-style-type: none"> • Residential hazardous waste can be taken to the City of Austin Household Hazardous Waste Facility (see more information below) • If available, dispose of at a hazardous waste collection event • Most of these wastes can be disposed of at a Type I Municipal Solid Waste Landfill

of at the City of Austin Household Hazardous Waste Facility. For more information on the City's Household Hazardous Waste facility, including location, business hours, and items accepted, visit their website at: <http://www.austintexas.gov/hhw>.

For large wildfire events, your local jurisdiction may schedule special waste pick-ups. Contact your local environmental jurisdiction for event-specific waste disposal guidance.

Consider employing the services of a trained professional for significant exposure risks. If drums or other containers of unknown wastes are identified, call the City of Austin 24-Hour Pollution Hotline at (512) 974-2550 for guidance.



After a wildfire there is potential for severe soil erosion and accelerated water runoff due to the lack of vegetation and ground cover to stabilize the soil.



Different types of waste may require different methods of disposal and need to be segregated accordingly.

For additional waste disposal guidelines, contact the Texas Commission on Environmental Quality at (512) 339-2929.

Determine the Need for Soil Erosion and Sedimentation Control

Erosion and sedimentation can have devastating impacts on the environment - polluting surface waters and aquatic habitats with excess amounts of fine-grained soil particles. It strips nutrient-rich topsoil from the land which diminishes productivity and hinders reestablishment of natural vegetation. Practical measures prop-

erty owners can take to mitigate soil erosion are:

- Include erosion control planning in your debris-removal and land restoration activities. Consider hiring experienced and certified contractors who can develop and implement a successful plan for controlling erosion and restoring permanent vegetation.
- Protect sensitive areas by paying special attention to steep or barren slopes, severely burned areas, erodible soils, and areas directly adjacent to streams, wetlands or other water bodies.
- Where practical, preserve existing vegetation whether burned or unburned. The roots of vegetation hold the soil together. It is especially important to protect vegetation alongside surface waters.
- Minimize soil disturbance by limiting activity in areas with exposed soils. Avoid using heavy machinery during recovery efforts. Control impacts from livestock by deferring grazing in burned areas until plant growth has reestablished.

Establish Erosion and Sedimentation Controls

Identify locations where water and burn debris are likely to flow through your property and consider some of the following erosion and sedimentation controls:

- **Reseeding** may help restore your landscape if existing vegetation has been badly damaged. However, in many cases, the preexisting vegetation may re-sprout and recover with normal rainfall.
- **Hydraulic mulching** is a method that uses a slurry of shredded wood or paper fiber with a binder that helps decrease runoff and increase water infiltration. Seed can be included in the slurry for revegetation.
- A layer of **wood mulch** can reduce runoff and protect soil from erosion. Chipping some of the burned vegetation on your property is a good way to create wood mulch for erosion control while using some of the fire debris onsite.

- **Mulch socks** are biodegradable, photodegradable, or recyclable mesh tubes, usually 12 to 18 inches in diameter, filled with mulch. They are typically used to intercept, settle, and filter runoff flows on slopes.
- **Erosion control blankets** reduce erosion in critical areas such as slopes and channels, and assist in the establishment of vegetation.
- **Silt fencing** helps intercept and detain sediment as it is transported from exposed soil areas.
- **Contour log terraces** can utilize large trees on the property that have been burned or cut down after the fire and serve as a barrier to runoff from heavy rainstorms.
- **Water bars** are installed across dirt roads and trails to redirect water and reduce erosion.

Do not install erosion and sedimentation controls that contain flammable materials, such as wood mulch, mulch socks and silt fencing, until the fire is completely out and there is no risk of re-igniting the fire.

Improper application of erosion and sedimentation control techniques can make conditions worse. For detailed information on how to correctly design and install erosion and sedimentation controls, refer to the City of Austin Environmental Criteria Manual, Section 1.4.0 located online at <http://www.austintech.amlegal.com/nxt/gateway.dll/Texas/enviro/section1-waterqualitymanagement>



Reseeding



Hydraulic mulching



Wood mulch



Mulch socks



Erosion control blankets



Silt fencing



Contour log terraces



Water bars

PLAN AND IMPLEMENT LONG-TERM RECOVERY

Evaluate Revegetation Needs

Not all burned areas require reseeding. Local plant species have evolved several mechanisms to survive wild-fire. Some will re-sprout, some will grow new leaves and others have fire resistant seeds that sprout after a fire. Some woody plants survive fire by having thick, protective bark or dormant buds below the soil surface. Most woody plants re-sprout if top growth is killed. Once top growth is lost, dormant basal buds begin growing. The success of unassisted vegetation recovery after a fire is dependent upon a number of factors, including:

- Types of plants and their adaptation to fire,
- Fire intensity,
- Precipitation before and after the fire,
- Soil type,
- Prior grazing history,
- Prior fire history,
- Season of the fire, and
- Management after the fire.

When determining the need for revegetation, take into account the severity of the burn and the abundance of undesirable plants that were on the land before it burned. In general, more severe burns and higher pre-burn populations of undesirable plants increase the need for revegetation. Examine the burned soil and residual ash material. If white ash is present, then resident seed from pre-existing native plants may no longer exist. White ash is an indicator that the fire burned very hot and any resident seed bank in the soil was likely killed during the fire in these areas. Also consider slope steepness, proximity to drainage ways, and overall land management objectives. Steep slopes should be stabilized quickly to control erosion. Vegetation in drain-



Shortly after this photo was taken, native grass and wildflower seed was applied by hydraulic mulch at the 2011 Oak Hill fire site to quickly stabilize slopes and protect a detention pond.

age ways will help reduce erosion and filter sediment from post-burn runoff. Re-seeding these areas with native grasses and/or re-planting with native plants may be a good idea.

Support New Plant Growth

Encourage good germination and establishment of desirable plants when revegetating burned areas of your property. Additional steps to bolster success of preferred plants are advised.

- If there is no ash layer, prepare a seedbed before and after broadcast seeding.
- Use drought-resistant plant stock and locally-collected seed that is native or adapted to Central Texas. Do not choose invasive plants or grasses, such as annual ryegrass. For guidance, refer to the City of Austin Grow Green

gardening education program (www.growgreen.org) and recommended native and adapted plant guide (www.austintexas.gov/department/grow-green/plant-guide).

- Explore ways to reduce irrigation needs. Consider reducing the size of your turf areas with wildscape or xeriscape plants. Revegetate turf areas in full sun locations with alternatives to St. Augustine grass, such as Buffalo, Bermuda, or Zoysia.
- To improve the soil structure and contribute to a healthy nitrogen cycle, add nitrogen-fixing legumes (plants in the Fabaceae/pea family), such as Texas Mountain Laurel, Redbud, Honey Mesquite and Bluebonnets.
- Increase seeding rates to improve competition with undesirable plants.

- After the fire is completely out and there is no risk of re-igniting the fire, provide a thin protective mulch cover, such as native chipped wood, to protect soil and seeds from erosion, conserve moisture, and moderate soil temperatures. Too thick of a mulch layer will prohibit vegetation growth.
- Manually remove emerging undesirable plants to the extent possible.
- Defer livestock grazing until vegetation has been established, usually after two growing seasons.
- For additional recommendations on revegetating land after a wildfire, contact the City of Austin Watershed Protection Department or your local environmental jurisdiction.

Manage Invasive Plants



Invasive tumbled mustard (Sisymbrium altissimum) emerges after a wildfire.

Quickly develop a management plan for invasive plants within burned and adjacent areas. Wildfires can expose ground surfaces and create conditions that favor the establishment of invasive plant species. While many native and desirable plants survive fires, their ability to reestablish, thrive and reseed is reduced by the presence of invasive

species that aggressively compete for water, light, and soil nutrients. The key is to support the reestablishment of desirable plants and healthy plant communities. For detailed guidance on invasive species management, refer to the City of Austin Invasive Plants Management website:

<http://www.AustinTexas.gov.Invasive>.

Support Wildlife Recovery

Understandably, many people fear that fire will harm wild animals. But animals' senses are often far stronger than we can imagine. Before it ever comes to a race to safety, animals in the wild are almost always aware of a fire growing nearby. Even small flames crackling and popping through dry grass in calm winds are easily seen, smelled, and heard from great distances. So escape from a wildfire is easy for most individual animals who are able to avoid direct harm by moving away or burrowing underground, and species as a whole are well-adapted to fire as a natural part of their ecosystem. In fact, many wildlife species depend on fire for their survival, and thrive after a fire event. The grasses, seedlings, shrubs, and trees that re-establish burned areas provide

an ideal environment for many small seed-eating mammals and birds. This abundance of small prey attracts other wildlife like foxes, bobcats and hawks.

You can support post-fire recovery of general wildlife populations by working to enhance wildlife habitat on your property. Take steps to turn your backyard, balcony, or patch of grass into a habitat for wildlife.

- Provide natural food sources for wildlife by planting native vegetation. Native grasses, shrubs and trees provide the foliage, nectar, pollen, berries, seeds and nuts that many species of wildlife require to succeed. Avoid providing supplemental food via animal feeders. Supplemental food will hold animals in habitats that cannot naturally support them, and populations will exceed carrying capacity. Excessive animal populations that stay in a burned area will quickly eat any new plant regrowth, slowing or even stopping the natural land healing process.
- Supply clean water for wildlife year-round. Water sources may include natural features such as ponds, lakes, rivers, springs, and wetlands; or human-made



Most wildlife can instinctively sense when fire is near, and will flee or take refuge to avoid harm.

features such as bird baths, installed ponds, rain gardens, or watering troughs. Provide “ladders” into and out of above-ground watering troughs using stacked rocks or wire-mesh. This allows small animals and birds to access the water, and a way out if they fall in. Do not let your supplemental water sources turn into a mosquito-breeding ground - change the water a few times each week during warm weather.

- Create cover for wildlife to provide places to safely reproduce and raise its young. Native vegetation, shrubs, thickets, and brush piles provide great shelter. Even some of the badly burned or dead trees can be left in place as they can provide value to lots of different animals. Birds like flickers, kestrels, and chickadees use tree cavities for nesting and perching, while woodpeckers thrive on the insects that inhabit fire-killed trees.
- If the fire-impacted area is known to include endangered species habitat, contact the Texas Parks and Wildlife Department for information on how you can limit further impacts and perhaps assist with the recovery of that special habitat.

Evaluate Stormwater Ponds

Wildfire can affect a stormwater pond’s ability to properly function. If you are aware of a stormwater pond that was burned, filled with sediment and burned debris or otherwise impacted by fire, contact the City of Austin Watershed Protection Department by calling (512) 974-2550 and determine what steps need to be taken to restore function to the pond.

Monitor Land Recovery and Let Nature Take Its Course



Monitoring the environmental recovery at the 2011 Oak Hill fire site finds many native grasses, shrubs, and trees beginning to reestablish shortly after the fire.

Periodically monitor and evaluate the burned area to determine the adequacy of your land recovery management practices and make adjustments as necessary. If appropriate, consider allowing the area to recover naturally. In some natural areas, inaction may be the best solution for environmental recovery. Doing nothing allows the land to heal naturally over time, as it did once before.



Many native plants are fire-adapted, and thrive after a wildfire.



PHONE NUMBERS

Capital Area Master Naturalists	(512) 863-8250
City of Austin - 24-Hour Pollution Hotline	(512) 974-2550
City of Austin - Austin Energy	(512) 494-9400
City of Austin - Austin Fire Department	(512) 974-0130
City of Austin - Austin Fire Department, Firewise Program Coordinator	(512) 974-0298
City of Austin - Austin Water Utility, Wildland Conservation Division	(512) 972-1690
City of Austin - City Arborist	(512) 974-1876
City of Austin - Development Assistance Center	(512) 974-6370
City of Austin - General Information	3-1-1
City of Austin - Household Hazardous Waste	(512) 974-4343
City of Austin - Parks and Recreation Department, Park Rangers	(512) 978-2600
City of Austin - Watershed Protection Department	(512) 974-2550
City of Austin/Travis County - Office of Homeland Security and Emergency Management	(512) 974-0450
Lower Colorado River Authority	(512) 473-3200
The Nature Conservancy, Austin Office	(512) 623-7240
Texas A&M Forest Service - Austin Area Wildland Urban Interface Specialist	(512) 339-4118
Texas Commission on Environmental Quality - Debris Hotline	(800) 687-7057
Texas Commission on Environmental Quality - Regional Office	(512) 339-2929
Texas Parks and Wildlife Department	(512) 389-4800
Travis County - Fire Marshal	(512) 854-4621
Travis County - Natural Resources Program Manager	(512) 854-7214
Travis County - Park Rangers	(512) 263-9114
Underground Utility Locating	(800) 545-6005
United States Fish and Wildlife Service - Austin Ecological Services Office	(512) 490-0057
United States Fish and Wildlife Service - Balcones Canyonland National Wildlife Refuge	(512) 339-9432

For a list of local erosion control supply companies, contact the City of Austin Watershed Protection Department.

WEBSITES

LOCAL RESOURCES

- Capital Area Council of Governments - Emergency Notification System Registration (Reverse 9-1-1)
<http://alertregistration.com/capcog/>
- Capital Area Master Naturalists
<http://www.txmn.org/capital/>
- City of Austin - Austin Energy Tree Pruning Program
<https://my.austinenergy.com/wps/portal/ae/residential/Residential-Services/tree-pruning>
- City of Austin - Austin Fire Department, Wildfire Division
<http://austintexas.gov/department/wildfire-division>
- City of Austin - Austin Resource Recovery, Curbside Collection Schedule
<http://austintexas.gov/department/Residential-Curbside-Collection-Schedule>
- City of Austin - City Arborist and Tree Permitting
<http://austintexas.gov/department/city-arborist>
- City of Austin - Environmental Best Management Practices for Wildfire Risk Reduction and Recovery
<http://www.austintexas.gov/WildfireEnviroBMPs>
- City of Austin - Erosion and Sedimentation Control Criteria
[http://www.austintech.amlegal.com/nxt/gateway.dll/Texas/enviro/section1-waterqualitymanagement?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:austin_environment\\$anc=JD_1.4.0](http://www.austintech.amlegal.com/nxt/gateway.dll/Texas/enviro/section1-waterqualitymanagement?f=templates$fn=default.htm$3.0$vid=amlegal:austin_environment$anc=JD_1.4.0)
- City of Austin - Grow Green
www.growgreen.org
- City of Austin - Homeland Security and Emergency Management
<http://www.austintexas.gov/department/homeland-security-and-emergency-management>
- City of Austin - Household Hazardous Waste
<http://www.austintexas.gov/HHW>
- City of Austin - Invasive Plants Management
<http://www.austintexas.gov/Invasive>
- City of Austin - Licensed Private Waste Haulers
<http://www.austintexas.gov/department/austin-private-waste-hauler-licensing>
- City of Austin - Prescribed Burns on City Wildlands
<http://www.austintexas.gov/rxfire>
- City of Austin - Water Conservation
<http://www.austintexas.gov/department/water-conservation>
- Prepared.ly - Stay Informed and Proactive about the Ongoing Threat of Wildfires
<http://www.prepared.ly>
- Ready, Set, Go! - Localized Personal Wildland Fire Action Guide
http://www.co.travis.tx.us/fire_marshall/pdf_files/ReadySetGoTexasBooklet.pdf
- Travis County - Fire Station Map and Department Information
http://www.co.travis.tx.us/fire_marshall/esd.asp
- Travis County - Cell Phone Text Notification of Burn Ban Status Changes
http://www.co.travis.tx.us/fire_marshall/news/burn_ban_alerts.asp

STATE RESOURCES

- Oak Wilt Information and Prevention Guidelines
<http://texasoakwilt.org>
- Texas A&M AgriLife Extension Service - Wildfire Information Network
http://www.extension.org/surviving_wildfire
- Texas A&M AgriLife Extension Service - Extension Disaster Education Network - Fires and Wildfires
<http://texashelp.tamu.edu/004-natural/fires.php>
- Texas A&M Forest Service - Daily Fire Danger and Advisory Maps
<http://texasforests.tamu.edu/main/article.aspx?id=1991>
- Texas A&M Forest Service - Disaster Resources
<http://texasforests.tamu.edu/main/article.aspx?id=14767>
- Texas A&M Forest Service - Firewise Home Construction, Renovation and Maintenance
<http://texasforests.tamu.edu/uploadedFiles/Edited%202012materials%5B1%5D.pdf>

Texas A&M Forest Service - Protect Your Home

<http://texasforests.tamu.edu/main/article.aspx?id=15378>

Texas A&M Forest Service - Wildfire Preparedness Home Page

<http://texasforests.tamu.edu/main/article.aspx?id=8512>

Texas Commission on Environmental Quality - Interpreting the TCEQ Outdoor Burning Rule

http://www.tceq.texas.gov/publications/rg/rg-049.html/at_download/file

Texas Commission on Environmental Quality - Managing Debris from Texas Wildfires

<http://www.tceq.texas.gov/assets/public/response/drought/managing-wildfire-debris.pdf>

Texas Commission on Environmental Quality - Protect Your Health and the Environment Following a Wildfire

<http://www.tceq.texas.gov/response/smoke/wildfires>

Texas Parks and Wildlife Department - Threatened/Endangered Species Management Guidelines

https://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/nongame/management/

Texas Wildfire Risk Assessment Portal

<http://www.TexasWildfireRisk.com>

NATIONAL / INTERNATIONAL RESOURCES

FEMA Wildfire Preparedness and Recovery Information

<http://www.ready.gov/wildfires>

Fire-Adapted Communities

<http://www.FireAdapted.org>

Firewise Communities/USA Recognition Program

<http://www.FireWise.org>

Firewise Tips and Tools for Homeowners

<http://www.firewise.org/wildfire-preparedness/be-firewise/home-and-landscape.aspx>

Invasive Plant Management after Fire

http://www.weedcenter.org/textbook/9_sheley_etal_fire.html

Ready, Set, Go! - International Program Homepage

<http://wildlandfirersg.org/>

Reducing Wildfire Risk While Achieving Other Landscaping Goals

http://www.interfacesouth.org/products/fact_sheets/fire-in-the-interface-fact-sheets/reducing-wildfire-risk-while-achieving-other-landscaping-goals/index_html

Selecting and Maintaining Firewise Plants for Landscaping

http://www.interfacesouth.org/products/fact_sheets/fire-in-the-interface-fact-sheets/selecting-and-maintaining-firewise-plants-for-landscaping/index_html

Proper Tree Care Guidelines and Tree Care Service Providers

<http://www.treesaregood.com>

U.S. Department of Agriculture - Natural Resources Conservation Service - Wildfire Protection and Restoration

<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATION&cid=stelprdb1044051&navid=120160320120000&pnavid=120160320000000&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Wildfire%20Protection%20and%20Restoration%20|%20NRCS>

U.S. Fish and Wildlife Service - Fire Management Homepage

<http://www.fws.gov/fire/>

U.S. Fish and Wildlife Service - Fuel Treatments in Golden-Cheeked Warbler Habitat

http://www.fws.gov/southwest/es/Documents/R2ES/AUES_GCWA_FINAL_BMP.pdf

U.S. Forest Service - Fire and Aviation Management Homepage

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