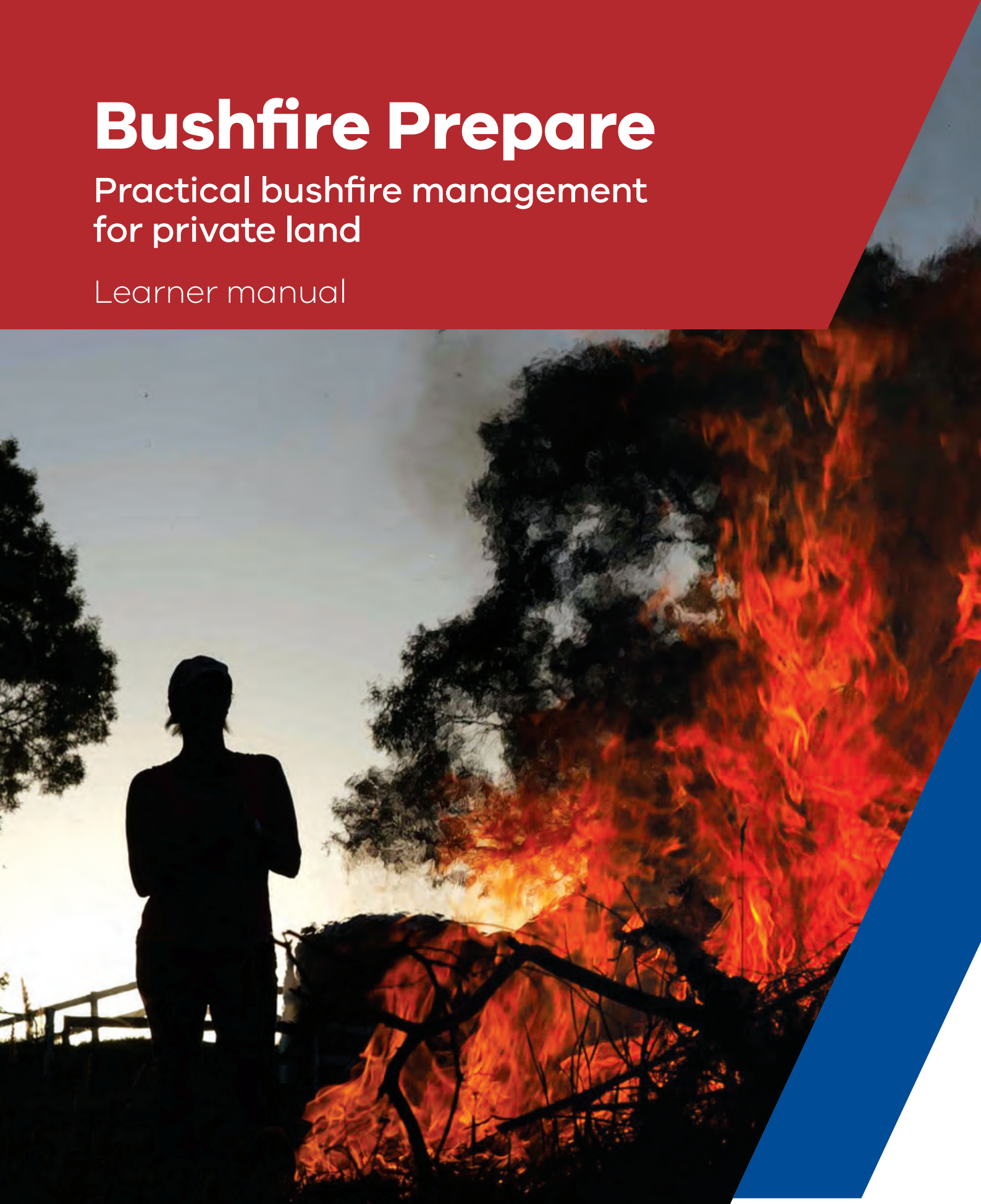
Bushfire Prepare

Practical bushfire management for private land

Learner manual



SAFER TOGETHER

Bushfire Prepare
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VICTORIA State Government

Disclaimer

This information is provided in good faith and is based on current best practice derived by fire management agencies.

This information contained in this resource is intended to be of assistance to private landholders who want more information to undertake planned burning and other fuel management activities on their properties.

However, it is not a comprehensive reference source and it is highly recommended that people who wish to undertake planned burning use other sources of information as well as experience.

Links to further information are contained in the resources section www.bushfireprepare.online/resources.

This information available on the understanding that you take reasonable care when using it. If you have any uncertainty about the application of the information to your particular circumstances you should obtain professional advice.

In particular, those who are inexperienced with fire should take additional steps to up-skill through relevant CFA programs including Fire Safety Essentials and Community Fireguard.

This program does not align with any public safety training package (PUA) competencies.

Despite the best efforts of the authors and the peer review process, it is not guaranteed that this manual is without flaw of any kind, and those involved in this project disclaim any liability for any error, loss or other consequence which may arise from relying on any information included in this publication.

This publication does not purport to provide legal or medical advice, and any recommendations herein do not necessarily represent current public policy.

No person should act on the basis of the contents of this publication, whether as to matters of fact or opinion or other content without seeking additional advice as required and assuming responsibility for their actions.

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INTRODUCTION

Many parts of Victoria are at high risk of bushfires. Over the last 100 years, bushfires have caused a great loss of life and livelihoods. Homes and towns have been destroyed.

Recovery from fires often takes many years.

It is important for you to understand the risk your community faces from fire.

Victoria is one of the most fire-prone areas in the world. Understanding your level of risk is the first step in knowing what to do before and during a fire. By recognising and understanding your risk environment this will also help you to start preparing your property for fire and know what to do.

Program focus

This program is aimed to assist property owners of medium sized rural properties (1 to 10 hectares) within the bushfire risk engagement areas to prepare their properties within the context of the regional bushfire management strategies.

It is also designed as a tool to assist other landholders understand their fire risk, how to reduce that risk through appropriate vegetation management and prepare a fire-ready plan.

The program is designed to complement CFA's existing range of bushfire community engagement programs, and where relevant incorporates some aspects of these programs.

Build individual capability

The program supports people to understand their own risk, make informed decisions, and take responsibility for preparing themselves, their families, and their properties.

Start small and make progress

Preparation is most effective when it is practical and achievable. The program encourages small, manageable actions that build confidence and lead to longer-term preparedness.

Plan for fuel management and bushfire preparedness

The program supports participants to develop practical fuel management plans while also considering how they will respond on days of elevated fire risk.

This includes understanding the role of low-intensity burning and other fuel reduction activities, assessing property and landscape risks, planning for safer access and defendable space, and making informed decisions about when to stay, when to leave early, and how to enact a bushfire survival plan.

Participants are encouraged to align fuel management actions with broader preparedness planning, drawing on CFA's Plan and Prepare guidance.

Learn through doing

Hands-on activities, local knowledge, and practical experiences—such as low-intensity burning, property walks, fuel management, and community-led projects—help people develop skills and confidence.

Empower local action

Communities are best placed to understand their local landscape, values, and risks. The program supports locally led solutions, partnerships, and decision-making that strengthen bushfire resilience.

Safer Together

Safer Together is our approach to reducing the risks of bushfire in Victoria that combines stronger community partnerships with the latest science and technology to more effectively target our actions.

This approach saw us move from a hectare target for planned burns to a risk reduction target for bushfire management. It means a more integrated approach across public and private land. Fuel management is just one of the actions we will take to protect lives, homes, the economy and the environment.

Safer Together involves fire and land agencies working together with communities, combining in-depth local knowledge with the latest science and technology to reduce bushfire risk on both public and private land. Strategies and solutions are based on community values and risk is measured using our local knowledge, field data and bushfire simulation technology.



Figure 1: Safer Together approach.

Bushfire Risk Engagement Areas (BREAs)

Bushfire Risk Engagement Areas (BREAs) were identified through the 2017–2019 strategic bushfire management planning process to highlight locations where managing bushfire fuels can most effectively reduce risk.

These areas help agencies and communities focus efforts on the highest-priority locations and support discussions about the most appropriate ways to reduce bushfire risk.

BREAs encourage collaboration between land and fire management agencies, local government, stakeholders, and landowners to explore fuel reduction and other risk treatment options on both public and private land.

They are not legislated planning zones and do not require any action from landowners or agencies, but instead provide a framework for informed conversations and coordinated risk-reduction efforts.

A multi-pronged approach

Bushfire safety is built from several layers working together. No single action - not even a well-run planned burn - will protect people or a house on its own.

- **Layer 1:** People: a written household bushfire plan. Leaving early is the safest option. Decide triggers, routes, kits, pets/livestock and communication before the season.
- **Layer 2:** The building: prepare the house and immediate surrounds so embers and radiant heat are less likely to ignite it.
- **Layer 3:** The garden and landscape: landscaping for bushfire and fire-wise planting create defendable space, break fuel continuity and reduce flame contact and radiant heat on the house.
- **Layer 4:** Broader fuel and land management: slashing, raking, grazing, mechanical treatment and, where it is appropriate and permitted, planned or landscape burning. Treat this as one option among several, not the default.

Bushfires can be unpredictable and in the most extreme conditions, even with the most well-prepared properties, bushfire losses can happen.

MODULE 1 – GENERAL BUSHFIRE BEHAVIOUR

1.1 Factors affecting bushfire

Bushfire behaviour and bushfire spread can alter dramatically depending on changes in fuel, weather and topography. These are the three main factors that influence bushfire behaviour.

1.2 Basic fire science

Combustion is a chemical reaction that gives off heat, light and/or flames. Combustion (or fire) initially takes place when the vapours given off by a combustible material combine with sufficient heat and oxygen (air) to ignite.

The fire triangle (figure 2) depicts the three basic components necessary for a fire to ignite, burn and continue to burn.

- **Oxygen** is a colourless, odourless gas which makes up about one fifth of the volume of the atmosphere (the air we breathe) and is necessary for a fuel to burn.
- **Heat** every fuel has a particular temperature at which it will begin to burn, known as its ignition temperature. A source of heat, such as a naked flame, is required to bring a fuel to its ignition temperature.
- **Fuel** is any material such as grass, leaf litter and live vegetation which can be ignited and sustains fire.

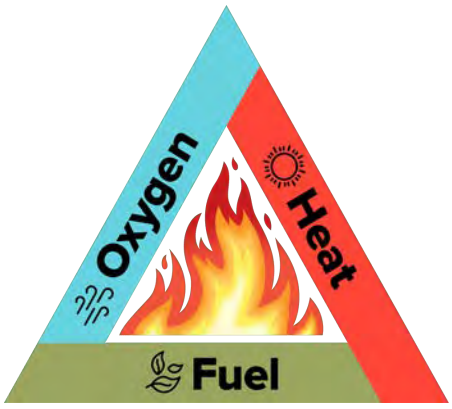


Figure 2: The fire triangle.

Removing any one of these three components will extinguish the fire. Sometimes, though, you need to ensure that it is permanently removed. If you allow that basic component to be reintroduced, if enough of the other two are present when you allow it back in, the fire can reignite.

1.3 Fuel

Fuel is one of the most important factors that influences the way fire behaves and travels.

Fuel varies in its type, size, quantity, arrangement and moisture content.



1.3.1 Fuel type

Common types of fuel involved in a bushfire include:

- Grass.
- Forest litter lying on the ground.
- Small shrubs and scrub.
- Trees, logs, stumps and bark.
- Slash (tree residue remaining after logging).
- Decomposing humus and duff (fine ground litter).
- Plantation prunings.

Different vegetation types lead to different types of fire behaviour, mainly because of variations in fuels. The different vegetation types can be placed under broad ategories of forest, scrub and grassland.

Vegetation type is important in a bushfire context because it tells us information about:

- How much fuel is available (fuel loads).
- How the fuel is arranged.
- The flammability of that vegetation type.

Grass

Grass is a fine fuel and burns faster than bush or forests.

Grassfires tend to be less intense and produce fewer embers than bushfires, but still generate enormous amounts of radiant heat.

- The taller and drier the grass, the more intensely it will burn.
- The shorter the grass, the lower the flame height and the easier the fire will be to control.
- Short grass (under 10cm) is a much lower risk.

Grassfires can start earlier in the day than bushfires, because grass dries out more quickly when temperatures are high.

Living in a grassland area with dried-out brown or golden-coloured grass that is over 10cm high is a fire risk. There are some exceptions, such as Phalaris grass, which will burn even when green.

Bark

Bark fuel is the bark on tree trunks and branches. Bark lying on or near the ground or draped over understorey plants is considered to be surface, near-surface or elevated fuel.

Fine fibrous bark types (such as Stringybarks) create short distance spotting while Ribbon bark types create long distance spotting.

Forest and woodland fuels

Forests occur throughout Victoria and encompass great floristic diversity. Forests are generally characterised by tall, straight trees, but there is a great degree of variability in forests. Forests are described as having multiple layers of vegetation, including a pronounced shrubby middle layer in addition to a taller canopy and an underlying layer of grasses, herbs or sedges.

Woodlands occur throughout Victoria, in isolated patches in the Mallee and on the plains of the north-central and south-west, the slopes of the central, and the lower slopes of the north-east, south-west and Gippsland areas.

Woodlands are dominated by trees and are characterised by a canopy cover of less than 30%. Woodlands also lack the dominant shrubby middle layers normally associated with forests and have a more grassy ground layer, typically without ferns.

Scrub and shrubland fuels

As suggested by their names, shrubland and scrub are dominated by shrubs and smaller trees (such as Melaleuca or Banksia) that are typically non-eucalypt in nature. The key difference between shrubland and scrub is the height of vegetation at maturity.

These fuel types contribute significantly to near surface and elevated fuel layers.



1.3.2 Fuel size

Fuel is normally classified as fine or heavy (coarse) in relation to size.

Fine fuels are less than 6mm in diameter, that is, thinner than a pencil. Fine fuels include leaves, twigs, grasses and some tree barks. They ignite easily and burn readily.

Heavy (or coarse) fuels are greater than 6 mm in diameter, that is, thicker than a pencil. Examples include sticks, branches logs and stumps. Coarse fuels tend to ignite less readily, burn more slowly and burn for much longer periods.

1.3.3 Fuel quantity

Fuel quantity is the amount of fuel in an area that a bushfire may burn.

The more fuel there is, the greater the fire intensity. But depending on how dry it is, not all the fuel in an area (the total fuel) will burn under given conditions. In a bushfire, increasing quantities of available fuel will cause:

- Increasing rates of spread.
- Greater fire intensity.
- Greater flame heights.

1.3.4 Fuel arrangement

The way pieces of fuel are arranged in relation to one another will affect how they burn.

Fuels that are tightly packed, either vertically or horizontally, for example, cut hay or heavy leaf litter, or compacted fuels such as hay bales or peat will smoulder due to a lack of oxygen.

Loosely arranged and continuous fuels are more likely to burn fiercely as more oxygen is available to promote combustion, for example, uncut grass, or hay closely grouped and standing.

Well separated fuel, such as sparse tussock grassland, are harder to ignite than more closely grouped collections of fuel because of reduced flame contact and radiant heat.

A continuous ladder of fine fuel from the ground surface to the crown of the vegetation encourages the development of crown fires.

Fuel in forests, woodlands and shrublands can be divided into four layers, each based on its position in the vegetation profile.

Through fuel management by minimising the vertical continuity of the vegetation, such as by removing elevated or bark fuels, fire spread can be reduced.

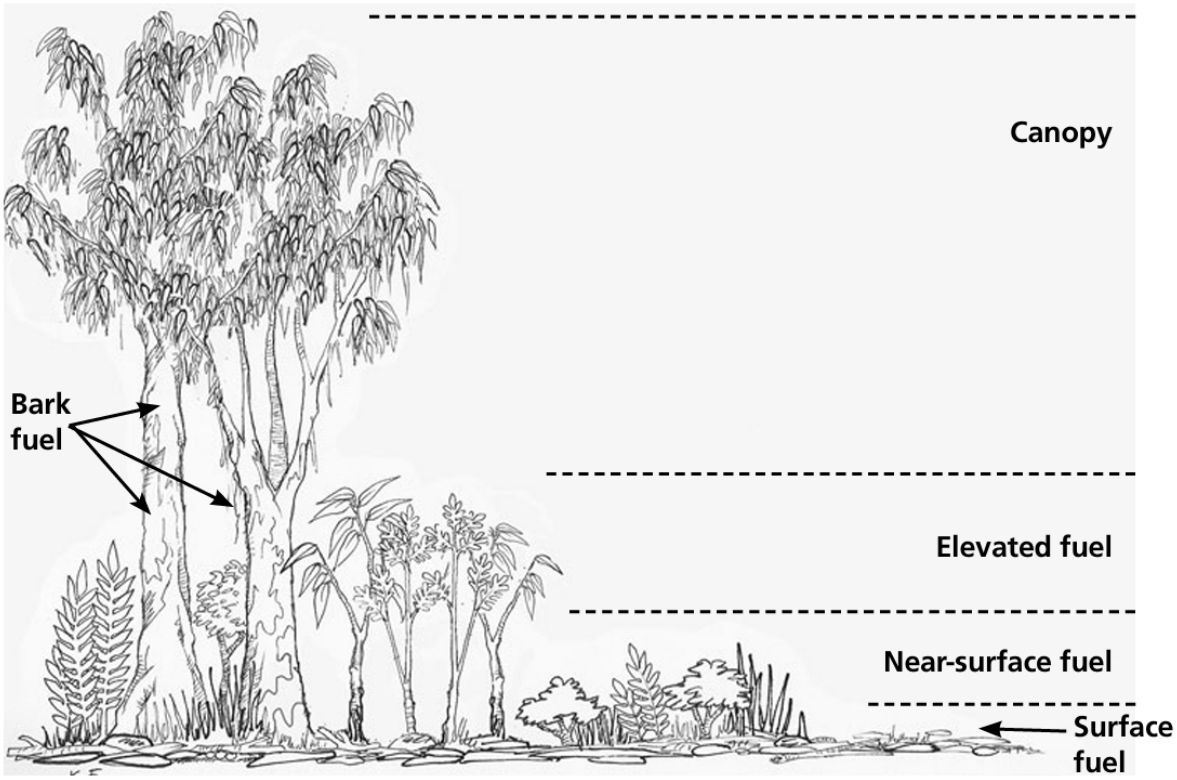


Figure 3: Fuel layers and bark (Fuel Hazard Assessment Guide, 4th Edition).

1.3.4 Moisture content

Fire behaviour is affected by how dry fuels are, or their moisture content. The moisture content will vary depending on factors such as weather conditions, vegetation type, and whether the fuel is dead or living. Essentially, the longer the period of time since it has rained, the drier the fuel.

The moisture content of fuels affects: ease of ignition (it can take longer to dry out and pre-heat) probability of spotting rate of combustion rate of fire spread amount of heat radiated.

1.3.5 Seasonal effects on grass fuel

Most annual grasslands in Australia have a life cycle where growth is greatest in spring and early summer until seed is set, following which the grass dies and slowly dries out.

The drying of grass following the end of active growth is called curing and can be seen by the yellowing of grass stems.

The stages of curing are identified below.

When grasslands are:

- Half yellow = 50% cured.
- Bleached yellow = 100% cured.
- When 100% cured moisture content will vary daily depending on the weather.

1.4 Weather

Weather is a major factor that impacts on fire behaviour. The key elements of weather are:

- air temperature.
- relative humidity.
- wind (speed and direction); and
- atmospheric stability.

1.4.1 Air temperature

The sun warms fuels, land surface and the surrounding air, raising their temperature. An increase in temperature, and the resulting decrease in relative humidity, will reduce fuel moisture content making it easier for fuel to ignite.

1.4.2 Relative humidity

Relative humidity (RH) is a measure of the actual water vapour content of the air, expressed as a percentage of its maximum water vapour holding capacity (at the same temperature).

A high RH figure indicates a high level of water vapour in the air; a low RH indicates a low level of water vapour in the air.

In a bushfire situation, fire intensity usually increases during the day as the temperature rises and relative humidity falls, and reduces at night as humidity increases and temperature drops.

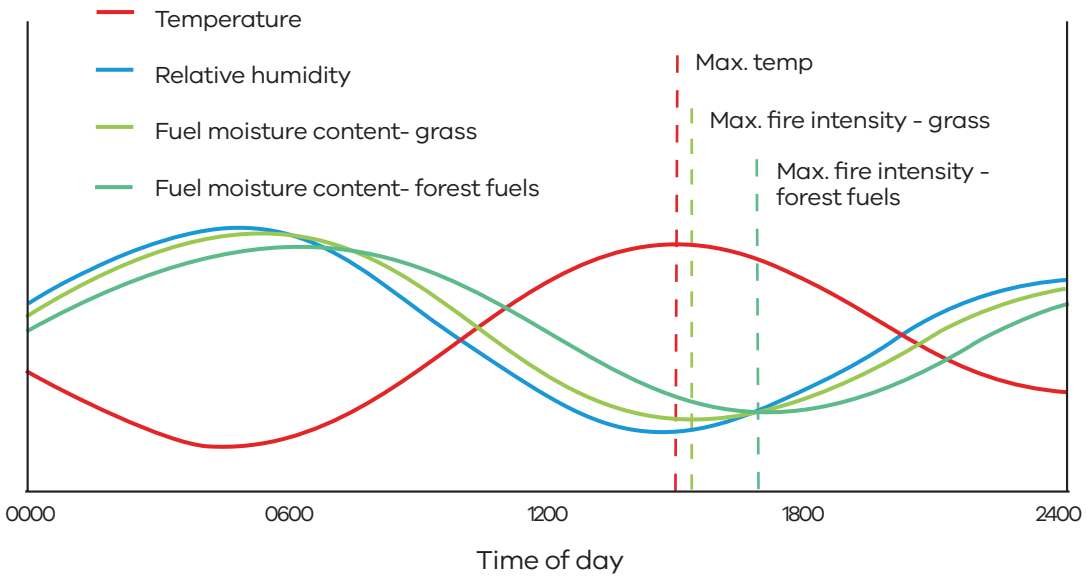


Figure 4: Variations to relative humidity and temperature throughout the day. (Note how the period of maximum fire intensity coincides with lowest fuel moisture content and occurs after the temperature begins to fall.)

1.4.3 Wind

Wind is the movement of air past a particular location. Wind is the most critical aspect affecting the shape, forward rate of spread, direction of spread, fire intensity and likelihood of spotting. It does this by:

- Increasing oxygen supply to the fire (increasing intensity).
- Bending flames towards new fuels (increasing preheating of fuels).
- Bending the convection column through new fuels.
- Transporting ember material ahead of the fire (spotting).

Generally, in summer wind tends to blow from inland Australia bringing hot, dry air to Victoria. This will dry out fuels, making fires burn more intensely.

A change in wind direction is one of the most dangerous influences on fire behaviour. Many people who die in bushfires get caught during or after the wind change.

In Victoria, hot, dry winds typically come from the north and north-west and are often followed by a south-west wind change. In this situation the side of the fire can quickly become a much larger fire front.

A change in wind direction can change the size of the fire front. This makes wind a very dangerous ingredient in a bushfire.

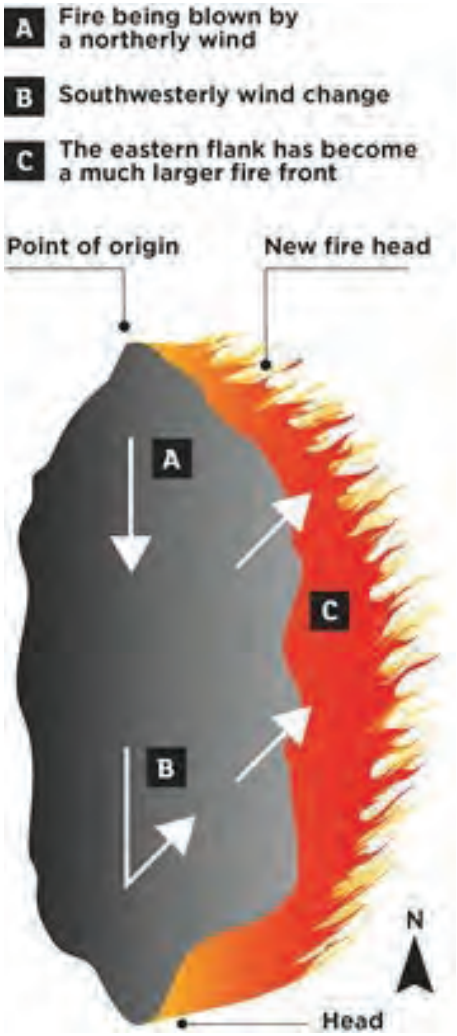


Figure 5: A change in wind direction can change the size of the fire front.



1.4.4 Atmospheric stability

Atmospheric stability is a measure of whether air is able to easily mix upwards and downwards in the atmosphere. All fires produce heated air which rises, carrying smoke, ash and embers away from the fire. This is known as a convection column.

The degree to which a convection column can form will influence how high and far large embers can travel. Also, thelarger the convection column, the more air is drawn into the fire, further increasing intensity.

A stable atmosphere will tend to resist formation of large convection columns and therefore limit fire behaviour. In stable atmospheric conditions, fire behaviour will generally be steady.

A stable atmosphere can be observed by:

- Steady, predictable winds.
- Stratus (layer-like) clouds.
- Hazy, lower atmosphere (perhaps morning fog).

In stable conditions smoke columns will tend to rise to a point, flatten out and then drift in the direction of prevailing winds

An unstable atmosphere can be observed by:

- Gusty, erratic unpredictable winds.
- Cumulus (cotton wool) type clouds showing noticeable vertical growth.
- Good visibility (clear lower atmosphere).
- Potential for thunderstorms to develop.

An unstable atmosphere produces gusty, erratic winds that promote development of large convection columns and encourage severe fire behaviour.

1.4.5 Drought

Drought is defined as extended periods of at least three months of below average rainfall. It can lead to:

- Greater quantities of fine fuel in forests.
- Greater quantities of available heavy fuels.

In a drought situation, living vegetation reacts to dry soil conditions by shedding an increased amount of leaf material to reduce transpiration rates. This increased rate of leaf shed can amount to an extra several tonnes per hectare of surface fine fuel. This will lead to more intense, faster spreading fires.

In addition, a drought situation means that a greater proportion of deep surface beds of fine fuel, and of heavy fuels, will be dry and available to burn.

This will also contribute to:

- More intense bushfires.
- Damaging forest fires.
- Increased likelihood of fires starting, spreading and causing damage.
- Increased likelihood of fires burning overnight.
- Fires crossing natural barriers (such as creeks) that would contain a fire in non-drought conditions.

1.5 Topography

Topography is the surface features of a particular area or region such as mountains, valleys, hills or plains. The topography of an area will influence the direction and speed at which a fire will travel. The effects can be quite complex as the topography will also affect the local wind speed and direction.

The two main elements of topography that influence bushfire behaviour are:

- Slope
- Aspect

1.5.1 Slope

Slope is the angle of the ground surface to the horizontal. It can be measured in degrees or expressed as a gradient or percentage.

Slope will dramatically affect a fire's rate of spread (and hence its intensity) when burning uphill because: hot air from the fire will travel through upslope fuels, drying and preheating them flames are closer to fuels on the uphill side, pre-heating them faster and contacting them sooner

Fires burning uphill:

A fire will burn faster uphill. This is because the flames can reach more unburnt fuel in front of the fire. Radiant heat pre-heats the fuel in front of the fire, making the fuel even more flammable. As a general rule, for every 10˚ slope, the fire will double its speed as it travels uphill.

For example, if a fire is travelling at five kilometres an hour along flat ground and it hits a 10˚ slope it will double in speed to 10 km/h up that hill, if the slope increases to 20˚, the fire will travel at 20km/h. By increasing in speed the fire also increases in intensity, with flames becoming even larger and hotter.

Fires burning downhill:

As fires travel downhill they tend to move more slowly as the flames and radiant heat reach less fuel.

1.5.2 Aspect

Aspect is the direction that a slope faces. It can affect fuel quantity, fuel type and fuel moisture content.

Aspect influences the amount of solar radiation that a slope receives. Northern aspects (slopes facing the north) have a greater exposure to the sun than southern aspects.

Therefore, they will generally have:

- Drier and hotter local environments.
- Drier dead fuels.
- Sparser, drier living vegetation.
- Less total fuel than more sheltered aspects.

This means that fires on northern and western aspects will generally burn more fiercely than fires on southern and eastern aspects.

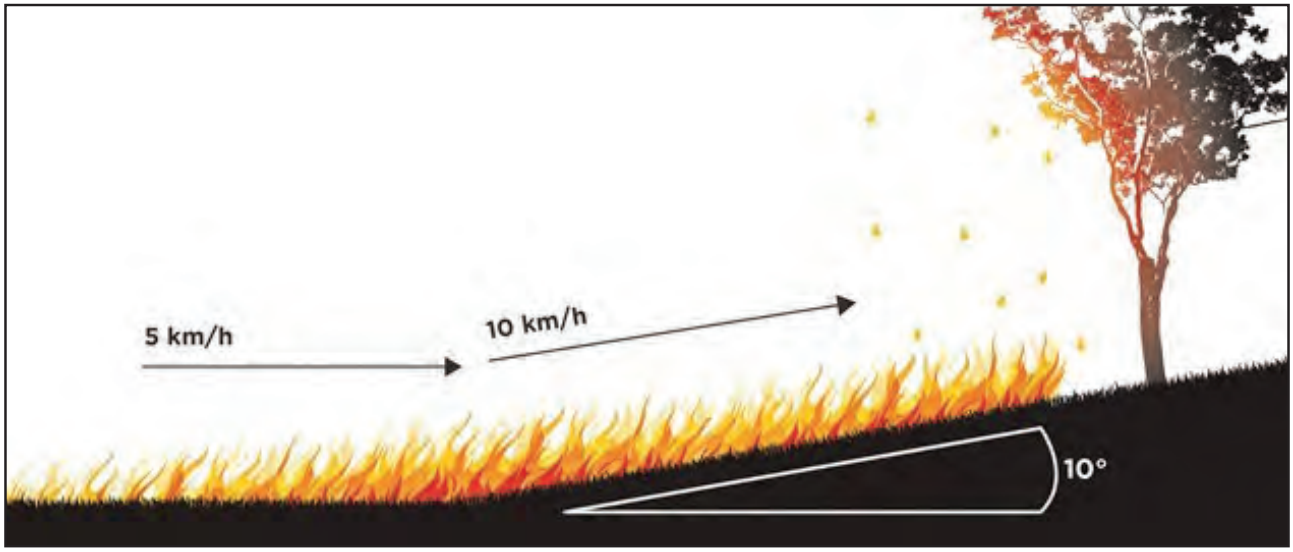


Figure 6: A fire will burn faster uphill. As a general rule, for every 10˚ slope, the fire will double its speed as it travels uphill.

1.6 Types of fire

A bushfire is an unplanned vegetation fire in grass, scrub and forest areas and may involve a combination of fuels. There are three types of bushfire:

- Ground fire.
- Surface fire
- Crown fire.

Ground fires

burn under the surface of the earth, burning the organic material in the soil layer, riplines in plantations, peat, humus, roots and tree litter.

These fires smoulder with no flame and little smoke and can burn unnoticed and may later ignite surface fires. You need to take care to avoid stepping into undetected hot spots in the ground.

Surface fire

travels on the surface in vegetation such as grass, crops, stubble, low scrub and forest litter. It is by far the most common type of fire. It burns in fuels lying on the ground consuming litter and low vegetation such as grass and scrub and does not extend into the crowns of trees.

Fire conditions can change rapidly due to strengthening winds or changes in wind direction which impact fire direction, intensity and rate of spread.

Crown fires

burn in the crowns (tops) of trees ahead of, and above, an intense surface fire. Radiant heat and direct flame contact from the surface fire will ignite treetops.

Crown fires are exposed to higher wind speeds than the surface fires. This stronger wind carries the fire along the upper storey vegetation faster than the rate of spread below. Crown fires normally need a surface fire and sufficient continuous canopy fuel to sustain them.

These are fast travelling fires that are extremely destructive and often consume all in its path;

- an intense surface fire follows shortly behind a crown fire
- short or long-distance spotting often accompanies crown fires (spotting distances of up to 25 km have been recorded), and
- falling material from a crown fire can start further surface fires below.

1.7 Radiant heat

Radiant heat is the intense heat that radiates from a bushfire. It is like the heat you feel from a campfire but can be up to 50,000 times stronger. In the right conditions, radiant heat can ignite exposed surfaces and crack or break windows.

Radiant heat is the biggest killer in a fire. The human body cannot absorb large amounts of radiant heat without its cooling system failing, leading to heat exhaustion and heart failure.

Radiant heat can be blocked by a solid object or barrier such as a concrete wall or building. This heat travels in straight lines, radiating out from a bushfire ahead of the flames and will bounce off solid objects, although it will travel through glass.

Protection from radiant heat

The best protection from radiant heat is distance. Protection from low levels of radiant heat includes:

- Wear protective clothing.
- Seek shelter inside a building – active sheltering.
- Stay in your vehicle.
- Pre-hydrate as much as possible.
- drink water regularly, to avoid dehydration.

If you are caught outside in a fire, seek to protect yourself by:

- Covering up exposed skin.
- Being as far away as you can – by doubling your distance from the fire you reduce the radiant heat load by four.
- Getting behind a solid object or barrier.
- Staying away from windows as radiant heat can pass through glass.

The only sure way to survive a bushfire and avoid radiant heat is to leave early and be away from the threat.

1.8 Embers

Spot fires occur when embers (firebrands) are carried by prevailing winds or hot, convected air and drop ahead of, or away from, the main fire.

Problems arising from spot fires include:

- spot fires near the main fire can be particularly hazardous as they have the potential to cut off escape routes;
- greater demand for firefighting resources;
- the rate of spread of a main fire front may accelerate rapidly if spot fires start ahead of it; and
- in winds of varying direction, the occurrence and spread of spot fires will be unpredictable.

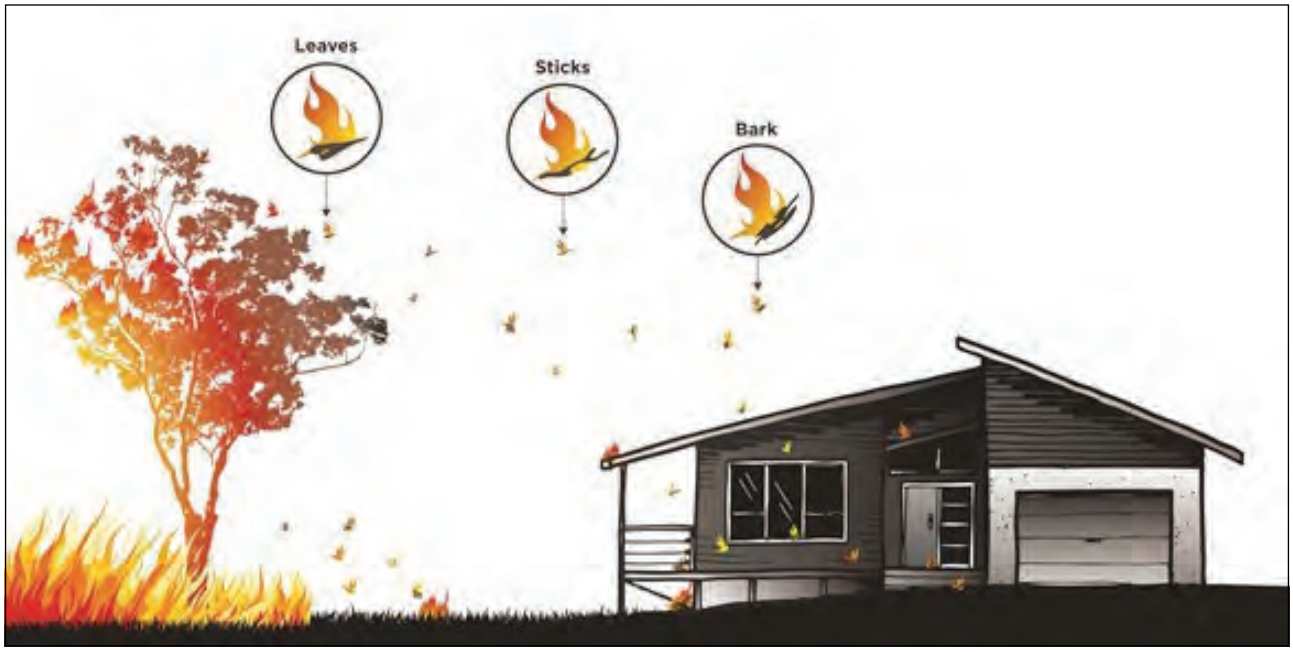


Figure 7: Embers can cause fires well ahead of the fire front

1.9 Fire intensity

The heat of a fire is called the fire intensity. This is governed by:

- How much fuel is burning.
- How quickly the fire is spreading.

A useful indication of fire intensity is how tall the flames are. This is described as flame height. Fireline intensity cannot be measured directly but is calculated from the fire rate of spread and the quantity of fuel that is consumed by the flame front.

It is expressed in units of kilowatts (kW) per linear metre (kW/m), and is the total amount of energy released by a fire front. Most of that energy is released upward in the atmosphere via convection. Some of this energy is released outward as radiant heat.

Fireline intensities for forest bushfires in Australia can range up to 100,000 kW/m, and up to 60,000 kW/m for grassfires.

The flames from an intense surface fire may progressively consume elevated shrub and bark fuels, and may eventually reach and ignite the crowns of trees.

Large scale landscape fires can produce extremely dangerous fire conditions through feedback of the fire, which can result in the fire creating its own weather conditions, spotting ahead of the fire and ember attacks. With this type of fire, the risks caused by the fire are more significant and the fire will behave differently to a fire starting in close proximity to your property. It will be more intense and is likely to travel faster.

It is important that fire intensity is not confused with the expression of radiant heat which is measured in kilowatts (kW) per square metre (kW/m2).

The difference is in the 'square'. A radiant heat value of 100 kW/m2 is extreme. It is completely incorrect to use the 100,000 kW/m figure to describe radiant heat.

1.10 Fire Danger Ratings

The Australian Fire Danger Rating System (AFDRS) is now the nationally adopted system for predicting and communicating fire danger across Australia.

Developed collaboratively by Commonwealth, state and territory governments, the AFDRS uses advanced science, weather forecasting, fuel information and fire behaviour modelling to provide more accurate and locally relevant fire danger ratings. It supports public safety by helping communities understand fire risk and take appropriate action, while also providing government and emergency services with improved decision-making tools.

The AFDRS introduced a simplified, nationally consistent Fire Danger Rating framework in 2022, replacing the previous six-level system. The four fire danger ratings are:

- **Moderate**: plan and prepare.
- **High:** be ready to act.
- **Extreme:** take action now to protect your life and property.
- **Catastrophic**: for your survival, leave bushfire risk areas.

These ratings are used consistently across Australia and are designed to provide clear, action-oriented advice to help people make informed decisions before and during periods of elevated fire risk.

What do Fire Danger Ratings tell us?

Research tells us that most people think Fire Danger Ratings (FDR) indicate how likely it is a fire will start.

This is wrong! They tell us how dangerous a fire would be if one started.

Fire Danger Ratings provide people with the information they need to take timely action to protect themselves and others from the potentially dangerous impacts of bushfires.

The Australian Fire Danger Rating System calculates, forecasts and reports fire danger using up-to-date fuel state data, spatial and satellite data, weather data, science and technology.

Daily forecasted fire danger ratings are shown on:

- Roadside signs (in jurisdictions where they are installed).
- Emergency services websites.
- The Bureau of Meteorology webpage.
- The VicEmergency App, emergency broadcasts through tv, radio, newspapers and the internet.

There are four levels of fire danger in the system, each with an action-oriented message.



The Fire Danger Rating sign style is shown above. The bar across the bottom left (under moderate) indicates when there is no fire danger rating.

Catastrophic (FBI 100+) For your survival, leave bushfire risk areas. If a fire starts and takes hold, lives are likely to be lost.	**Extreme (FBI 50-99)** Take action now to protect life and property – Fires will spread quickly and be extremely dangerous.
Catastrophic fire danger days, previously known as Code Red days in Victoria, are the deadliest conditions for a bush or grassfire. • These are the most dangerous conditions for a fire. • Your life may depend on the decisions you make, even before there is a fire. • For your survival, do not be in bushfire risk areas. • Stay safe by going to a safer location early in the morning or the night before. • If a fire starts and takes hold, lives and properties are likely to be lost. • Homes cannot withstand fires in these conditions. You may not be able to leave and help may not be available. What you should do: • Leaving high-risk bushfire areas the night before or early in the day is your safest option – do not wait and see. • Avoid forested areas, thick bush or long, dry grass. • Know your trigger – make a decision about: – when you will leave – where you will go – how you will get there – when you will return – what you will do if you cannot leave.	• These are dangerous fire conditions • Check your bushfire plan and that your property is fire ready • If a fire starts take immediate action. If you and your property are not prepared to the highest level, go to a safer location well before the fire impacts. • Reconsider travel through bushfire risk areas. – Expect extremely hot, dry and windy conditions. – If a fire starts and takes hold, it will be uncontrollable, unpredictable and fast moving. – Spot fires will start, move quickly and come from many directions. – Homes that are situated and constructed or modified to withstand a bushfire, that are well prepared and actively defended, may provide safety. – You must be physically and mentally prepared to defend in these conditions. What you should do: • Consider staying with your property **only** if you are **prepared to the highest level**. This means your home needs to be situated and constructed or modified to withstand a bushfire, you are well prepared and you can actively defend your home if a fire starts. • If you are **not prepared to the highest level**, leaving high risk bushfire areas early in the day is your safest option.

High (FBI 24-49) *Be ready to act – Fires can be dangerous*	**Moderate (FBI 12-23)** *Plan and prepare – Most fires can be controlled*
• There's a heightened risk. Be alert for fires in your area. • Decide what you will do if a fire starts • If a fire starts, your life and property may be at risk. The safest option is to avoid bushfire risk areas. On a High fire danger day: • Expect hot, dry and possibly windy conditions • If a fire starts and takes hold, it may be uncontrollable • Well-prepared homes that are actively defended can provide safety • You must be physically and mentally prepared to defend in these conditions What you should do: • Well-prepared homes that are actively defended can provide safety – check your Bushfire Survival Plan. • If you are not prepared, leaving bushfire-prone areas early in the day is your safest option. • Be aware of local conditions. Seek information by listening to ABC local radio, commercial and designated community radio stations, or watch Sky News TV, visit emergency.vic.gov.au, call the VicEmergency Hotline on 1800 226 226 or via National Relay Service on 1800 555 677.	• *Stay up to date and be ready to act if there is a fire* • If a fire starts, it can most likely be controlled in these conditions and homes can provide safety. • Be aware of how fires can start and minimise the risk. • Controlled burning off may occur in these conditions if it is safe – check to see if permits or conditions apply. What you should do: • Check your Bushfire Survival Plan. • Monitor conditions. • Action may be needed. • Leave if necessary

1.12 Module 1 Recap

- Differences in fuel type mean differences in general arrangement and bark and fuel size characteristics. Together with fuel load, fuel hazard and fuel moisture content they influence flame heights and rates of spread and hence fire intensities.
- Slope, aspect and elevation influence fuel type, available fuel quantity and fuel moisture content, and therefore rate of spread and fire intensity.
- Temperature, relative humidity, wind, atmospheric stability and drought index influence either proportion of fuels available to burn, or rate of fire spread, and thus fire intensity.
- You should be aware of your district's Fire Danger Rating throughout the fire danger period.

MODULE 2 – YOUR BUSHFIRE PLAN

If you live in an area at risk of bush or grassfires it is essential that you have a documented bushfire plan.

You will need to consider:

1. Which Fire Danger Rating is your trigger to leave?
2. Will you leave early that morning or the night before?
3. Where will you go?
4. What route will you take – and what is your alternative in the event that a fire is already in the area?
5. What will you take with you?
6. What do you need to organise for your pets or livestock?
7. Who do you need to keep informed of your movements?
8. Is there anyone outside your household who you need to help or check up on?
9. How will you stay informed about warnings and updates?
10. What will you do if there is a fire in the area and you cannot leave?

CFA has a number of resources to help you make a plan. These include:

- Fire Ready Kit.
- Leaving Early – bushfire survival planning template.
- Your guide to property preparation.

These resources are available on the CFA website: www.cfa.vic.gov.au.

To access further advice and tools relevant to this module, refer to www.cfa.vic.gov.au/fire-safety

2.1 How people die in bushfires

Bushfires carry multiple risks for people. Historical evidence of fires in Victoria shows us that radiant heat is a major cause of death for people caught in bushfire.

Fatalities also result when people become trapped in their homes.

Evidence from the 2009 "Black Saturday" fires indicates that many people died whilst sheltering inside their bathrooms. Many people associate the bathroom as a safe place to shelter based on anecdotal strategies for cyclone and earthquake.

However, no fire authority in Australia advocates bathrooms as a safe place to shelter from fire.

As well as being trapped inside their homes, many who perish during a bushfire do so when fleeing from fire at the last minute on foot or in a vehicle.

- 58% of people who died had made no preparations.
- 20% intended to stay and actively defend.
- 14% had made some limited preparations.
- 30% were taken by surprise.
- 14% were fleeing the fire.
- 69% were passively sheltering - but may have tried to defend, then retreated and passively sheltered.
- 44% were classed as vulnerable - young, old, acute or chronic illness or disability.

Overall, during bushfires there are two significant dangers to avoid:

- Radiant heat, particularly:
  - Getting caught in the open.
  - Getting caught on the road during a bushfire.
- Getting caught in a burning building

2.2 Understanding your risk

Before you start any property preparation, it is important to understand the fire risk you face as the methods to manage the risk may differ depending on the nature of your surroundings.

Bushfire risk is the likelihood of a fire starting, spreading and impacting on people, property and the environment – the things we care about most.

Victoria is particularly susceptible to large, intense bushfires which can spread up to 30 km or more across landscapes. This is due to Victoria's terrain, naturally flammable vegetation and frequent exposure to hot, dry, windy weather.

2.2.1 Grassfires

Grassfires can be extremely dangerous - people can die in grassfires.

You can expect:

- Dry and brown grass that easily catches fire.
- Grass more than 10cm tall will have a higher flame height and intensity.
- Faster burning than through forests as grass is a finer fuel.
- Radiant heat (the heat created by a fire)
- Fires that can start early in the day.
- Faster moving fires that travel up to 25 km per hour.

2.2.2 Forest and woodland fires

Risk is most extreme if you live surrounded by or near forest that is difficult to see through. However, all forest or woodland presents a bushfire risk.

You can expect:

- Very hot fire and many embers.
- Embers such as twigs, bark and debris arriving from far away.
- Dangerous levels of radiant heat and fire intensity.
- Trees falling in high winds.
- Embers landing for a long time after the fire has passed.
- Fine fuels (the thickness of a pencil or less) that burn very quickly.
- Heavy fuels that will burn very hot for long periods of time.
- A reduction in visibility due to very thick smoke.

2.2.3 Coastal scrub

Burning scrub, heath or other coastal vegetation can create hot, dangerous bushfires. If you live by, work by or travel to the coast you are at risk. Beaches, foreshores and shallow waters may not be safe or protect you from radiant heat. Often a fire will be burning between you and the beach.

You can expect:

- Very hot and fast-moving fires.
- Gusty ocean winds causing fire to behave erratically.
- A lot of embers.
- Fire reaching houses quickly.
- Busy, congested coastal roads.
- Radiant heat (the heat created by a fire)

2.2.4 Where cities and towns meet the bush or grassland

If you live in a built-up area on the edge of grassland – whether it's open grassland, parks, paddocks or reserves – you could be impacted by grassfire this summer. You do not have to live in the country to be at risk of bushfire.

You can expect:

- Scrub, forest and grass catching fire.
- A fire in a park or reserve quickly spreading to timber fences and gardens.
- Fire spreading from house to house once houses start to burn.
- A high risk of ember attack if the house is near dense bushland environments.
- Embers falling close to or on your house starting a new fire.
- Strong winds that bring embers from far away.
- Grassfires can start anywhere and spread quickly.
- Radiant heat (the heat created by a fire)
- Lots of smoke: Smoke makes it hard to see and can cause breathing difficulties.
- Remember, smoke may lead to traffic congestion and accidents so stay off the roads.

2.3 Stay or go?

If you live near areas that have significant amounts of bush, forest, long grass, or coastal scrub, then you need to plan ahead for the fire season.

Victoria is one of the most fire-prone areas in the world and it is inevitable that fires will occur every year in parts of the state. Fire – by its very nature – is unpredictable and difficult to control especially on hot, dry, windy days. On these days, a fire may start near you.

Not everyone thinks clearly in an emergency. A written, and preferably well-practised plan, will help you remember what needs to be done during a crisis. To provide advice about making the decisions around your fire plan, CFA has developed the Fire Ready Kit, which is available from the CFA website.

2.3.1 Being aware of options

On a fire risk day there are several survival options. The safest option is to leave a fire risk area before a fire starts. However, years of research and experience indicates that a large percentage of the population will choose to 'wait and see'.

This means they may leave when they hear of a fire in the area, or once the fire is already close by, effectively leaving too late to do so safely.

A small percentage of people will only choose to stay and defend their property. People need to understand the risks associated with their decisions on fire risk days and what the safer options are.

Generally, people will take one of the following five options.

1. Leaving early before a fire starts on fire risk day.
2. Leaving as soon as they are aware of a fire that could threaten them.
3. Leaving if threatened (wait and see).
4. Sheltering in a private bushfire shelter or;
5. Seeking refuge locally in a community etc.

People need to plan:

- When to leave (i.e. their trigger to go, such as the Fire Danger Rating).
- Where to go.
- What to take.
- Staying to actively defend a property throughout a fire.



2.4 What leaving early means

'Leaving early' means being away from high-risk areas before there are any signs of fire.

In other words, leaving early is a precaution you take just in case there is a fire – because in some conditions, any fire that starts is likely to be uncontrollable. Leaving early does not mean waiting for a warning or a siren. It does not mean waiting to see or smell smoke. And it certainly does not mean waiting for a knock on the door.

2.4.1 Why you should leave early

Because fires can start and spread very quickly in some conditions, leaving early is by far the safest option for anyone in a high-risk bushfire area. Many people have died trying to leave their homes at the last minute. Even a fire that is kilometres away could be at your door in minutes. In certain conditions, embers can travel many kilometres in front of a fire and a grassfire can travel faster than you can run.

Wind changes are unpredictable and can rapidly change the direction or size of a fire.

Driving in a bushfire is extremely dangerous, and potentially life threatening. A drive that would normally take five minutes could take two hours. Road closures, traffic jams, collisions, smoke, fallen trees and embers are all real possibilities.

In a bushfire, people may be confused, disoriented and physically or psychologically stressed. In these conditions, making good decisions becomes very difficult.

2.4.2 Leaving as soon as aware of a fire

People will wait until there is already a fire in the area - even though this is against CFA's advice

People need to understand the risks of this strategy. It may be more dangerous than leaving early because of:

- Heavy traffic.
- Poor visibility.
- Fallen trees and other obstacles.
- Emergency service vehicles responding.

2.4.3 Leaving if threatened

These people know there is a fire threat but choose to wait to see if it will directly threaten them personally. They may wait until they see smoke nearby or flames. People are more likely to die by fire either on the road or on foot.

2.5 Defending your property

Planning to stay and defend is a big decision. Defending a home requires at least two fit and determined adults, at least 10,000 litres of water and appropriate firefighting hoses and pumps.

For some, defending a property is a back-up option (if they are trapped by fire). Others will plan to leave early on some days and stay and defend on others, linking their decisions to the Fire Danger Ratings. For many others, staying to defend is not an option under any circumstances. Most homes in high-risk bushfire areas are not defendable on Catastrophic rated days.

- Do not expect a fire truck at your property during a bushfire.
- Do not rely on a warning. It is your responsibility to know when to leave.

Defending your home will be extremely hard work and requires significant resources. It may take hours and sometimes days of extreme effort. Children, the elderly, and people with special needs or a disability should be well away from the threat.

Before deciding to stay and defend you should seek advice from the CFA and read the CFA Fire Ready Kit.

Note that CFA does not recommend this option But it is recognised that some people will make this choice.

People need to know the risks, including the following.

- They may not succeed in saving the property.
- They may die while trying to save their property.
- People who are helping them may die.

It requires a very large commitment to the following.

- Property preparation.
- Equipment - firefighting hoses, pumps, protective clothing.
- Resources - large water supply.
- Knowledge and skill.
- Practice.

2.6 Back up plans

Fires are unpredictable and plans can fail. Having a back-up plan that identifies your shelter or last resort options may save your life if you are caught in a fire.

Some options may include:

- Private fire bunkers.
- Community Fire Refuge.
- Neighbourhood Safer Places – Place of last resort.
- Stationary car in a cleared area.
- Ploughed paddock or reserve with little vegetation.
- Body of water such as a beach, swimming pool, dam or river (does not include water tanks or above ground pools).
- Wombat hole, ditch or culvert.

2.7 Seeking shelter

A well-constructed and prepared building can provide a shield against radiant heat during the passage of a fire front.

However, during a Catastrophic day there is no safe place to shelter as no buildings are currently designed to withstand those conditions.

Bathrooms are a dangerous place to attempt to shelter. This is because they:

- Typically only have one door into the house.
- Are designed for privacy, with small, frosted windows.

2.8 Getting caught in a burning building

If people have sought shelter inside their homes as part of a stay and defend plan or an emergency contingency plan, they need to be prepared to take the following actions:

- Monitor what's going on outside and inside.
- Be prepared to isolate areas of the house that catch fire.
- Be aware of the exits of the house but do not immediately evacuate - it may still be too dangerous.
- Avoid getting trapped in rooms with one exit e.g. a bathroom.
- Be prepared to get outside of the house as soon as possible and have an idea of where to move to e.g. a blackened area or alternative building.

2.9 Preparing yourself – what to expect

Bushfires are frightening and stressful Understanding what to expect and being well-planned and confident about what you will do can help you to cope.

You can expect:

- Embers and spot fires moving ahead of the main fire.
- Smoke, heat, noise and possibly darkness.
- Lack of visibility, making it difficult to know where the fire is.
- Travel will be dangerous.
- Fires can approach from any direction (or two directions at once).
- Embers can land around your property for many hours before or after the main fire front has passed.
- Roads can be blocked by fallen branches, powerlines and congested with emergency vehicles.



2.10 Being mentally prepared

Bushfires are frightening and stressful. Understanding what to expect and being well-planned and confident about what you will do can help you to cope.

How you might feel:

- Confused
- Disorientated (don't know where you are)
- Unable to breathe properly
- Scared
- Thirsty and hungry
- Tired.

Preparing yourself mentally is very important. In a bushfire you will need to stay focused, avoid taking risks, and make critical decisions under stress. You also need to consider how you will cope mentally not just over a short period of time but over a longer period, whether that is a string of hot days, a long-running fire or a long fire season.

Maintaining a 'state of alert' over a long time can make your mind and body fatigued, affecting your efficiency and ability to make good decisions. The best way to prepare yourself mentally is to have a written and practised plan that everyone in your household understands and has agreed to. Speaking to people in your area who have experienced bushfire in the past or looking at written material or videos online may help you to prepare.

If at any time you are worried about your mental health or the mental health of a loved one, call Lifeline 13 11 14.

2.11 Children

It is understandable that you want to keep your family close in a stressful situation, but if you are planning to stay and defend your home during a bushfire, it is strongly advised that children are well away from the threat. There are several reasons for this:

- Children are more vulnerable to stress than adults.
- Although children may appear to cope in a crisis, their reaction to the event may not be evident until a much later time.
- Reactions to a crisis can lead to children becoming unable to cope with ordinary problems, suffering sleep problems and nightmares, and having relationship issues with parents, siblings and friends.

If you plan to stay and defend, make sure your children are looked after by someone who is well known to them and who they feel safe around. Remain positive and reassuring and ensure that you plan regular communication with your children to let them know that you are safe.

2.12 Looking after your physical health

Heat stress can make you confused and weak. In a bushfire, you can become dehydrated or heat-stressed without being aware of it.

Managing heat stress is important because it can lead to heat stroke – a serious, even potentially fatal condition. It is important to stay hydrated even if you don't feel thirsty, and be vigilant for symptoms of heat stress such as cramps, fatigue and dizziness.

Prevent heat-stress by:

- drinking plenty of water or electrolyte sports drinks
- avoiding alcohol and fizzy drinks
- regularly splashing your face with water to keep cool
- placing wet towels over your upper arms
- moving in and out of the shade and the house where possible
- loosening clothing to circulate air flow.
- Remove head protection temporarily
- getting some rest when safe to do so.

If someone is affected by heat stroke, call 000 immediately. Move them to a shaded area (if safe to do so). Remove excess clothing, damping them down and fanning air over them. Give small sips of fluid and place wet towels to the back of their head and armpits.

2.13 Smoke and ash

Smoke and ash resulting from a fire can affect a person's eyes causing pain, discomfort, vision impairment and distress. This may reduce a person's ability to enact their bushfire survival plan. Smoke can also be particularly dangerous for sufferers of asthma and other respiratory illness. People can provide some protection for themselves from smoke by covering their nose and mouth with dust masks and their eyes with goggles.

2.14 What to wear

Covering all exposed skin with clothing can offer some protection from radiant heat.

Have a set of clothing ready for each member of the family:

A. A wide-brimmed hat to protect your head.

B. Eye protection such as smoke goggles to shield your eyes.

C. A 'P2' type mask or cotton scarf/handkerchief for face protection and to filter smoke.

D. A long-sleeved, collared shirt and long pants made from cotton or some other natural fibre.

E. Tough leather garden gloves – not rubber or synthetic.

F. Sturdy boots and wool or cotton socks.

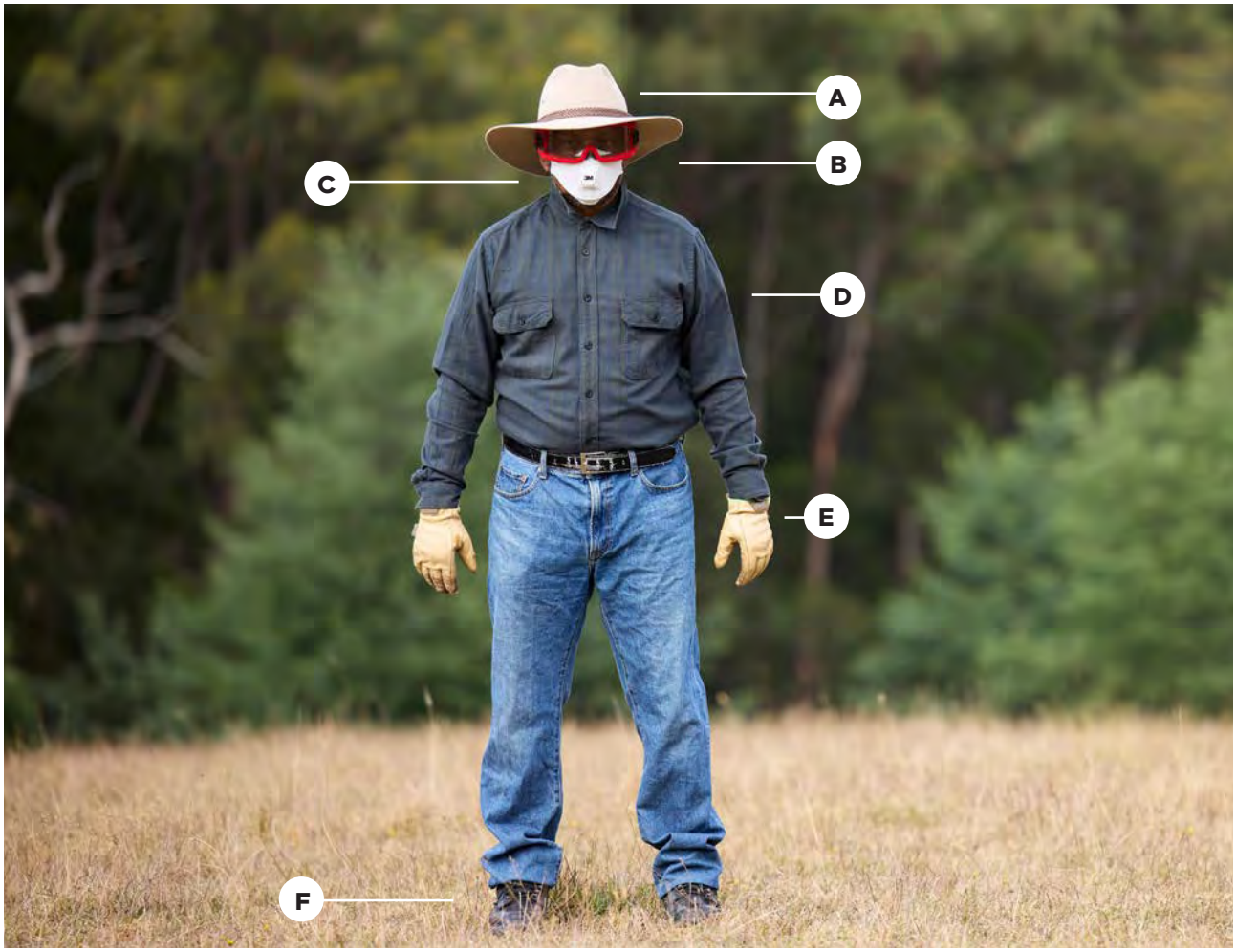
Do not wear a t-shirt, shorts or thongs. Wearing a t-shirt, shorts and thongs or similar clothing will expose you to dangerous radiant heat in a fire.

Wearing appropriate protective clothing can assist with the avoidance of heat illness.

Research has shown that the body's metabolic heat can contribute at least as much or more to heat stress as environmental heat, so clothing should both shield and ventilate.

People should consider the following:

- Wear loose fitting clothes made from natural fibres that open at the neck.
- Avoid heavy woollen clothing (wools insulating properties may hinder the cooling process) and for the same reason, too many layers.
- Do not tuck trouser bottoms into boots (this inhibits heat ventilation and allows embers to enter the boots).
- Do not wet clothing (water may scald the skin if exposed to radiant heat).
- Take regular opportunities to loosen clothing and cool down.



2.15 Keeping informed

During summer, it's up to you to stay informed.

Make it your habit to:

- Check your Fire Danger Rating every day during summer.
- Know if it's a TFB day.
- Check for warnings, especially on hot, dry, windy days.

2.15.1 Warnings and emergency information

Victoria uses the Australian Warning System, which provides nationally consistent warnings for emergencies. There are three warning levels:

- **Advice (yellow):** An incident has started. There is no immediate danger. Stay informed and monitor conditions.
- **Watch and Act (orange):** There is a heightened level of threat. Conditions are changing and you should take action to protect yourself and your family.
- **Emergency warning (red):** This is the highest warning level. You may be in danger and need to act immediately. Any delay puts your life at risk.

Warnings are accompanied by clear action statements, such as *prepare to evacuate, evacuate immediately, leave now,* or *seek shelter.*

Do not expect warnings to be issued in any particular order. The first warning you receive may be an emergency warning if conditions change rapidly.

Never rely on an official warning to leave, as bushfires can start quickly and threaten lives and property within minutes.

2.15.2 Staying Informed

The primary source of emergency information in Victoria is VicEmergency, which provides warnings, incident information, preparedness advice and recovery information through:

- VicEmergency website: www.emergency.vic.gov.au
- VicEmergency app.
- VicEmergency Hotline: **1800 226 226.**
- VicEmergency social media channels.
- ABC Local Radio and other emergency broadcasters.

In some circumstances, emergency information may also be delivered through the Emergency Alert System via SMS messages or voice calls to landline phones.

As telecommunications and internet services may be disrupted during emergencies, households in bushfire-prone areas should have a battery-powered radio as a backup source of information.

2.15.3 Community information messages

In addition to warnings, agencies may issue Community Information messages. These provide updates about incidents that may be of public interest but do not require immediate action from the community.



Figure 8: The three warning levels of the Australian Warning System (VicEmergency).

2.16 Module 2 Recap

- You should seek to understand the risk of bushfire your property faces. Refer to the CFA website (cfa.vic.gov.au) or speak to your local CFA brigade for further information.
- Know what to expect if a fire starts near you or travels towards you from a distance.
- If you live close to a fire in grassland near an urban area, do not attempt to drive away, walk two streets back as driving is more dangerous than walking away.
- Prepare your bushfire plan – Go to the CFA website to get your CFA Fire Ready Kit
- Bushfires are scary and confronting. The best place to be is away from the fire. You should always consider leaving early. Leaving when the fire has started is too late.
- If you plan to stay and actively defend your property, you need to be well prepared and understand the risks of staying and defending.
- Radiant heat is a killer, make sure you have suitable clothing to help protect you from radiant heat.
- You should stay informed by downloading the Vic Emergency app, monitoring ABC or local radio or monitoring official social media channels. It is a good idea to have a battery-operated radio to maintain awareness.
- Be aware of the fire danger rating in your area and consider your triggers for action in your bushfire plan.

MODULE 3 – FIRE MANAGEMENT ARRANGEMENTS

Many complex arrangements exist within Victoria regarding responsibilities for fire prevention and management on different lands. Fire prevention and management is a shared responsibility. Many different organisations play a role in fire management.

3.1 Councils

Fire Prevention is a statutory responsibility of all municipal councils where the municipal district or part of the municipal district is in the country area of Victoria. Section 43 of the Country Fire Authority Act 1958 (CFA Act) states 'it is the duty of every municipal council and public authority to take all practical steps (including burning) to prevent the occurrence of fires on, and minimise the danger of the spread of fires on and from – any land vested in it or under its control or management; and any road under its care and management'.

3.1.1 Fire Hazard Inspections

Under the CFA Act, each municipal council must appoint a Municipal Fire Prevention Officer (MFPO) and may appoint Assistant Fire Prevention Officers (AFPOs). Fire Prevention Officers have the power to assess fire threats to life or property in their municipal district, and if necessary, issue fire prevention notices on owners or occupiers of land requiring them to take specified steps to remove or minimise that threat.

Where a person fails to carry out the work required by a fire prevention notice, under the CFA Act councils may initiate proceedings for an offence or serve a fire prevention infringement notice. In addition, under the Local Government Act 1989, councils or persons approved by them may enter private lands and undertake the works required by the notice. Councils can then recover costs from the landowner/occupier for that work.

3.1.2 Permits

Most local councils have local laws that restrict the circumstances in which residents can burn in the open air. Some councils will issue permits to residents to allow burning off outside the fire danger period subject to certain conditions.

It is very important to understand your local rules for burning off as penalties may apply if you burn off outside the conditions of your council's local laws. You should check with your local council before lighting a fire.

3.1.3 Planning scheme

Under Victoria's planning system, local councils and the State Government develop planning schemes to control land use and development.

Planning schemes are also developed to ensure the protection and conservation of land in Victoria in the present and long-term interests of all Victorians.

Planning schemes are developed in accordance with planning policies and strategies. They contain planning policies, zones, overlays and other provisions that affect how land can be used and developed.

3.2.4 Fire management plans

Many councils have Municipal Fire Management Plans as subplans to their Municipal Emergency Management Plan. These plans are developed with the involvement of councils and other agencies with input from their communities.

Generally, the objectives of each Municipal Fire Management Plan are to:

- Identify, prioritise and co-ordinate treatment of fire risks.
- Engage the community to participate actively in fire management planning.
- Increase the capacity of communities to prepare themselves and their assets in the event of fire.
- Monitor, review and evaluate all activities across this fire planning.
- Reflect the regional strategic direction.

3.2 Fire authorities (CFA/FFMV)

The Department of Energy, Environment and Climate Action (DEECA) as Forest Fire Management Victoria (FFMV) is solely responsible for fire prevention and management in fire protected areas – State forests, national parks and protected public lands under the Forests Act 1958.

The Country Fire Authority has responsibility for fire management in the country area of Victoria, excluding areas of public land managed by FFMV.

In the country area of Victoria CFA provides policy, planning, leadership, standards for training and best practice advice in municipal fire prevention.

CFA is represented on Municipal Emergency Management Committees and relevant sub-committees established in relation to fire management and prevention.

Some private lands adjoining these public lands (within 1.5km) are also fire protected areas, and the lighting of fires in these areas during a period of fire restrictions is controlled by the Forests Act and the Forests (Fire Protection) Regulations 2014.

CFA and FFMV both have roles in responding to reports of fire within their relevant areas.

3.2.1 Fire Danger Period

CFA declares the Fire Danger Period for each municipality (shire or council) within the country area of Victoria at different times in the lead up to the fire season. It depends on the amount of rain, grassland curing rate and other local conditions. In declared Fire Danger Periods, CFA restricts the use of fire in the community.

A Total Fire Ban can also be declared by CFA for the whole or part of Victoria at any time of year, on days when fires are likely to spread rapidly and could be difficult to control.

Within the fire danger period, burning off is tightly restricted as escaped burn-offs can cause extensive damage.

3.2.2 Fire permits (CFA)

During the fire danger period, CFA and Fire Rescue Victoria may issue permits to burn where there is an essential need to burn.

Schedule 3 permit

A Schedule 3 permit may be issued to burn fine fuel (such as grass, stubble, weeds), and only where there is an essential need to burn during the Fire Danger Period. For example: farming – broad acre cropping.

Schedule 4 permit

A Schedule 4 permit may be issued to light a fire for purposes not covered by a Schedule 3 permit, and only where it is essential to use fire during the Fire Danger Period.

For example: biosecurity requirements such as diseased plants or deceased livestock; essential hot works to repair or maintain infrastructure on rail or road corridors, solid fuel catering; fireworks; blacksmithing; hot air ballooning; bird scaring device; etc.

Refer to firepermits.vic.gov.au or the CFA website for more information.

3.2.3 Planned burns

CFA and FFMV work together to undertake planned fuel management burns on private and public land.

The Joint Fuel Management Program (JFMP) sets out a three-year FFMV and CFA program of fuel treatment across public and private land. It implements long-term bushfire management strategies that outline how we will manage the risk of bushfires for the protection of life and property, while maintaining and improving natural ecosystems.

Burns are planned to address bushfire risk close to towns and along strategic roads and rail corridors. In remote areas, planned burns address the spread of large landscape-scale fires and reduce the bushfire risk to natural ecosystems

3.3.3 Community engagement

CFA and FFMV run a variety of community engagement programs, with specific target groups. These include:

- Community Fireguard Groups.
- Property Advice Visitation Service.
- Bushfire planning workshops.
- Online information.

3.3 Other agencies

The CFA Act requires every municipal council and public authority to take all practical steps (including burning) to prevent the occurrence of fires on, and minimise the danger of the spread of fires on and from – any land vested in it or under its control or management: and any road under its care and management'

What this means is that, alongside councils, public authorities have a role in bushfire risk management in the areas they are responsible for.

3.3.1 *Power companies*

Power companies are required to prepare Bushfire Mitigation Plans as outlined in the Electricity Safety Act 1998. They are also required to prepare an annual management plan involving vegetation clearance.

Power companies are required to prepare Bushfire Mitigation Plans as outlined in the Electricity Safety Act 1998. They are also required to prepare an annual management plan. The minimum vegetation clearance requirements for powerlines are detailed in the Code of Practice. The clearance distances are calculated based on a range of factors including whether the powerline is in a hazardous or low bushfire risk area; whether the powerline is high or low voltage; and the length of the section of powerline between power poles

3.3.2 *Water corporations*

Arrangements in this area are complex due to a mix of several organisations having responsibility for the provision of water. All Water Corporations established under section 85 of the Water Act 1989 are public authorities for the purposes of the CFA Act and, in the country area of Victoria, have fire prevention responsibilities under section 43 of the CFA Act. Water corporations may have their own fire prevention officer who can issue permits to burn on their land in the country area of Victoria, during a declared Fire Danger Period.

Forest Fire Management Victoria is primarily responsible for fire prevention and suppression in many of Victoria's water catchment areas as many of Victoria's significant reservoirs and catchment areas are located in national parks or State forests. National parks and State forests are outside the country area of Victoria. There are some exceptions to this rule where the land lies within the country area of Victoria.

3.3.3 *Railways*

Railway governance and management arrangements are complex in Victoria. Put simply Victorian Rail Track Corporation (Vic Track) and V/Line are public authorities, and as such have responsibilities under section 43 of the CFA Act for fire prevention and mitigation activities on rail lines. Through lease agreements and franchising arrangements these authorities discharge their responsibilities through private rail companies who in turn contract out maintenance arrangements. Fire Prevention Notices cannot be served upon public authorities.

3.3.4 *Road authorities*

The Department of Transport and Planning (DTP) responsible for the maintenance of freeways, arterial roads and non-arterial State roads

Municipalities are responsible for municipal roads. DTP is a public authority for the purposes of the CFA Act and with councils are responsible for fire prevention and risk management on public roads under section 43 of the CFA Act. Private roads are the responsibility of the road owner.

These departments have broad fuel management programs along roadsides, including tree management, seasonal roadside grass slashing and fire-break maintenance.

3.4 Owners and occupants

Owners and occupiers have responsibilities to ensure their properties are free of fire hazards that may put the lives and property of others at risk. Council Fire Prevention Officers have a power to issue Fire Prevention Notices when they form the opinion that it is necessary to remove or mitigate a threat to life or property, and where there is no procedure under any other Act or regulations that is more appropriate in the circumstances to address that threat.

Council or persons approved by council may enter private land to remove or minimise the threat if the owners or occupiers do not undertake the works required within the time frame or manner stipulated on the Fire Prevention Notice. If a Fire Prevention Notice is not acted upon, owners or occupiers may be liable to a penalty infringement notice or prosecution in court.

The costs associated with the removal of the fire hazard are billed to the owner or occupier of the property

3.5 Planning schemes and exemptions

Planning Policy Framework for Bushfire is outlined in Clause 13.02 of the Planning Scheme. The objective is to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life.

A planning scheme controls land use and development within a municipal district. It contains state and local planning policies, zones and overlays and other provisions that affect how land can be used and developed.

The Bushfire Prone Area (BPA) and Bushfire Management Overlay (BMO) hazard maps trigger specific building and planning requirements. Further consideration of the bushfire hazard at the site and landscape scale is required for all strategic and statutory planning proposals.

There are a number of exemptions within the Victoria Planning Provisions (at Clause 52.12 and 52.17) which allow bushfire prevention works under certain circumstances.

For further information refer to the DOTP Planning website www.planning.vic.gov.au/schemes-and-amendments/browse-planning-schemes or speak to your Council's Statutory Planning Officer.

3.6 Bushfire management programs

The Joint Fuel Management Program (JFMP) is Victoria's coordinated, risk-based program for managing bushfire fuels across public and private land.

Developed jointly by Forest Fire Management Victoria (FFMV), CFA and partner agencies, the program identifies and prioritises fuel management activities over a rolling three-year period, focusing effort where it will achieve the greatest reduction in bushfire risk to communities, infrastructure and the environment.

The JFMP is a key delivery mechanism for Victoria's Safer Together approach to bushfire management. It supports integrated planning and delivery of fuel management activities across land tenures, with agencies working collaboratively to share expertise, personnel and resources.

Activities may include planned burning, mechanical fuel treatment and other risk-reduction measures informed by local risk assessments, Bushfire Risk Engagement Areas (BREAs) and community engagement.

The program also promotes cooperation between CFA brigades, FFMV and landowners to ensure fuel management is coordinated across landscapes rather than being limited by property boundaries.

The program is reviewed and updated regularly to reflect changes in bushfire risk, fuel conditions, emerging science and community needs.

Further information is available from Forest Fire Management Victoria's Bushfire Fuel and Risk Management website.



3.5 Understanding Fuel management zones

Fuel Management Zones (FMZ) are areas of public land where fire is used for specific asset, fuel and overall forest and park management objectives.

Each of the four FMZs differs in its intended fuel treatment aims and associated performance measures. Although the name of the zone indicates the primary purpose for that zone, it is recognised that multiple goals can be achieved when undertaking activities in a given zone.

For example, a burn undertaken primarily for land management purposes may also have asset protection results. FMZs describe fuel treatment aims (with associated performance measures) in a particular area.

3.5.1 Asset Protection zone

Using intensive fuel treatment, the Asset Protection Zone (APZ) aims to provide the highest level of localised protection to human life and property and key community assets.

The goal of fuel treatment is to reduce radiant heat and ember attack in the event of a bushfire. Fuel treatment will be carried out in the APZ through a combination of planned burning and other methods such as mowing, slashing or vegetation removal.

3.5.2 Bushfire moderation zone

The bushfire moderation zone aims to reduce the speed and intensity of bushfires.

This zone complements the APZ in that the use of planned burning in the BMZ is designed to protect nearby assets, particularly from ember spotting during a bushfire.

3.5.3 Landscape management zone

Within the landscape management zone, planned burning will be used for three broad aims:

- Bushfire protection outcomes by reducing the overall fuel and bushfire hazard in the landscape
- Ecological resilience through appropriate fire regimes.
- Management of the land for particular values including forest regeneration and protection of water catchments at a landscape level.

Other fuel reduction methods will be used within this zone as appropriate.

3.5.4 Planned burning exclusion zones

This zone excludes the use of planned burning primarily in areas intolerant to fire.



Asset Protection Zone



Bushfire Moderation Zone



Landscape Management Zone



Planned burning exclusion zone

3.7 Module 3 recap

- Fire prevention and management is a shared responsibility. Many different organisations play a role in fire management.
- Local councils play a key role in fire management, planning and enforcement.
- FFMV is responsible for fire management on public land.
- CFA is responsible for fire management on private land in the country area of Victoria. Fire Rescue Victoria has responsibilities in metropolitan Melbourne and some large regional centres.
- As a landholder, you have obligations to ensure your property does not constitute a fire risk.
- Victoria's planning schemes provide rules for land use. You should understand what planning provisions apply to your property.
- Fire management zones, primarily on public land, outline the fire management approaches to be taken in those areas.
- Strategic bushfire management across regions is undertaken through a process involving many agencies. The Joint Fuel Management Program provides a plan for fuel management in each region of Victoria for the next 3 years.

MODULE 4 – FUEL MANAGEMENT OPTIONS

Bushfire behaviour is influenced by three key factors: weather, topography and fuel. While weather conditions and the landscape cannot be controlled, fuel is the primary factor that can be actively managed.

By reducing the amount, continuity and arrangement of vegetation, fuel management helps lower bushfire intensity, reduce ember generation, slow the spread of fire and improve opportunities for firefighters to safely suppress a fire.

Fuel management includes activities such as planned burning, mulching, slashing, grazing and the construction of strategic fuel breaks. These treatments are applied across public and private land to reduce bushfire risk and support community safety. Although fuel management cannot prevent all bushfires, it can lessen their impact and improve the effectiveness of emergency response when fires occur.

Through programs such as the Joint Fuel Management Program (JFMP), fuel management activities are strategically planned and prioritised in locations where they will provide the greatest reduction in bushfire risk. Local councils and CFA can provide information and advice to help landowners understand and manage bushfire risk on their properties.

4.1 Slashing, mowing, spraying or grazing

Slashing, mowing, spraying or grazing of grass is an effective fuel management treatment.

Mechanical fuel treatments, such as mulching, can enable safer delivery of vegetation management and planned burns by treating part of a burn unit which has complex vegetation or topography.

This type of fuel treatment is also very effective where planned burning is not operationally feasible due to dispersed houses and other assets in a forested area. Mechanical fuel treatments are not weather dependent like planned burning, enabling the reduction of fuel loads more effectively each year.

Planning considerations must include:

- The impact on the natural environment (e.g. soil, water, flora and habitat for fauna).
- Scheduling to meet the requirements of the flora or fauna in the slashed area, providing the fuel management objectives are still met.
- Avoidance of translocation of weed species from one area to another.
- Maintaining slashed areas in a condition that satisfies the fuel management objectives.





4.2 Landscaping for bushfire

Landscaping for bushfire is much the same as any type of gardening. It involves planning, designing, planting and managing the area around your house.

Design and plant selection for bushfire can help reduce the effects of direct flame contact and radiant heat on a house.

The CFA has resources to assist you in planning and designing your garden to reduce fire impacts on your house.



The CFA provides official guidelines in its Landscaping for Bushfire Guide to help property owners reduce the risk of house loss from radiant heat, direct flame contact, and ember attack.

4.3 Sustainable fire management

Sustainable fire management meets community safety objectives for protecting life and property while:

- Avoiding or, if that is not possible or practical, minimising harm to the environment, including the quality of air, land, water and biodiversity.
- Maintaining or improving biodiversity (through regime management), where practical.
- Using regime management to reduce the occurrence and intensity of bushfire across the landscape.
- Meeting legal and policy obligations for environmental care.

4.4 Fire frequency intervals

Fire, or lack of fire, is an essential component of the ecology of Victoria's native vegetation communities and their constituent species. Fire regimes may result in both extinctions and regeneration opportunities for vegetation communities and their flora and fauna.

Applying an inappropriate fire regime may lead to undesirable changes in species composition and local extinctions. Applying an appropriate fire regime may lead to the maintenance of desirable species composition and the recovery of threatened species.

Tolerable fire intervals for a particular vegetation type provide guidance so that the frequency, severity and intensity of planned fires can be scheduled and conducted in ways that ensure the ecological sustainability of native vegetation.

Fire frequencies that are too high or too low threaten Victoria's biodiversity by changing the composition and structure of vegetation communities.

The ideal interval between fires for any given vegetation type is determined by the time taken by the constituent species to reach maturity and set seed, and the time to extinction in the absence of fire. If fire is too frequent, species that are not able to reproduce may be lost from the community. If the interval between fires is too long, species that depend on fire for regeneration may die out.

4.5 Measuring fuel hazards

The overall fuel hazard assessment guide provides a framework for assessing fuel hazards.

Each fuel layer is assessed simply and visually. Assessing the fuel takes only a few minutes and is based on the premise that the eye is better able to integrate local variations in fuel than systematic measurement. Each fuel layer is assessed in turn and given a hazard rating.

Particular emphasis is placed on how the fuel is arranged within each of these layers. The hazard ratings are then combined to produce an overall fuel hazard rating that ranges from low to extreme.

For further information see the overall fuel hazard assessment guide available on the Forest Fire Management Victoria website: www.ffm.vic.gov.au.

4.6 Ecological values and weed control

Scientists describe two broad post-fire regeneration strategies are of particular relevance to land managers. These are obligate seeding species and resprouting species.

The removal of weed species can also reduce fuel loads while maintaining ecological values. Weeds can impact on biodiversity and the health of ecosystems and threaten the survival of many plants and animals, out-competing them for space,nutrients and sunlight. Weeds can also reduce the productivity of farm and forestry operations, invade crops, smother pastures and some can harm livestock.

The process of fire (both planned and unplanned) can be a double-edged sword. In some instances fire can reduce weeds and improve ecosystem condition. In other instances, however, fire can cause an increase in both the number of weed species and the area occupied by weeds and degrade the ecosystem. Fire can also have both a positive and negative influence on weeds at the same site, particularly those sites which have a diversity of weed species.

When obligate species are exposed to fire, all, or almost all mature plants are often killed. These species can persist however, by regenerating from seed (they're obliged to regenerate from seed if they are to survive in an area).

This seed may be stored in the soil, on the plant or brought in from nearby unburnt patches of vegetation by wind, water, birds or animals.

Resprouters are able to resprout after fire from woody underground lignotubers or buds protected underneath their bark (epicormic buds). Many landholders may be familiar with the behaviour of these plants (most eucalypts are a good example). Some resprouters can tolerate frequent fire, and some can live for a long time without fire. However, it is important to note that even resprouter populations may have their vigour reduced by very frequent fire or by fire exclusion, and may rely on seed to ensure healthy, diverse gene pools.

4.7 Planned burning

Planned burning plays a vital role in maintaining ecological health in fire adapted environments.

Understanding and applying fire regimes suited to individual ecosystems is vital for maintaining biodiversity.

Fire adapted communities rely on precise intervals of burning to thrive, while fire sensitive ecosystems require protection from overly frequent fire to ensure their survival. Many native plant and animal communities depend on periodic, low intensity fire to stimulate regeneration, maintain habitat structure, and preserve key ecological processes.

In contrast, fire sensitive ecosystems require protection from overly frequent fire to avoid long term decline.



Epicormic shoots sprouting vigorously from epicormic buds beneath the bushfire damaged bark on the trunk of a Eucalyptus tree By jjron – Own work, GFDL 1.2

4.8 Threatened species – plants and animals

While planned burning can have very positive ecological benefits, species which are listed as threatened have very little "room to move" – they typically have low numbers of individuals and few populations and so potential impacts of fire on them requires special consideration.

For this reason, thorough preparation of the Fire Management Plan should take into consideration any potential impacts of the proposed planned burning program on threatened species. In some cases the actions recommended in the plan may need to be modified or adapted so that threatened species are not negatively impacted.



Emerald Starbush (Asterolasia asteriscophora subsp. albiflora)



Lowland Leadbeater's Possum. Credit: Zoos Victoria

4.9 Cultural burning influences

While Bushfire Prepare uses some low intensity burning techniques similar to indigenous burning it should be seen as a separate concept..

Indigenous participation and collaboration in land management activities, such as cultural burning, is now common practice in many parts of the world and the ecological benefits of cultural burning are well recognised in scientific literature.

The practice and impacts of cultural fire are also increasingly featured in interpretive information available to the general public.

The Victorian Traditional Owner Cultural Fire Strategy provides a framework to reinvigorate cultural fire through Traditional Owner led practices across all types of Country and land tenure; enabling Traditional Owners to heal Country and fulfil their rights and obligations to care for Country.



4.10 Native vegetation and planning requirements

In Victoria, the planning system regulates how and where native vegetation can be removed, destroyed or lopped.

These controls are designed to balance the protection of native vegetation and biodiversity with land management, development and bushfire risk reduction objectives.

Fuel management, including Bushfire Prepare processes, will invariably require the removal, destruction or lopping of native vegetation, therefore an understanding of the planning scheme and available exemptions is important.

While some exemptions may apply for bushfire protection and fuel management activities, a planning permit may still be required before undertaking works that affect native vegetation.

Requirements vary depending on the location, extent of vegetation removal and the purpose of the proposed works.

Before commencing any vegetation management activities, landholders should seek advice from their local council to determine whether a planning permit or other approvals are required and to ensure compliance with relevant planning controls.



4.10.1 Community based fuel management planning

Planning for the protection of communities at risk from bushfire is best done as a community-based process. It involves interested community members supported by staff from local government, fire and land management agencies, working together in a collaborative process.

Community-based bushfire programs provide opportunities for residents to better understand local bushfire risk, fuel management options and preparedness actions.

Community Fireguard brings neighbours together to learn about bushfire risk, discuss mitigation options and develop shared approaches to preparedness and response at the local level.

The CFA's Community Based Bushfire Management (CBBM) approach encourages communities, emergency services, councils and land managers to work together to identify local priorities and develop solutions that reduce bushfire risk.

Similarly, Victoria's Safer Together program supports collaboration between communities and land and fire management agencies to improve bushfire resilience through shared decision-making, risk reduction planning and fuel management activities across public and private land.

Participation in these programs can help residents better understand local risks, contribute to community-led fuel management initiatives and build stronger partnerships with agencies responsible for bushfire management.

4.10.2 Limitations of fuel management

Fuel management can provide useful protection to settlements and assets in bushfires occurring in fire danger conditions up to a High rating.

As the Fire Danger Rating moves into Extreme and Catastrophic, fuel management can still offer benefits, but will be less effective in the protection of life and assets.

Loss of life and property is much more likely in Extreme and Catastrophic conditions and the safety of people will become increasingly dependent on community safety solutions such as warnings and information, relocation and sheltering.

Research has shown that the beneficial effects of fuel management tend to reduce in Extreme and Catastrophic fire danger conditions due to the extreme fire intensity seen in these conditions where the fire becomes dominated by weather effects rather than fuel and topography.

However where fuel management has taken place, in many cases there is a reduced impact on surrounding areas.



4.10.3 Planning scheme exemptions

The Victoria Planning Provisions (VPPs) contain extensive and detailed policies for bushfire planning.

The VPPs set out a comprehensive set of bushfire policies to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. They also control the clearing of vegetation in Victoria.

If you want to clear vegetation from around your property you may need a planning permit. The planning controls in Clause 52.12 – Bushfire Protection Exemptions set out specific circumstances that allow you to clear vegetation around properties without a permit. Requirements apply around land use, construction dates and location.

Typically when the requirements are met, vegetation may be able to be removed between 10 metres, 30 metres or 50 metres around a home. This is commonly referred to as the 10/30 and 10/50 rules in the community.

Clause 52.17 of the Victoria Planning Provisions sets out the requirements for the removal, destruction or lopping of native vegetation. Its purpose is to ensure impacts on native vegetation are avoided, minimised and, where necessary, offset.

The clause includes a range of exemptions, including some that support bushfire protection and fuel management activities, subject to specific conditions.

If you plan to rely on a bushfire-related exemption under Clause 52.17, you are generally permitted to remove native vegetation only to the minimum extent necessary to achieve the intended risk reduction outcome.

As exemption requirements can vary depending on the circumstances, you should seek advice from your local council before undertaking any vegetation management works.

4.11 Preparing your property plan

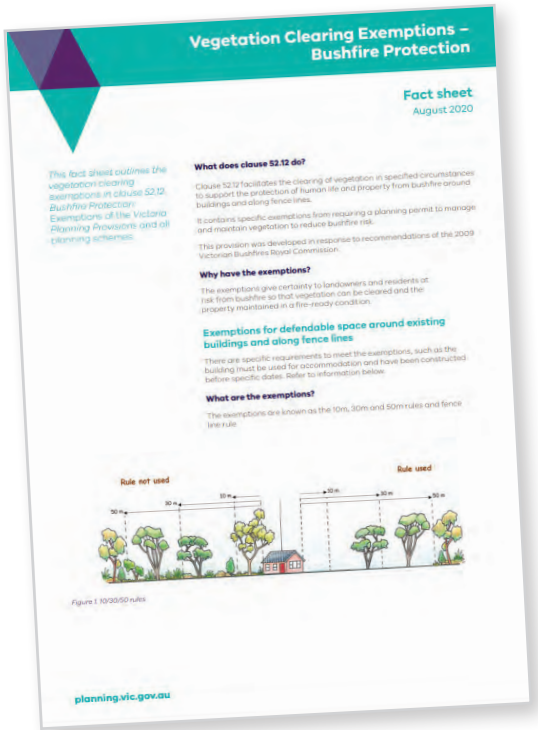
There are several steps involved in preparing your land management plan.

The first, and most important, is to research your property to understand what planning rules apply.

To do this you will need to check the Vicplan website and download your property title from www.landata.online. You may also need to check with your local CFA district office.

What you need to know is:

1. Are you in a Bushfire Risk Engagement Area?
2. Is your property subject to a bushfire management overlay (BMO) or in a bushfire prone area (BPA)?
3. What planning zones or overlays apply?
4. What is the current use of the land?
5. What is the fire risk?
6. What areas of the land are to be fire-managed? What methods could be used?
7. Consider any planning exemptions, such as in Clause 52.12 and 52.17.
8. Are there any planning or environmental covenants or conditions that would impact the proposed works?
9. Do you need a planning permit or permit to remove native vegetation?


Vegetation Clearing Exemptions – Bushfire Protection

Fact sheet
August 2020

This fact sheet outlines the vegetation clearing exemptions in clause 52.12 Bushfire Protection: Exemptions of the Victoria Planning Provisions and all planning schemes.

What does clause 52.12 do?

Clause 52.12 facilitates the clearing of vegetation in specified circumstances to support the protection of human life and property from bushfire around buildings and along fence lines.

It contains specific exemptions from requiring a planning permit to manage and maintain vegetation to reduce bushfire risk.

This provision was developed in response to recommendations of the 2009 Victorian Bushfires Royal Commission.

Why have the exemptions?

The exemptions give certainty to landowners and residents at risk from bushfire so that vegetation can be cleared and the property maintained in a fire-ready condition.

Exemptions for defendable space around existing buildings and along fence lines

There are specific requirements to meet the exemptions, such as the building must be used for accommodation and have been constructed before specific dates. Refer to information below.

What are the exemptions?

The exemptions are known as the 10m, 30m and 50m rules and fence line rule.

Rule not used

Rule used

Figure 1 10/30/50 rules

planning.vic.gov.au

4.11.1 Approach

Once you have researched your property and found out what you can and can't do, you need to identify the fire management approach (what is the intended outcome?)

Do you want to:

- Create or build on defendable space? Do the provisions of Clause 52.12 apply? (10/30 and 10/50 rules)
- Improve access and egress or construction of fuelbreaks?
- Undertake planned burning to achieve ecological or fire management outcomes?
- Progress strategic fuel management within BREA consistent with Joint Fuel Management Program (firebreaks/fuel breaks, Asset Protection Zones)?
- Achieve environmental outcomes? Weed removal, vegetation reproduction, etc?

Further advice or guidance can be provided by CFA Property Advice Visit Service or Vegetation Management Officer.

4.11.2 Mapping

A key step in the fire management planning process is to produce detailed property maps which summarise the information required for safe and effective fire planning.

Much of the mapping will be able to be done as a desktop exercise using existing information, although it will be necessary to ground truth some elements (e.g. fuel hazard rating, condition of tracks, suitability of proposed fire breaks, etc.).

1. Create a base map to show the key features on a property which are relevant to fire management (e.g. slope/ aspect, type of vegetation, access and egress, assets to protect, etc.).
2. Identify and map the vegetation types in your Land Management Zones.

4.12 Native Vegetation Permits

If you plan to remove, destroy or lop native vegetation, you should first determine whether a relevant exemption applies under Clauses 52.12 or 52.17 of the planning scheme.

Exemptions for bushfire protection and fuel management are generally limited to the minimum extent necessary to achieve the intended risk reduction outcome.

If an exemption is not available or your proposed works exceed the limits of an exemption, you will need to apply for a planning permit before undertaking vegetation removal.

The permit application process may require an assessment of the vegetation affected, biodiversity considerations and potential offset requirements.

The Native Vegetation Regulation Map (NVRM) system supports this process by providing access to biodiversity and native vegetation information. NVRM can be used to:

- Identify native vegetation and biodiversity values on a property.
- Assess native vegetation extent and condition.
- Calculate strategic biodiversity scores and native vegetation condition scores.
- Support planning permit applications and native vegetation assessments.
- Manage and track participation in relevant biodiversity programs and agreements.

Because permit requirements can vary depending on the location, vegetation and proposed works, landholders should seek advice from their local council before commencing vegetation management activities.

4.12.1 Preparing an application to remove native vegetation

The native vegetation removal tool will generate a report that is submitted with a permit application to remove, destroy or lop native vegetation under Clause 52.16 and Clause 52.17 of Victoria's planning schemes.

The report should also be included with any other application to remove, destroy or lop native vegetation. You should seek advice from your local council Statutory Planning team if you intend to remove native vegetation

4.13 Fuel management burns

- You should be aware that fuel management burns are a high-risk treatment option.
- There is a significant risk of fire escape if not planned and conducted appropriately.

If you are considering this option, you should also complete module seven of this package, undertake a practical workshop and seek advice from the CFA.

4.13.1 Fire frequency and ecological considerations

If you are considering fuel management burns, it is important to understand the recommended Tolerable Fire Intervals (TFIs) for the vegetation types on your property.

TFIs provide guidance on the minimum and maximum frequency of fire required to maintain ecological health and support the regeneration of plant and animal communities.

When assessing your property:

1. Identify the vegetation types present and note their recommended fire frequency intervals.
2. Review the fire history of the property, including when and where previous fires or planned burns have occurred.
3. Consider whether the past fire regime aligns with recommended ecological fire intervals.
4. Identify areas where the fire regime may be outside the recommended range and consider whether management actions may be needed.

It is important to recognise that Bushfire Prepare burns are typically low-intensity fuel management burns designed to reduce surface, near surface and elevated fuels that contribute most to bushfire spread.

These burns generally do not significantly affect the canopy or larger trees and are therefore unlikely to have a substantial impact on the fire-related ecological requirements of mature vegetation.

Consequently, small-scale fuel reduction burns undertaken as part of the Bushfire Prepare process can often reduce bushfire risk while maintaining broader ecological values when appropriately planned and implemented.

4.14 Mechanical works

If planning mechanical vegetation management works, consider:

- The impact on the natural environment (e.g. soil, water, flora and habitat for fauna).
- Scheduling to meet the requirements of the flora or fauna in the slashed area, providing the fuel management objectives are still met.
- Avoidance of translocation of weed species from one area to another.
- Maintaining slashed areas in a condition that satisfies the fuel management objectives.

4.15 Developing a Fire Management Map

The purpose of a fire management map is to build on the information collected during the property assessment process and identify features relevant to fuel management, planned burning and bushfire risk reduction. The map should clearly show:

- Fire exclusion areas, where fire is not intended to be used.
- Fire management areas, where fuel reduction burning or other treatments may be appropriate.
- Proposed burn units and control boundaries.
- Roads, tracks and access routes, including public roads and farm tracks.
- Water supply points, such as dams, tanks, creeks, pumps and hydrants.
- Key assets and values that may require protection, including homes, sheds, fences, livestock areas, critical infrastructure, plantations, environmentally sensitive areas and cultural heritage sites.

Using the information captured on the map, landholders can identify management objectives for different parts of the property and determine where fuel management activities are likely to provide the greatest benefit. Management objectives may include:

- Excluding fire from sensitive areas.
- Reducing fuel hazards around assets and infrastructure.
- Supporting ecological management objectives.
- Maintaining or enhancing green pick areas.
- Managing woody thickening and vegetation encroachment.
- Controlling weeds and pest plants.
- Establishing stock safety zones and emergency refuge areas.
- Protecting environmental, cultural and community values.

By mapping assets, hazards and management objectives together, landholders can make more informed decisions about where and how fuel management activities should be implemented to achieve both bushfire risk reduction and broader land management outcomes.



4.16 Module 4 recap

- Fuel management is one of the most effective ways to reduce the impact of bushfire.
- Local councils and CFA can provide advice about your fire risk and options to manage fuel on your property.
- Slashing, mowing, spraying or grazing of grass is an effective fuel management treatment and can work where prescribed burning may not be suitable.
- It is important to understand the ecological values of your property before commencing any works. This includes native wildlife as well as vegetation.
- To understand what needs to be done, you will need to assess the fuel across your block to know the fuel loads.
- Know your responsibilities in relation to removing native vegetation. Ensure you have a permit to remove native vegetation if one is required. Speak to your council if you are unsure.
- Research your property, know what planning regulations apply to your circumstances.
- Know what you want to achieve and from there you can work out the best methods to achieve your aim.
- Prepare a base map to record key features of your property. If you plan to use fire, prepare a fire map.
- Know that fuel management burns can be a risky process if you haven't prepared properly.

MODULE 5 – SAFETY

Before undertaking any fuel management works you should undertake a site safety survey. Essentially this is a process where the worksite is inspected and hazards are identified. Where hazards are identified, measures are put into place to mitigate risks.

For guidance refer to Worksafe website www.worksafe.vic.gov.au/do-your-own-inspection

5.1 Health and safety legal duties

If you are an employer you must provide a safe work environment for your employees.

You must provide and maintain a working environment that is safe and free of risks to health, so far as is reasonably practicable. As part of this you must, so far as is reasonably practicable:

- Provide and maintain safe plant (machinery and equipment).
- Provide and maintain safe systems of work - for example, controlling entry to high-risk areas and providing systems to prevent falls from heights.
- Ensure the safe use, handling, storage or transport of plant or substances.
- Keep workplaces that you manage and control in a safe condition, free of risks to health (for example, ensure fire exits aren't blocked, and the worksite is generally tidy).
- Provide suitable facilities for welfare at any workplace you manage and control.
- Give your employees the necessary information, instruction, training or supervision to enable them to do their work in a way that is safe and without risks to health.

5.2 Working alone

When you work alone, the risks increase. If people don't know where you are when an accident happens, you may not be found for a long time. You may be trapped, injured and not in a position to help yourself. Ensure someone knows where you are and what you are doing at all times.



5.3 Tree hazards

Working around trees can be particularly hazardous.

Falling trees, limbs and branches can strike operational personnel and members of the public, block access along roads, designated escape routes or fire control lines, or can be a traffic hazard. A weakened tree structure is a heightened risk and is an important hazard to be aware of.

5.3.1 How to identify hazardous trees

Look up for:

- Hung-up branches.
- Tree lean.
- Branch or trunk defects.
- Effects of wind on the tree.

Look down for:

- Trees with exposed dry wood.
- Exposed roots.
- Defect in lower trunk.
- Active fire or smoke at base of tree.

Look around for:

- Trees affected by fire.
- Trees beside roads and tracks.
- Diseased, stressed or drought-affected trees.

Managing hazardous trees on your property is your responsibility. Be aware of the condition of trees before you or people working on your property work near them. If you are unsure, seek professional advice from an arborist.

A planning permit is not required to remove any native vegetation (including trees) that presents an immediate risk of personal injury or damage to property (including internal and boundary fences). The risk is only considered immediate when ma

nagement of the risk can only be achieved by the removal of the native vegetation within a shorter timeframe than it would take to apply for and be issued with a permit for its removal. You should seek advice from an arborist before removing the tree.

5.4 Manual handling

Fire management activities often involve lifting or moving heavy equipment or objects (tasks referred to as manual handling).

The weight and shape of equipment or objects such as branches and logs may make them more hazardous to lift or move.

Risk factors associated with manual handling can include:

- Posture and movements.
- The duration and frequency of the task.
- Distance and time.
- The effort/force required to lift/move the object.
- The nature of the load, for example, shape and weight.

Unless performed correctly, manual handling activities have the potential to cause injury.



5.5 Personal protective equipment

Along with protective clothing, there is a range of personal protective equipment (PPE) used by firefighters offering:

- Respiratory protection.
- Eye protection.
- Hearing protection.

It is important to remember that personal protective equipment is the lowest level in the hierarchy of controls for health and safety and should be considered the last line option.

Wherever possible, risk management should focus on removing or controlling hazards at the source by eliminating the hazard or through administrative or engineering controls. However, it is still important that appropriate PPE is worn whenever fuel management tasks are being undertaken.

5.5.1 Respiratory

Respiratory protection against atmospheric contaminants (particulates) at bushfires can be provided by wearing a particulate filter mask which remove contaminants from the air that you breathe.

P2 particulate filter masks should be worn when working to prevent the inhalation of particulates contained in dust, exhaust fumes and smoke.

Eye protection is worn to prevent eye injuries and irritation, and the resulting impediment to your vision, from:

- Impacts, for example, small branches anh hand tools.
- Airborne particles, for example, smoke.
- Ash, dust and hot embers.
- Heat.
- Water and chemical splashes.
- UV damage.

5.5.2 Hearing

Equipment and machinery such as chainsaws, pump and plant used during fire management can be noisy.

Hearing protection, such as earmuffs or earplugs, should be worn when operating or when working near such equipment, particularly for long periods of time. The best form of hearing protection is to move away from the noise – remove ear protection as soon as practicable.

5.5.3 Chemicals

Chemicals such as herbicides and flammable liquids are often used in fuel management tasks.

- Exposure to chemicals can lead to a variety of immediate or long-term health effects including headache, poisoning, respiratory illness, burns and birth defects.
- Manufacturers and importers are required to supply a Safety Data Sheet (SDS) that explains how to handle the chemical safely.
- Always follow the manufacturer's instructions on storage, use and disposal of chemicals.

For further information on using agricultural chemicals, refer to the Agriculture Victoria website.



5.6 Using plant

Plant is a broad term. Under the OHS Act, plant includes any machinery, equipment, appliance, implement and tool. It also includes any part of that machinery, equipment, appliance, implement or tool and anything fitted, connected or related to any of those things.

In bushfire management, plant may include heavy machinery such as bulldozers, forestry mulchers, skid steer tractors and excavators. It can also include power take off (PTO) attachments on tractors and tree chippers.

Before using any of this equipment, you must ensure that you have been appropriately trained in its use and, wherever applicable, have obtained relevant licencing or certification to ensure safe operation.

Plant is a major cause of workplace death and injury in Victoria. There are significant risks associated with using machinery and equipment and injuries from the unsafe use of plant tend to be severe.

Examples of serious injuries caused by dangerous plant include:

- Having limbs amputated by unguarded moving parts of machines.
- Being crushed by mobile plant.
- Fractures from falls while accessing, operating or maintaining plant.
- Electrocution or burns from plant that is not adequately protected or isolated.
- Burns or scalds due to contact with hot surfaces or exposure to flames or hot fluids.

5.7 Working around machinery

Heavy machinery, such as bulldozers, excavators, graders, farm machinery, tractors, ploughs and bobcats create their own unique set of hazards. Personnel working near any heavy machinery, in a vehicle or on foot, risk being crushed if the machine operator is not aware of them.

It is important that you never work in an area below where the machinery is operating and that you maintain at least two tree lengths separation while working. These machines may dislodge rocks, logs and trees, on both flat ground and on slopes, causing hazards for both workers on foot and vehicles.

Precautions:

- Do not approach heavy machinery until you have established eye contact and received acknowledgement from the operator.
- Operators will have extreme difficulty hearing over the noise of the machine.
- Only approach when directed by the operator. Heavy machinery such as a bulldozer, can slew or turn quickly and without warning. You should never attempt to hitch a ride as the moving tracks, or wheels, can be hazardous.

5.8 Dynamic risk assessment

Fire services have adopted the Dynamic Risk Assessment process which can be applied to any task.

Dynamic Risk Assessment (DRA) is a continuous assessment and control of risk in the rapidly changing circumstances of an operational incident.

Unlike normal workplaces, the fireground often presents situations where risks are greater than normal due to the fact that emergency operations are dynamic and unpredictable.

The DRA process involves the following steps used as a guide to the identification, assessment and control of risks.

- Step 1 – Evaluate the situation, tasks and persons at risk.
- Step 2 – Select system/s of work.
- Step 3 – Assess the chosen system/s of work.
- Step 4 – Decide: Are the risks proportional to the benefits?
- Step 5 – Modify.
- Step 6 – Proceed with the task.

For more information see the EMV website files-em.em.vic.gov.au/public/JSOP/SOP-J08.02.pdf

5.8 Module 5 recap

- Workplace health and safety legislation requires that an employer as far as it is reasonably possible must ensure that an employee, while at work, is safe from injury and from risks to their health.
- Key steps for dealing with risk are to:
  - eliminate or remove the hazard
  - replace the hazardous procedure
  - apply engineering controls
  - apply administrative controls
  - use protective equipment.
- Making a risk assessment before commencing a task and observing safe work practices at all times are key to being a responsible and alert member of a crew.
- Hazards encountered on a fireground vary but some of the more common ones include heat stress, smoke and fatigue. Before undertaking any works you should undertake a site safety survey to ensure you identify any potential hazards and risks.
- Personnel undertaking fuel management works are particularly susceptible to dehydration because this work involves:
  - high physical activity
  - wearing personal protective clothing
  - working in hot, low-humidity environments.
- Regular consumption of water and other fluids during a shift enables you to maintain a higher level of hydration, which results in lower core body temperatures.
- The effects of smoke can be minimised by correct use of respiratory protection devices and, where possible, minimising smoke exposure.
- Remain aware of trees in the areas around you and identify trees that may present a hazard
- Working alone increases your risk. Ensure that someone else knows where you are and what you are doing. Make sure you check in with them regularly
- When using chemicals ensure that you use them safely and consider the safety data sheet.
- When working near bulldozers and other plant ensure the operator is aware of your presence.
- Beware of dislodged or rolling material near bulldozers and plant.
- Do not approach an earthmoving machine until the operator has acknowledged your presence.
- While undertaking fuel management works, consider using a dynamic risk assessment approach to safely guide your decision making.

MODULE 6 – OPERATING FUEL MANAGEMENT EQUIPMENT – SAFE USE AND MAINTENANCE

6.1 Hand tools

The most common hand tools used in firefighting and fire management are the axe and the rakehoe (or McLeod tool).

Both have sharp blades capable of inflicting injury to the user or others working nearby. Consequently, great care must be taken when using them.

Using hand tools and other small equipment can also be hazardous while working on a slope, in dusty or smoky environments, when darkness is falling and in areas where there is the potential of falling rocks and trees.

Extreme care must be taken at all times as it is difficult to maintain your mobility and balance when using certain pieces of equipment.

6.2 Powered hand tools (slashers, chainsaws)

Chainsaws are used in fuel management to fall trees, cut branches and to cut firebreaks. They are a useful, but a potentially dangerous tool.

Do not operate a chainsaw unless you are trained to use one and are wearing the correct protective clothing.

Correct protective clothing for chainsaw operation includes:

- Helmet.
- Face shield/eye protection.
- Ear protection.
- Gloves.
- Chainsaw trousers or chaps.
- High visibility personal protective clothing.
- Steel cap safety boots.

For further guidance refer to the Worksafe publication, Working safely with trees: www.worksafe.vic.gov.au/resources/working-safely-trees



6.3 Drip torches

A drip torch has a burning wick attached via a wand to a fuel reservoir. When in use, a constant flow of drip torch fuel keeps the wick alight. Drip torches are used solely for authorised prescribed burning, back burning, burning out and other lighting activities.

6.3.1 Construction

A drip torch consists of several components:

- Body.
- Filler cap.
- Wand.
- Nozzle and wick.
- Bleed screw/breather vent.
- Tap.

The body or reservoir contains the flammable mixture used for ignition. Capacity varies according to manufacturer from 4 to 9 litres of fuel. Drip torch fuel consists of a mixture of diesel and petrol (unleaded).

Typically, the mixture is:

- 3 parts (75%) diesel.
- 1 part (25%) unleaded petrol.

Flammable fuels are hazardous if not handled with care. The fuel tank must never be opened while the wick is flaming or hot. Always refer to the manufacturer's specification for the correct ratio to use (may be found stamped on the body of the drip torch). Other mixture must not be used.

6.3.2 How it works

- The wand transfers the fuel from the body to the nozzle and wick for ignition.
- The nozzle and wick. The nozzle controls the flow of fuel to the wick. The wick is soaked in fuel.
- The bleed screw/breather vent controls the rate of flow of the fuel to the wick. This ensures an even and constant flow of fuel when the unit is operated in a tilted or almost inverted position by allowing air to bleed into the tank. When not in use the bleeder screw should be tightly closed to prevent fuel spilling during transit.

6.4 Knapsacks

A knapsack is a portable spray pump containing between 16 to 20 litres of water and fitted with shoulder straps for carrying on the back. It has a hand-operated pump, which can be used to deliver water either in the form of a jet or a spray. Many knapsacks have containers made of polythene, while newer knapsacks may be collapsible to allow easier storage.

On the fireground, you can use a knapsack to:

- Suppress a low intensity fire that can be easily and safely extinguished.
- Support hand crews who are constructing a control line close to the fire edge.
- Assist in mopping up operations.

6.5 Pumps

Pumps, both portable and connected to tanks, are critical requirement for fuel management burns. Each pump has a slightly different method of operation with which you should be aware and proficient.

Generally, smaller pumps are impeller type pumps attached to a petrol or diesel motor. Centrifugal impeller type pumps require priming with water before their use, few smaller pumps have dedicated priming pumps or the ability to self-prime and will require filling from a bucket or similar through a priming port.

6.5.1 Characteristics of fire pumps

Pressure

Fire pumps operate at a higher pressure than reticulated supplies. Typically, firefighting pumps run at a pressure of up to 1000 kPa.

Head

Maximum head refers to the maximum height the pump can pump to. Simply put, if the pump has a maximum head of 50 metres (vertical rise), the flow rate will be around 0 at 60 metres. Friction loss in the hoses used can reduce this distance.

Flow Rate

The flow rate indicates the amount of water the pump can gush out in a minute or hour. Most smaller pumps can pump about 400 litres per minute. You should be aware of the output of your pump as this rate can quickly deplete your tank water.

MODULE 7 – PLANNING AND CONDUCTING YOUR OWN BURN

The success of planned burning involves balancing a wide range of factors, some of which increase the level of fire behaviour and some of which decrease it.

How these different factors are managed will determine the success or failure of a burn. Getting the balance right will maximise the probability that the fire will burn at the targeted level of intensity and its control will be within the available resources.

Key factors include the level of fuel hazard, the intensity at which fires are lit and the relative balance between head, flank and back fires. These factors interact strongly with weather conditions to influence fire behaviour.

7.1 Preparing a burn plan

It is essential that you have a comprehensive burn plan, based on your fire map. A detailed burn plan will ensure that all potential considerations have been taken into account to avoid the fire escaping and causing damage to areas outside the planned burn zone.

The burn plan should be overlaid on the fire map and include:

- Details of blocks to be burnt, including vegetation type, area and aspect
- Control lines.
- Objective of the burn.
- Weather prescriptions.
- Personnel and resource requirements.
- Lighting technique and sequence.
- Notifications and permit requirements
- Risk assessment.
- Contingency arrangements.
- Post-burn actions – mop-up, patrols and extinguishment.

Escaped burnoffs can cause extensive damage and may result in legal action under Council local laws, the Summary Offences Act or in serious cases the Crimes Act. Comprehensive documented plans can minimise the risk of escaped burns.



Figure 9 (right): Bushfire Prepare field mapping tool.

7.2 Legal requirements for burn-offs

Before undertaking a burn-off, it is your responsibility to ensure that all relevant legal requirements, permits and notifications have been addressed. Requirements may vary depending on the location, time of year and the nature of the proposed burn.

Outside the declared Fire Danger Period, burn-offs are generally regulated through local council laws and the Summary Offences Act 1966. Under this legislation, a person who lights or is responsible for a fire in the open air must ensure that it remains under appropriate supervision. Additional provisions apply where adequate firebreaks have been established and neighbouring landholders have been notified before burning commences.

Many councils have local laws governing burn-offs, which may include permit requirements, restrictions on when burning can occur, and conditions relating to smoke management, fire control and community notification. Failure to comply with these requirements may result in penalties. For this reason, landholders should always check with their local council before conducting a burn-off to understand the requirements that apply in their area.

During the declared Fire Danger Period, a Permit to Burn will be required from the CFA. These permits allow burning activities to occur under specified conditions and may provide exemptions from fire restrictions that would otherwise apply. Permit holders must comply with all permit conditions, including any requirements relating to weather conditions, supervision, firefighting equipment, notifications and contingency planning.

Regardless of permit requirements, all burn-offs should be carefully planned, adequately resourced and continuously monitored to ensure they remain safe, controlled and consistent with applicable legislation and local requirements.

There are three types of fire permits:

1. **Fire Danger Period** - Commonly referred to as 'Schedule 3' and 'Schedule 4' permits
2. **Prohibited Period** - Commonly referred to as 'Authority to burn' permits
3. **Total Fire Ban** - Commonly referred to as 'Section 40' permits Permits can be applied for online at the firepermits.vic.gov.au website.

7.3 Burning piles

Burning-off of vegetation can be an effective way to prepare your property for fire by reducing fuel loads

In most cases, a pile of bushfire fuels, in the form of vegetation waste, will be collected from around the property and burned off when the pile is big enough and the weather is suitable.

You should check that your local council local laws permit allow this type of burning off and obtain a permit if needed. If you plan to burn off within the Fire Danger Period you will need a permit issued by CFA.

Burning of piles is often easier and safer than undertaking landscape burning for property owners, particularly those who are not confident or experienced. However, you are unlikely to see potential ecological benefits as would be seen in landscape fires if this is one of your objectives.

While burning in piles is a less risky option than introducing fire into the landscape, it still presents some risk. CFA is often called out to pile fires which have escaped after the fire has become beyond the capacity for the landholder to control.



7.3.1 Steps to reduce the risk of escaped burnoffs from piles

1. Check the weather for the day of your planned burnoff and for the days following. If there is more than light winds (more than 10 km/h) you should consider postponing the burn to a more suitable time.

   If strong winds are forecast in the following days, these can reignite the fire. You should note the forecast wind for the following days and if there is strong wind, reconsider igniting the fire.

2. Make sure you have a sufficient water supply to extinguish the fire. Wherever possible you should have access to a hose connected to a household or property water supply.

   CFA recommends that for small fires you have at least 10 litres of water available, however this is a bare minimum for very small fires. For larger fires, you may need to consider a trailer mounted tank or similar if you don't have access to household supplies.

3. Make sure you have a suitable fire break, of at least 3 metres. You should ensure that all vegetation and flammable materials are clear for at least 3 metres around the perimeter of the fire.

4. You must register your burn off with CFA (through the Emergency Services Telecommunications Authority – ESTA) on **1800 668 511** or at firepermits.vic.gov.au

5. You should notify your neighbours that you are having a burn off. You should be considerate of any smoke that the fire will cause and ensure that it does not become a nuisance. You should not burn wet green waste, as this causes excessive smoke which may affect your neighbours.

6. Ensure you have someone to monitor the fire at all times and make sure that they have the ability to be able to contain and extinguish the fire if needed. Fires can escape and cause much damage in a short period of time when unattended.

7. Make sure that your burn off is completely extinguished and safe before you leave it. Make sure that any hot spots within the fire are cooled down. Fires that are not properly extinguished may reignite in the days following and cause damage.



7.4 Low intensity burning

The objective of a low intensity bush fire hazard reduction burn is to reduce the fuel load (vegetation) and therefore minimise the potential impacts of a bush fire on life, property and the environment.

The characteristics of a low intensity burn include:

- **Low flame heights** – Flame heights should average about one metre, but may be higher in patches of heavy or elevated fuels.
- **Low scorch height** – Scorch height should average less than five metres. Scorch height is the height to which tree leaves are killed from the heat of the fire.
- **Slow rate of spread** – The fire should spread only at a slow walking pace.

The rate of fire spread is normally estimated from its average spread rate, once minor variation resulting from wind gusts, fuel characteristics and/or topography have been accounted for.

Flames are normally described from the average vertical height of the flame above the ground surface.

Fire intensity is estimated using the fuel's energy content, load and the rate of fire spread.

7.5 Mosaic burning

Mosaics are all about maintaining different parts of the landscape at different stages of post-fire development.

Creating these 'patchworks' of different fire ages in time and space has ecological advantages over 'burning the whole place at once'. These patches can be burnt in different seasons, as different sized fires and/or with different intensities.

Unburnt patches can act as animal refuges during the fire and provide food and shelter once the fire has passed.

They also provide a base for some plant species to slowly recolonise burnt areas as these recover. Burnt patches may reduce the speed and intensity of unplanned fires and can provide boundaries for later planned burns.

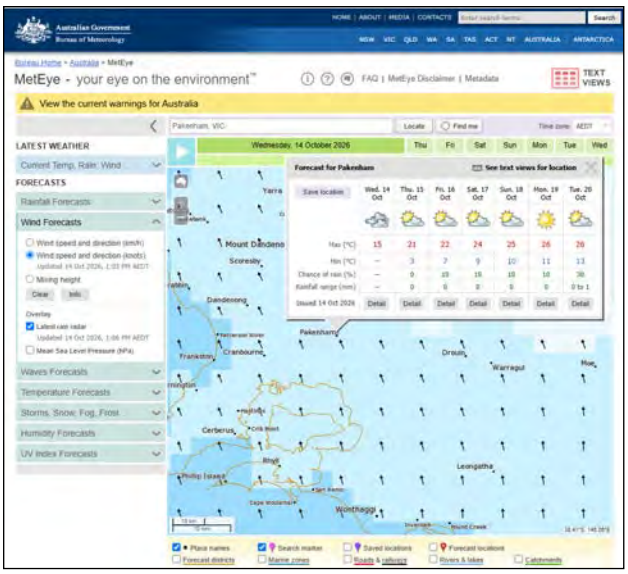
7.6 Safe weather parameters (burn prescription)

It is important to consider the weather prescription that is needed to achieve your burn (e.g. wind speed and direction, humidity, time since last rain event, temperature), and study the weather forecasts with the prescription in mind.

In general, a stable high pressure system is ideal for burning and the location of the high relative to your location will effect wind direction and speed. A key thing to look for is the forecast reliability (i.e. does the forecast for any given day change much over the forecast period?).

In planning your burn, you will need to decide the safe weather parameters. In general, you should consider the following parameters as a guide.

- Temperature: Less than 25 degrees.
- Relative humidity: Above 40%.
- Wind speed: Less than 10 km/h.
- You should also check and record the weather forecast for the following three days



The Bureau of Meterology "Met-Eye" tool helps you visualise local weather observations and forecasts for any location in Australia: www.bom.gov.au/australia/meteye/

7.7 Resourcing

The resources required to safely manage a planned burn will vary depending on the size, weather conditions and nature of the burn. Resources include both labour (people) and equipment. In general, private landholders do not have ready access to large amounts of labour, and people experienced and trained in planned burning are rare.

CFA brigades may sometimes be available to assist and resource planned burns if they have the capacity. However, as this will vary depending on the brigade and the time of year, the availability of local brigades shouldn't be taken as a given when planning burns.

You should contact your local CFA District office for advice well before your planned burn if you are considering calling upon the CFA to help you resource your burn.

For private landholders who have limited resources, as a general rule it is likely to be better to conduct burns that are low intensity and planned to self-extinguish, rather than high intensity burns which need to be actively extinguished. Low intensity burns will require fewer labour resources to safely manage.

There is basic equipment which landholders planning burns should have access to, as it will increase the likelihood that the burn can be safely managed and kept under control. The basic equipment recommended includes:

- Driptorches – fueled by 1 part petrol and 3 parts diesel.
- 400 – 1200L tanker mounted on a trailer or on a ute/ tractor. Before burning it is important all water tanks are filled ready to go and pumps are tested.
- Mobile phones (and phone numbers) to communicate with other members of the team (in some areas UHF radio may be more reliable).
- Access to current weather information via internet/phone.
- Tractor with slasher/discs/loaders/etc (optional) (these can be most valuable for preparing firebreaks prior to the burn).
- Beaters/hessian bags.
- Knapsacks (e.g. collapsible knapsacks).
- Hand tools such as rakes, hoes and/or chainsaws.
- Suitable clothing.

7.8 Control strategy

Control lines are a critical component of planned burning and bushfire suppression. They are used to contain fire within a designated area by creating or identifying features that are unlikely to burn, thereby limiting the spread of fire. Control lines may be formed using natural barriers, constructed fuel breaks or areas where fuel conditions make fire spread unlikely.

When planning a burn, consideration is given to a range of factors, including existing roads and tracks, vegetation type, fuel hazard levels, weather conditions, available resources and the potential consequences of a fire escaping containment. Particular attention is also paid to fuel moisture conditions, both within the burn area and in surrounding vegetation. Differences in fuel moisture can significantly influence fire behaviour and can be used as a deliberate control strategy.

Control lines may include:

- Roads, tracks and vehicle access routes.
- Rivers, creeks and other waterways.
- Previously treated or fuel-reduced areas.
- Bare-earth or mineral-earth breaks.
- Wetlands, green vegetation or other fuels that are unlikely to sustain fire.

In addition to traditional fuel breaks, fire managers increasingly use moisture differentials as a containment tool. A moisture differential occurs where fuels within the burn area are dry enough to carry fire, while adjacent fuels contain higher moisture levels and are less likely to ignite.

These naturally occurring or intentionally selected transitions can provide effective control boundaries while minimising the need for more environmentally disruptive measures such as ploughing or vegetation removal.

The type and width of a control line will depend on the expected fire behaviour and burn objectives. While conventional fuel breaks are often designed to be wider than the anticipated flame height, low-intensity burning techniques may allow reliance on narrower breaks, wet lines or moisture differentials to safely contain fire.

Early planning of control lines is essential to the success of any burn. Identifying and preparing suitable boundaries well in advance can reduce operational complexity, minimise environmental impacts and improve the safe and effective delivery of planned burning activities.

7.9 Burn notifications

There are a few key tasks which must be done as part of the preparation on the day of the burn or leading up to the burn:

- Council permits must be obtained and council notified of burnoff where required .
- Neighbours must be notified of the burn.
- Burnoff must be registered with CFA via firepermits.vic.gov.au or phone **1800 688 511**

Failing to take these steps may constitute a breach of the Summary Offences Act 1966 or local laws and the landholder may become liable to a fine or imprisonment if convicted.

7.10 Smoke management

It is important to be aware that burns can be a significant contributor to episodes of air pollution. Smoke in sufficient concentrations can lead to exacerbation of asthma and other health conditions, even from short, episodic exposures. It can also have negative impacts on some crops (for example wine grapes).

Smoke is an inevitable consequence of conducting planned burns, which are a legitimate land management practice.

However, smoke produced from your burn is your responsibility, and management of a burn should be done in such a way so as to avoid or minimise impacts from smoke.

For example, use weather forecasts to predict where smoke will travel, modify prescriptions to prevent smouldering, or conduct the burn at a time when the impact will not occur.

7.11 Protecting habitat trees and features during planned burns

Raking around habitat trees and key ground features such as logs, fallen branches, and stags helps protect important wildlife refuges during planned burns.

These features support birds, mammals, reptiles, and invertebrates, and many take decades to develop—so protecting them is vital.

How to prepare habitat trees and features before a burn:

- **Clear a 1–3 m** radius around the base of habitat trees to remove fine fuels (leaf litter, bark, dry grass).
- **Rake gently** to avoid disturbing roots or damaging the tree base.
- **Do not push debris against trunks or logs—** this increases flame height and risk of hollow loss.
- **Retain logs, woody debris, and dead standing trees** where safe to do so (they provide essential habitat).
- **Use lower intensity** fire around known habitat features whenever possible.
- **Monitor during and after burning,** particularly where hollows or loose bark are present.





7.12 Estimating fuel moisture

Fuel moisture is one of the most important factors influencing whether vegetation will ignite and sustain combustion. In many situations, fuel moisture is the primary determinant of whether a fuel will burn at all.

Even during hot weather, fuels with high moisture content may not ignite readily, while dry fuels can support rapid fire spread and more intense fire behaviour.

Fuel moisture varies across the landscape and is influenced by vegetation type, recent weather, aspect, slope, shading and exposure to wind and sunlight.

Within a single fuel layer, moisture levels can differ considerably between exposed surface fuels and the more sheltered fuels beneath.

As a result, a fire may only consume the driest fuels under mild conditions, producing relatively low-intensity fire behaviour.

As fuel moisture decreases throughout the fuel profile, a greater proportion of available fuel can burn, resulting in faster rates of spread, higher fire intensity and more challenging suppression conditions.

Understanding fuel moisture is fundamental to both bushfire risk management and planned burning operations. Fire managers use fuel moisture assessments to determine whether fuels are likely to ignite, carry fire and achieve desired burn objectives, while also ensuring fires can be safely contained.

Differences in fuel moisture between adjacent areas (moisture differential) can also be used strategically as a control measure, with wetter fuels often acting as effective barriers to fire spread.

A simple field-based method for assessing fuel dryness is the single-leaf test, which involves observing whether a dead leaf or similar fine fuel can sustain combustion when ignited.

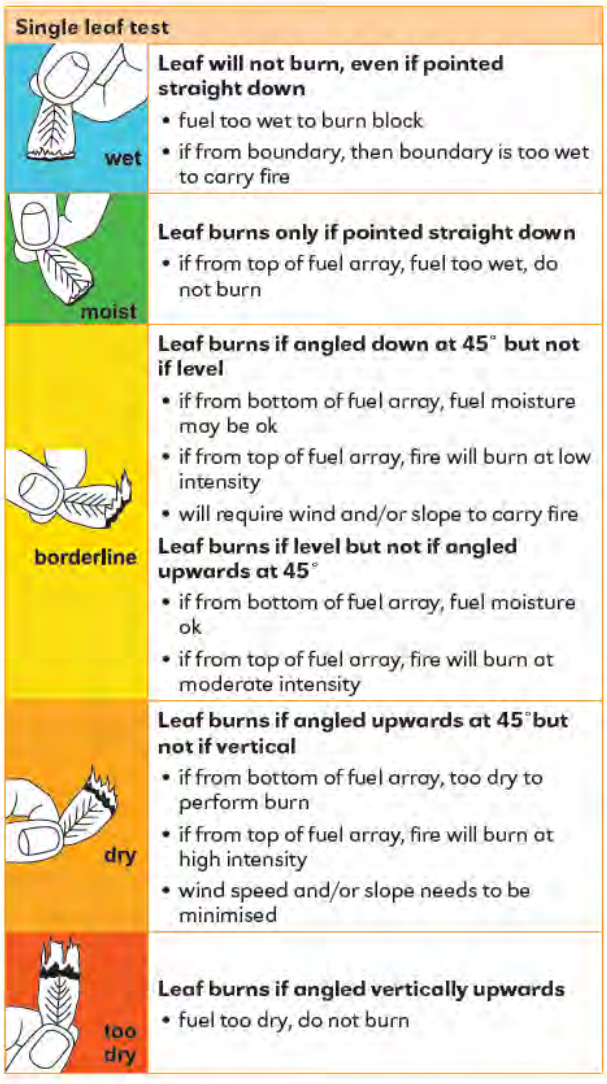
While not a substitute for formal fuel moisture measurements, this test can provide a practical indication of fuel availability for burning.

7.12.1 Single leaf test

If it sustains burning when pointing straight up, the fuels will probably be too dry for planned burning. If it only sustains burning when pointing straight down, then the fuels are probably too wet to get an adequate burn.

The single leaf test can be used to estimate the moisture of different locations, such as gullies versus ridges, or different parts of the fuel layer, such as fuels that are exposed on the top versus those which are shaded on the lower part of the layer.

The single leaf test must be performed with care in order to ensure that the fuels tested are representative of the planned burn area. It is also critical that the single leaf test is not conducted too long prior to the burn as fuels may dry out further after testing.



7.14 Lighting the fire

Generally, hand light the planned burn using driptorches, gas weed burners, firesticks or matches. Be very careful to balance the length of fireline lit and/or the number of ignition points against the required level of fire behaviour.

Expect a time-lag between when fires are lit and the fire reaching its average level of fire behaviour. Do not over light during this build-up period.

If fires are lit too intensively or too close together, they are likely to form junction zones, which can cause strong local winds and increases in the rate of fire spread, intensity and potential for spot fires.

If you light spot fires, the rate of fire spread and intensity will slowly increase as the fire gets larger. If you light lines of fire, then the fire will burn at its potential rate of spread and intensity from the time at which it is lit.

The following table provides information about lighting patterns, when to use each one, and why.

Type	Characteristics	Use to	Use when
Back fire ignition	Direction of travel is into the prevailing wind and/ or downslope	Keep the rate of fire spread and intensity to a minimum Burn fire breaks	Fuels are dry Weather conditions would make head or flank fires burn with excessive rates of fire spread, intensity, scorch or spotting
Flank fire ignition	Fires are lit in lines parallel to the direction of fire spread and/or straight up-down slopes	Produce intermediate rates of fire spread and intensity	
Head fire ignition	Fires are lit in lines with the wind behind and/ or straight across slopes	Maximises rate of fire spread and intensity	When fuels are moist and/ or weather mild
Spot fire ignition	Independent spot fires. The aim is for the spots to join up in the cool of the evening and/ or burn into less flammable fuels (e.g. gullies or S-SE slopes), where they self-extinguish	To minimise fire junction zones and excessive levels of fire behaviour OR To intensively light up areas with the fire junction zones increasing the level of fire behaviour, to reduce the burnout time	When fuels are moist and weather mild
Perimeter ignition	The block is lit normally as strips from pre-existing fire breaks (e.g. roads, tracks and/ or rivers)	Burn into a block	

Common ignition pattern characteristics and uses. Credit: Tasmania State Fire Management Council

7.15 Contingency planning

As part of your planning, it is important to consider any possible contingencies. What will you do if:

- Weather conditions are outside prescription, winds are gusty?
- Fuel moisture content is not suitable?
- Lighting plan is not effective?
- An incident occurs or someone receives an injury?
- The fire escapes or spots over control lines?
- The fire becomes unmanageable with current resources?

Safety must always guide your decision making. You should continually monitor the conditions in the burn area and the fire behaviour.

Your plan needs to be adaptable to changes in weather conditions and fire behaviour. You should always consider postponing the burn if conditions are not suitable, particularly if the weather is hotter, drier or windier than expected.

You need to be aware of your capabilities and work within them.

Where your fire is becoming beyond your ability to manage, you should consider early notification to CFA to allow them to dispatch the appropriate resources to assist.



7.16 Day of Burn Plan

On the day of a planned burn, a clear and practical burn plan helps ensure the activity is conducted safely, efficiently and within legal requirements. Before lighting any fire, review the burn plan with all personnel involved and confirm that conditions remain suitable for burning.

A Day of Burn Plan should include:

- Burn location and site map showing the area to be burnt, access tracks, control lines, water points and assets at risk.
- Weather conditions and burn prescriptions, including acceptable wind speed and direction, temperature, relative humidity and Fire Danger Rating. Burns should only proceed when conditions are within the limits identified in the burn plan.
- Personnel and roles, identifying who is responsible for ignition, patrol, communications and suppression activities.
- Equipment and resources, including firefighting equipment, water supplies, hand tools, vehicles and communication devices. Ensure all equipment is operational before commencing. Ignition and control strategy, outlining how the burn will be lit, how fire spread will be managed and the sequence of burning operations.
- Safety and contingency arrangements, including procedures for responding to spot fires, escapes or changing weather conditions.
- Notification requirements, confirming neighbours and any required authorities have been notified.
- Patrol, mop-up and extinguishment arrangements to ensure the fire is fully contained and monitored until there is no risk of re-ignition.

Remember: If weather conditions change or are outside the approved prescription, postpone the burn and reassess at a later date. Safety should always be the highest priority.

7.17 After the burn

Plan to check the burn for two days in the heat of the afternoon and then again on the next high fire danger day after the burn (the latter check is especially important if heavy fuels or log heaps have been burnt).

Feeling the ground for warmth is a simple way of testing whether the fire is still smouldering or not.

Patrol the burnt area the morning after the burn to check whether it has extinguished or not.

If the fire is still actively burning, steps may need to be taken to make the fire as safe as possible. This might involve suppressing the fire's boundary if practical and/or re-lighting the fire's boundaries to bring the fire out to safe edges.

Great care should be taken when patrolling after the burn, as trees that may have burnt but still be standing may have been structurally weakened and there is a danger of trees/ branches falling.

Heaps and stumps are high risk for fire escapes after the burn and should be checked regularly in the weeks after the burn to keep track of whether they are extinguished or not.

Ideally heaps and heavy fuels should be rolled over using machinery to aerate them and burn them right through. During the period before heaps or heavy fuels are extinguished if there are any high fire danger days, monitor closely for smoke.

In the months following the burn, you should monitor the site for weed growth. Depending on the intensity of the burn, the plant composition and growth will be altered. This may result in an increase in weeds which should be managed at an early stage to prevent infestation. Agriculture Victoria or your local council have information on environmental weeds in your area.

The disruption to ground cover caused by fire may increase erosion on the site, as vegetative ground cover provides some protection against erosion.

To prevent erosion you should minimise vehicle and livestock traffic on bare ground and check and check any surface water management structures, such as drains, banks or levees to avoid water flows across disturbed areas.

7.18 Post-burn record keeping and reporting

Accurate record keeping is an important part of the fuel management process. Following a burn, details of the treatment should be documented, including the burn date, location, area treated, objectives achieved, weather conditions, fuel conditions and any issues encountered during implementation.

Photographs and observations of burn outcomes can also be recorded to support future planning and evaluation.

Burn areas should be updated on property maps and fuel management plans to ensure records remain current and to help identify future treatment priorities.

Where required, information from completed burns should be reported to relevant programs, agencies or organisations to contribute to fuel management metrics, program evaluation and continuous improvement.

Maintaining clear records helps demonstrate risk reduction activities, supports ongoing property management and provides a valuable reference for future fuel management decisions.



7.19 Module 7 recap

Fuel considerations and fire behaviour

- Differences in fuel type may mean differences in general arrangement and bark and fuel size characteristics. This will influence flame heights and rates of spread and hence fire intensities.
- Available fuel is quantified in tonnes per hectare and used to predict fire intensity and rate of spread. Fuel quantity can be calculated using precise sampling or estimated roughly using visual guides.
- Vertical arrangement of fuel will influence flame height, intensity and rate of spread. In forests it is much more important to integrate information on surface fuels with the contribution of bark fuels and elevated fine fuels such as shrubs, heath and suspended dead litter fuels.
- The character of any particular fire is the result of a combination of factors, including local climate, topographical influences, meteorological influences, and factors relating to fuel.

Igniting the burn

- Any fire will grow and build in intensity until its growth cannot be further promoted by the conditions under which it is burning. When it reaches this state of full development, the conditions affecting it will be in equilibrium.
- Fires lit from a single point do not usually reach their average rate of spread until 20 minutes after being lit.
- Fires lit via strip ignition, or head fires which develop from flank fires after a wind change, can reach their maximum rate of spread within five minutes.

Burn planning

- Operational planning requires an assessment of the burn site and its values, hazards and risks analysis to be able to make informed decisions on the burn execution and risk-treatment requirements.
- Check with experienced personnel or the CFA to verify the burn boundaries and that the burn can be contained within this area using available control lines.
- Consider the topography within and surrounding the burn area to help plan ignition patterns, anticipate variations in the fire behaviour of the prescribed burn, and contingency planning in the event of escape.
- Prescribed burns have the potential to impact on a range of values and assets within and adjacent to the burn area, such as infrastructure, cultural-heritage values, amenity values, utilities, commercial land use and biodiversity values.

Undertaking the burn

- Review the burn plan before commencing so that the person in charge is confident to safely deliver the burn and meet the burn objectives.
- Before the burn day prepare and check access, escape routes and safety zones.
- To prepare for suitable burning conditions, it is important to:
  - check weather outlooks
  - consider smoke management in relation to outlooks
  - monitor site fuel and moisture conditions
  - monitor site preparations.
- Align site weather observations with the nearest weather station by monitoring weather factors such as temperature, relative humidity and wind speed and direction at the proposed burn site in the lead up period.
- Monitoring of fuel moisture conditions is fundamental to determining whether fuels will burn, and if so, how rapidly and intensely.

NEXT STEPS

Completing the Bushfire Prepare e-learning or learner manual provides the foundation for understanding how fuel management can reduce bushfire risk.

The next step is to apply this knowledge by assessing the fuels on and around your property, considering how vegetation, fuel continuity and fuel moisture influence fire behaviour, and identifying opportunities to reduce risk through appropriate fuel management treatments.

Residents are encouraged to attend a Bushfire Prepare practical workshop, where they can work through the fuel management planning process in a local context and gain hands-on experience using bushfire planning tools.

These tools can help evaluate fuel hazards, identify treatment options and support informed decision-making about managing vegetation on private land.

If you need property-specific guidance, seek advice from your local council or CFA, who can help you understand local bushfire risks, fuel management considerations and how your efforts can complement broader community and landscape-scale risk reduction activities.

By engaging in this process, you can contribute to a more coordinated and effective approach to reducing bushfire risk across your neighbourhood.



GLOSSARY

Adaptor

A fitting used to couple different sized hoses, hose of the same size with different threads, or different types of couplings, or to connect the male to male, or female to female parts of the same type of coupling.

Adsorption (as it relates to fuel)

The taking up of moisture during the cool, still, humid conditions of night.

Air attack

The direct use of aircraft in the suppression of bushfire.

Allocated resources

Resources working at an incident.

AMG

Australian Map Grid.

Anchor point

An advantageous location from which a fireline can be constructed. It is used to minimise the possibility of being outflanked by a fire while the line is being constructed.

Appliance

A firefighting vehicle, usually equipped with a pump and water supply.

Assets

Anything valued by people which includes houses, crops, forests and, in many cases, the environment.

Asset Protection zone

Using intensive fuel treatment, the Asset Protection Zone (APZ) aims to provide the highest level of localised protection to human life and property and key community assets. The goal of fuel treatment is to reduce radiant heat and ember attack in the event of a bushfire.

Back (heel or rear)

The section of the perimeter opposite to and usually upwind or down slope from the head of the fire.

Backburning

A fire ignited along the inner edge of a control line to consume the fuel in the path of a bushfire.

Backing fire

The part of a fire which is burning back against the wind, where the flame height and rate of spread is minimal.

Blacking out

See mopping up.

Branch

A device fitted to the end of a hose line to allow the water or other extinguishing medium travelling through the hose to form an effective firefighting spray or jet.

Breakaway

The points at which a fire, after it has been contained, escapes into unburnt areas across a fireline or fire edge.

Burning out

The deliberate burning of small patches of unburnt fuel within the fire perimeter. It can also mean burning small patches of unburnt fuel between the fire control line (constructed or natural)

Bush

A general term for forest or woodland, but normally used to describe indigenous forest.

Bushfire

An unplanned fire. A generic term which includes grass fires, forest fires and scrub fires.

Bushfire Moderation zone

This zone aims to reduce the speed and intensity of bushfires. This zone complements the APZ in that the use of planned burning in the BMZ is designed to protect nearby assets, particularly from ember spotting during a bushfire.

Bushfire Risk Engagement Area (BREA)

BREAs identify parts of the landscape where managing bushfire fuels is most effective in reducing risk. This helps to indicate the priority areas in our region where we can work with communities to reduce bushfire fuels.

Candle bark

Long streamers of bark that have peeled from some eucalypt species that form fire brands conducive to very long distance spotting.

Canopy cover/canopy density

The foliage cover from the crowns of the trees in a forest. It is usually expressed as a percentage of the area of ground covered.

Centrifugal pump

A pump using centrifugal force to increase the pressure of liquid. Centrifugal force causes the liquid to move along the vanes of an impeller thus acquiring kinetic energy. This is transformed into energy at the pump casing.

Chemical chain reaction

This is the fourth dimension of the fire tetrahedron. In the combustion process, a chemical chain reaction occurs between the fuel and oxygen and is promoted by heat.

Class A foam

A firefighting medium produced by adding Class A concentrate to water and passing it through a foam or spray nozzle.

Combustion

A chemical reaction between the vapours of a combustible material and oxygen. It releases heat, light and/or flames.

Contained

A fire is contained when its spread has been halted, but it may still be burning freely within the perimeter or the control lines.

Containment

Operations designed to restrict fire and stop it spreading to surrounding structures or areas.

Control line (fire line)

A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire.

Controlled

The time at which the complete perimeter of the fire is secured and no breakaway is expected.

Convection column

The rising column of smoke, ash, burning embers and other matter generated by a fire.

Crew

The basic unit of a bushfire suppression force. It normally consists of two or more personnel.

Crown fire

A fire which burns in the tree tops ahead of and above an intense fire in the undergrowth. A fast travelling fire that is most destructive and usually consuming all available fuel in its path.

Dehydration

Excessive loss of water from the body's tissues. Dehydration may follow any condition in which there is a rapid depletion of body fluids.

Delivery hose

Hose made of fabric in various diameters and used to transport water under pressure. Delivery hose may not be internally or externally lined with rubber or plastic.

Delivery valve

On a pump, the valved outlet through which water is discharged.

Desorption

The loss of moisture to the atmosphere from dead plant material.

Direct attack

A method of bushfire attack where wet or dry firefighting techniques are used. It involves suppression action right on the fire edge which becomes the control line.

Dozer

A crawler tractor fitted with a blade which can be transported to a fire on a tray truck or trailer.

Drip torch

A canister of flammable fuel fitted with a wand, a burner head and a fuel flow control device. It is used for lighting fires for prescribed burning and backburning.

Dry firefighting

The suppression of a fire without the use of water. This is normally achieved by removing the fuel by the use of hand tools or machinery.

Eastings

These are lines running north–south (top to bottom) on a map.

Elevated dead fuel

Dead fuel forming part of, or being suspended in, the shrub layer.

Energy

Source of power which may be released in forms such as heat, light and movement.

Escape route

A pre-planned route away from danger areas at a fire.

Evaporation

To change or cause to change from a liquid or solid state to a vapour.

Fine fuel

Grass, leaves, bark and twigs less than 6 mm in diameter.

Fingers

Narrow slivers of the advancing bushfire which extend beyond the head or flanks.

Fire behaviour

The manner in which a fire reacts to the variables of fuel, weather and topography.

Fire brand

A piece of burning material, commonly bark from eucalypts.

Fireground

The area in the vicinity of fire suppression operations, and the area immediately threatened by the fire.

Fire perimeter

The entire outer boundary of a fire area.

Fire retardant

A chemical generally mixed with water, designed to retard combustion. It is applied as a slurry from the ground or the air.

Fire spread

Development and travel of fire across surfaces.

Fire tetrahedron

An instructional aid in which the sides of the tetrahedron (comprising four triangular shaped figures) are used to represent the four components of the combustion and flame production process – fuel, heat, oxygen and the chemical chain reaction.

Fire triangle

A figure illustrating the three components necessary for a fire to burn and continue to burn – oxygen, heat and fuel.

Fire whirl

A spinning column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris and flame. Fire whirls range in size from less than a metre in diameter to small tornados in intensity.

Firefighting vehicle

Any vehicle used by fire agencies to fight fires, regardless of its intended purpose.

Fireline

A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire.

Flame height

The vertical distance between the tip of the flame and ground level, excluding higher flame flashes.

Flammable

Capable of burning with a flame

Flammable vapours

The vapours given off by solids and liquids that combine with oxygen and burn if ignited.

Flank attack

Attempting control of a fire by attacking its side (flanks).

Flanks of a fire

Those parts of a fire's perimeter that are roughly parallel to the main direction of spread.

Foam – Class A

A firefighting medium produced by adding Class A concentrate to water and passing it through a foam or spray nozzle.

Forest fire

A fire burning mainly in forest and/or woodland.

Friction loss

Loss of water pressure during the passage of fluid through a pipe or hose. Loss due to friction depends on factors such as the length of the hose or pipe, its diameter, the rate of flow and the restrictions, such as corrosion in a pipe or the number of bends in a hose.

Fuel

Any material such as grass, leaf litter and live vegetation which can be ignited and sustains fire.

Fuels can be categorised as fine or heavy.

Fuel management exclusion zones

See Planned burning exclusion zones

Fuel Management Zones

Areas of public land where fire is used for specific asset, fuel and overall forest and park management objectives. They can also be applied to private and community land through a community process.

Fuel moisture content

The water content of a fuel particle expressed as a percent of the oven dry weight of the fuel particle (%ODW).

Heat stroke

A life-threatening condition that develops when the body's temperature-regulating and cooling mechanisms are overwhelmed and body systems begin to fail.

Heavy fuels

Dead woody material, greater than 6 mm in diameter, in contact with the soil surface (fallen trees and branches).

Heel (back or rear)

The section of the perimeter opposite to and usually upwind or down slope from the head of the fire.

Hose lay

The practice of running out firefighting hose to enable fire suppression by the application of water. May be conducted from a firefighting vehicle using hose bins and/or hose reels, or the act of bowling out a length of hose that is rolled up (hose on the bight).

Hot spots

Areas of burnt ground that are still hot and could re-ignite.

Ignition

The process of starting combustion.

Indirect attack

A fire control strategy where the fire is intended to be brought under control a considerable distance away from its current position, but within a defined area, bounded by existing or planned fire control lines. A common method of achieving this is by backburning.

Initial attack

The first suppression work on a fire.

Junction zone

An area of greatly increased fire intensity caused by two fire fronts (or flanks) burning towards one another.

Knock down

The rapid application and concentration of water or foam, intended to reduce fire intensity prior to manual follow-up action.

Ladder fuels

Fuels that provide vertical continuity between strata. Fire is able to carry surface fuels into the crowns of trees with relative ease

Landscape Management zone

Within this zone, planned burning will be used for three broad aims:

- *bushfire protection outcomes by reducing the overall fuel and bushfire hazard in the landscape*
- *ecological resilience through appropriate fire regimes*
- *management of the land for particular values including forest regeneration and protection of water catchments at a landscape level.*

Litter

The top layer of the forest floor composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves and needles, little altered in structure by decomposition. (The litter layer of the forest floor.)

Magnetic north

The direction to the magnetic north i.e. the direction a compass points to. It moves around the true North Pole.

Map scale

The relationship between a unit of measurement on a map and the equivalent distance on the ground. The scale of a map can be expressed in words (e.g. one centimetre equals one kilometre), graphically by the use of a linear scale or scale bar, and in numbers written as a ratio (e.g. 1:100,000) or as a representative fraction (e.g. 1/100,000).

Mineral earth

A term used to describe the ideal condition of a constructed firebreak, being completely free of any vegetation or other combustible material.

Mopping up (blacking out)

Making a fire safe after it has been controlled, by extinguishing or removing burning material along or near the fireline, felling stags, trenching logs to prevent rolling, and the like.

Northings

These are lines of a map running west–east (left to right) on a map.

Nozzle

A fitting at the end of a hose line used to control the volume of water and/or pattern of the discharge of water or extinguishing medium.

Objective

A goal statement of what is to be achieved.

Oxygen

Colourless, odourless gas, making up about one fifth of the air volume of the atmosphere. It is the supporter of combustion in the air.

Parallel attack

A method of suppression in which a fireline is constructed approximately parallel to and just far enough from the fire edge to enable firefighters and equipment to work effectively. The line may be shortened by cutting across unburnt fingers. The intervening strip of unburnt fuel is normally burnt out as the control line proceeds, but may be allowed to burn out unassisted where this occurs without undue delay or threat to the line.

Patrol

(a) *To travel over a given route to prevent, detect and suppress a fire.*

(b) *To go back and forth vigilantly over the length of a control line during and/or after construction, to prevent breakaways, to control spot fires and extinguish overlooked hot spots.*

(c) *A person or group of persons who carry out patrol activities.*

Perimeter

The entire outer boundary of a fire area.

Planned burning exclusion zones (also known as Fuel management exclusion zones)

This zone excludes the use of planned burning and other forms of fuel management primarily in areas intolerant to fire.

Point of origin

The area where the fire started.

Priming the pump

Removing air from a main pump casing and suction hose line so that atmospheric pressure can force water from a static water supply up the hose into the pump.

Rakehoe (McLeod tool)

A hand tool used for bushfire firefighting, consisting of a combination of a heavy rake and hoe.

Rate of spread

The forward progress per time unit of the head fire or another specified part of the fire perimeter. The key variables affecting rate of spread are the type, arrangement and quantity of fuel, the dead fuel moisture content,wind speed at the fire front, the width of the fire and the slope of the ground.

Rear (heel or back)

The section of the perimeter opposite to and usually upwind or down slope from the head of the fire.

Relative humidity (% RH)

The amount of water vapour in a given volume of air, expressed as a percentage of the maximum water vapour the air can hold at that temperature.

Representative fraction

See map scale.

Retardant

Chemicals mixed with water to inhibit combustion.

Ribbon bark/Candle bark

Long streamers of bark that have peeled from some eucalypt species that form fire brands conducive to very long distance spotting.

Safe

The stage of fire suppression or prescribed burning when it is considered that no further suppression action or patrols are necessary.

Safety zone

An area cleared of flammable materials used for escape if the line is outflanked or in case a spot fire outside the control line renders the line unsafe. In fire operations, crews progress so as to maintain a safety zone close at hand, allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuelbreaks.

They are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of a blow up in the vicinity.

Spot fire

Isolated fires started ahead of the main fire by sparks, embers or other ignited material, sometimes to a distance of several kilometres.

Spotting

The ignition of spot fires from sparks or embers.

Stag

A large, old tree either dead or with significant dead upper branches. Often hollow with an opening at ground level. Once alight, a stag represents a major hazard.

Standard operating procedures

A set of organisational directives that establish a standard course of action on the fireground to increase the effectiveness of the firefighting team. They are written, official, applied to all situations, enforced and integrated into the agency's management of incidents.

Static water supply

A dam, lake, river, creek, pool or tank.

Strategy

A statement detailing how an objective is to be achieved.

Suction hose

Hose, made in various diameters, of reinforced rubber or plastic, used to draught water from a static supply i.e. ponds, dams, creeks, tanks or rivers.

Sunburn

Injury to the skin, including redness of the skin, tenderness, and sometimes blistering, following excessive exposure to unfiltered ultraviolet rays produced by sunlight.

Surface fire

A fire which travels just above ground surface in grass, low shrub, leaves and forest litter.

Tactics

The tasking of personnel and resources to implement the incident strategies

Task

A job given to any firefighting force or unit.

Topographical map

A map that shows contours, mountains, valleys, patterns of rivers and all other natural and manmade features on the landscape.

Topography

The surface features of a particular area or region. It may include mountains, rivers, populated areas, roads, railways and vegetation.

Transmission lines

Overhead conductors generally supported by steel towers that may operate at extra high voltage (66,000 volts to 500,000 volts).

True north

The direction to the North Pole.

Volute

A part of the casing in a centrifugal pump, shaped like the shell of a snail where the water exits the pump.

Water hammer (shock)

The shock caused by opening and shutting off a hydrant, pump delivery or controlled branch too quickly.

Wetting agent

A chemical added in low concentration to water. It is used in firefighting to break down the surface tension of water and improve its penetration into fuels.

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