

# Guideline for Building in Bushfire Prone Areas

Wye River & Separation Creek

---

## Contents

Introduction	4
1. Building and living in a bushfire prone area	5
2. Bushfire Measures in Combination	6
3. Bushfire Protection Measures Provided by this Guideline	8
3.1. Building Siting and Building separation	8
3.2. Construction Requirements	8
3.3. Water supply & Utilities	10
3.4. Electricity Supply	10
3.5. Gas Supply	11
3.6. Landscaping, Maintenance & Access	12
3.7. Private Bushfire Shelter	13

Version 2.0 - 13<sup>th</sup> October 2016

### Authors:

Justin Leonard, CSIRO  
Lew Short, EMV

---

## Abbreviations

<b>AS3959</b>	Australian Standard for Construction of Buildings in Bushfire Prone Areas
<b>AS1596</b>	Sets out requirements and recommendations for the safe storage and handling of LP Gas, in cylinders and bulk tanks.
<b>BAL</b>	Bushfire Attack Level
<b>BPM</b>	Bushfire Protection Measure
<b>FRL</b>	As defined in the Building Code of Australia (BCA) is the grading period in minutes for three criteria: structural adequacy, integrity and insulation.
<b>NASH Standard</b>	National Association of Steel-framed Housing Standard for Construction of Buildings in Bushfire Prone Areas
<b>NCC</b>	National Construction Code

## Glossary

<b>Access (routes)</b>	The means or opportunity to approach or exit a place.
<b>Bushfire Attack Level (BAL)</b>	A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. In the Building Code of Australia, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements (AS3959).
<b>Bushfire Prone</b>	An area of land that can support a bushfire or is likely to be subject to bushfire attack
<b>Bushfire Protection Measures (BPM)</b>	A range of measures used to minimise the risk arising from a bushfire. BPMs include Building Siting and Building separation, Defendable Space, Construction Requirements, Water supply & Utilities, Landscaping and Maintenance, Access, Private Bushfire Shelter and Emergency Planning.
<b>CFA plant key</b>	CFA guide to assist you in choosing plants suitable for use in a garden in a high bushfire risk area. <a href="http://www.cfa.vic.gov.au/plan-prepare/plant-selection-key/">http://www.cfa.vic.gov.au/plan-prepare/plant-selection-key/</a>
<b>Defendable space</b>	An area adjoining an asset that is managed to reduce combustible elements ( <i>fine fuels</i> ). It is a safe working environment in which active firefighting can be undertaken to defend the structure, before and after the passage of a bushfire. Defendable space provisions are defined in the planning scheme. These provisions need to be met at time of occupancy and maintained throughout the life of the building.
<b>Bushfire prone areas</b>	For the purposes of this guideline the all of Wye River and Separation Creek are considered bushfire prone.
<b>Fine Fuels</b>	Grass, leaves, twigs and other small pieces of vegetation under 6mm in diameter
<b>Heat shields</b>	A barrier for shielding from excessive heat
<b>Heavy Fuels</b>	Dead Fuel and other combustible materials greater than 6mm in diameter or thickness. May also include built assets such as houses, cars, caravans etc. Note: a living tree trunk or branch greater than 6mm is not considered as a heavy fuel.
<b>National Construction Code</b>	The NCC is produced and maintained by the Australian Building Codes Board on behalf of the Australian Government and each State and Territory government. The NCC is a uniform set of technical provisions for the design and construction of buildings and other structures, and plumbing and drainage systems throughout Australia.
<b>Non-combustible</b>	As per the definition provided in the National Construction Code, which is available online. This code provides a general definition, a test method and section 3.7.1.2 of volume two provides detailed description further descriptions of what are consider to perform adequately as non-combustible building materials.
<b>Portable gas cylinders</b>	LPG cylinders of capacity less than 10kg, for more details refer to AS1596.
<b>Private bushfire shelter</b>	A structure classified as a Class 10c building associated with a Class 1a dwelling that may, as a last resort, provide shelter for occupants from immediate life threatening effects of a bushfire event.

---

## Introduction

The Christmas Day 2015 bushfire in Wye River and Separation Creek reminds us that the Australian landscape while breathtakingly beautiful, is also prone to bushfires that can have devastating consequences for the environment, communities and individuals.

The landscape scale bushfire risk of the Otways is extreme with the prospect of very intense fires given the potential fire weather, steep slopes and extensive eucalypt forests. The settlements of Wye River and Separation Creek are within this landscape risk context.

A key driver in the recovery after the fires is to increase the resilience of the communities and to provide a better bushfire protection outcome than existed prior to the fires.

Wye River and Separation Creek consist of houses of mixed contemporary styles and varying ages set on steep slopes amongst native vegetation. Houses are generally well screened from views by native forest, including canopy trees. A key priority identified by the community is to maintain the character of the area while providing for better bushfire protection outcomes that deliver a safer and more resilient community.

This precinct will continue to be characterised by dominant native bush that can form a consistent canopy, linking to the adjacent bushland. The size and location of a new house on a lot will need to be appropriate for the site and topography, providing defensible space and access through the area. The siting of new buildings should provide for the retention of existing trees, contemporary building standards and enhanced safety outcomes.

Adopting an integrated and holistic approach to the process of design for structures in steep and challenging settings allows best value solutions to be embraced that deliver multiple benefits to the use of the structure in the longer term. For example, use of building mass for both fire resistance and energy efficiency outcomes and the use of shutters for fire resistance and for managing sun, heat loss and the like.

The guideline provides a set of voluntary bushfire protection measures that when comprehensively followed will increase the survival prospects of the houses and provide a contingency for people to safely move through the township if they are unable to shelter in their houses. Whilst these guidelines are likely to incur some costs, it is considered that the longer term benefits are likely to far outweigh these additional costs. Minimising costs is achieved by carefully considering these guidelines prior to designing and siting the house.

---

## 1. Building and living in a bushfire prone area

Wye River and Separation Creek are like many communities along the Great Ocean Road in that they can be isolated by bushfires. The nature of the terrain and existing road access throughout much of the settlements present challenges for access which in turn presents potential for fires to entrap residents and emergency services. Isolated developments, particularly in rugged, heavily timbered country, pose additional problems in the provision of adequate levels of protection from fires. Where developments are located in these areas, occupants and firefighters may have to travel large distances through bushfire prone vegetation. In addition, the isolation means that, if a fast running fire impacts on the development, occupants may also be a long way from firefighting assistance.

These guidelines recognise these challenges and the desire of the community to increase its resilience to future fires. These guidelines aim to enhance the prospect of building survival throughout the bushfire event and improve access provisions to ensure occupants have a contingency in being able to pass through township if they need to leave their burning house.

In building a safer and more resilient community, some key principles for the townships include:

- Enhanced building design and construction to increase the likelihood of occupant and building survival;
- The new building work must comply with either AS3959 or the NASH Standard or comply with an alternative solution approved in accordance with the *Building Act 1993* and *Building Regulations 2006* and all Council building and planning requirements;
- Provide the required minimum defensible space;
- Provide suitable emergency planning;
- Ongoing maintenance of the bushfire protection measures (BPM) is fundamental to their effectiveness;
- Accepting that the risk of bushfire is a shared responsibility.

## 2. Bushfire Measures in Combination

This guideline is intended to be used in combination with established building and planning regulations specific to Wye River and Separation Creek which together form part of a broader suite of Bushfire protection measures.

The NCC sets a minimum requirement for construction in bushfire prone areas. AS3959 is primarily concerned with improving the ability of buildings to better withstand attack from bushfire, giving a measure of protection to the building occupants (until the fire front passes) as well to the building itself. The *NASH standard* seeks to achieve this as well as improve the overall survival prospect of the house and includes some measures that facilitate access.

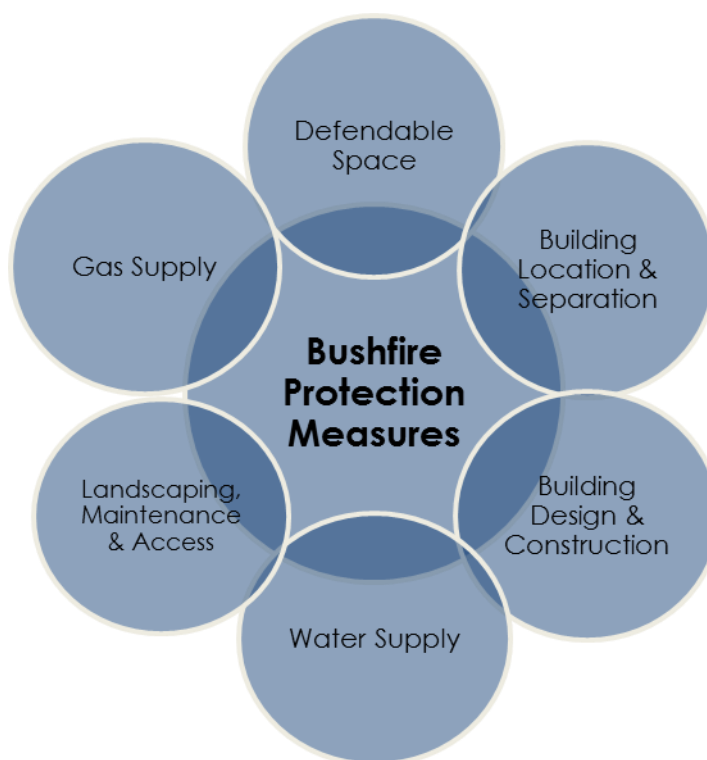
Building to the NCC and these guidelines does not guarantee that a building will survive a bushfire. However, they do contribute towards a safer and more resilient community. The NCC seeks to reduce but not eliminate the likelihood that a house will ignite and burn down in a bushfire. The more resilient a community is, the faster it will bounce back from future fires.

This guideline introduces bushfire protection measures (BPM) in combination with existing planning and building requirements to provide a better outcome for the site than regulations will provide on their own. Each home and site will be unique, providing different constraints and opportunities to utilise the *BPM*.

The measures in combination provide a system that increases the resilience of the building and should provide refuge for people and emergency services that may be caught by the fire. Figure 1 shows the different *BPM* in combination.

These *BPM* in combination should provide for a better bushfire outcome for people who have no better option than to use the building as a shelter during the fire. The *BPM* will enhance safety for people in the surrounding houses and township that may need to travel past the location in an effort to reach a place of relative safety.

**Figure 1 Bushfire Protection Measures in Combination**



---

It is important to understand the range of conditions possible before, during and after bushfires and how these relate to the level of bushfire risk that is willing to be accepted by individual households and neighbours. When considering the *BPM* in combination, people need to understand that during the peak of the fire activity, it is not likely to be survivable outside. As fire weather and fire conditions worsen, the ignition and burning of *fine fuel* and *heavy fuel* (including adjacent buildings) on and around the property is likely.

It is also highly likely that access will be compromised and the risk of entrapment within the township increases as various roads and pathways become impassable. These conditions are likely to present high risk of injury and death from the effects of the fire.

The *BPM* need to be implemented and maintained by each household to enhance broader community resilience and opportunities for occupant and building survival during future bushfires.



---

### 3. Bushfire Protection Measures Provided by this Guideline

This voluntary guideline describes a set of *BPM*. These *BPM* become effective when all of the measures are followed in combination. The failure to adhere to one or more of the *BPM* is likely to provide a weak link that can diminish the benefits of the other *BPM*. For this reason the *BPM* are described with clear terminology such as 'shall'.

In some cases additional advice is provided under the heading of 'Good Practice' and uses terminology such as 'should' indicating that while these are useful principles to follow they do not form part of the *BPM* that are essential be followed in combination.

In some case either the *BPM* or the good practice advice may coincide with requirements from other building or planning regulations. As these building and planning regulation are also a requirement they must also be followed.

#### 3.1. Building Siting and Building separation

**Objective:**

To limit the probability of house to house spread of fire.

**Solution:**

Houses shall be separated from adjacent houses by at least:

- 0m where the separating walls is non-combustible with an FRL 60/60/60 or;
- 4m for BAL FZ rated walls and eaves;
- 8m for BAL 40 rated walls and eaves;
- 12m for BAL 29 rated walls and eaves;

If the adjacent house is a BAL29 or greater that also complies with the measures in this guideline these minimum separation shall be reduced by 30%.

**Why**

House to house ignition is prevalent in bushfire events where buildings are close enough to ignite each other. The recent fire showed evidence of house to house damage at distances approaching twelve meters. Building regulations do not provide adequate prescriptions to prevent house to house ignition in the absence of timely fire fighter suppression.

#### 3.2. Construction Requirements

**Objectives:**

To provide a building with a high likelihood of surviving the passage of fire and any consequential fire.

To facilitate access from the house if fire develops in the building contents.

To improve fire fighter safety and access to and from the house.

---

## Solution:

A building shall use in all cases:

- *Non-combustible* window frame and screen frame material where not fully protected by shutters.
- *Non-combustible* door frame material.
- *Non-combustible* door material.
- *Non-combustible* external cladding.
- *Non-combustible* bargeboards, eave linings and fascia's.
- Shutters where fitted must be *non-combustible*.
- *Non-combustible* supports systems for decking and stairs.
- *Non-combustible* decking boards and stair treads within 600mm of facades and for all access routes.
- *Non-combustible* leafless gutter system (not required as an additional requirement if using NASH standard)
- External joints, penetrations and gaps either being openable (including windows, door and vehicle access doors) or *non-openable* shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 2 mm (not required as an additional requirement if using NASH standard).
- When joints are sealed they shall be sealed with flexible fire-resistant sealant or *non-combustible* external moldings, jointing strips and trims (not required as an additional requirement if using NASH standard).
- Tile battens shall be *non-combustible*.
- Bulk insulation used for any purpose shall be *non-combustible*, glass wool or mineral wool conforming to AS/NZS 4859.1.
- use *non-combustible* cladding and cladding supports to enclose a subfloor
- where subfloor areas are not enclosed they shall have the following:
  - o *Non-combustible* subfloor supports.
  - o *Non-combustible* flooring or combustible flooring fully protected with *non-combustible* material (e.g. fiber-cement sheet)

## Why

Construction requirements are part of a national system to increase the resilience of buildings to bushfire. The construction methods and materials affect the ability of the building to withstand bushfire attack. These additional requirements aim to improve the performance of the building to achieve a greater likelihood of ultimate survival to the passage of the bushfire and consequential fires. The use of *non-combustible* elements removes the potential for the ongoing combustion of elements after the passage of the bushfire where hot, dry windy condition can persist.

---

### 3.3. Water supply & Utilities

#### Objectives:

To improve the provision of water as a contingency for the protection of buildings before and after the passage of fire.

#### Solution:

- All tanks shall be *non-combustible*.

#### Good Practice

- Where practical locate water tanks high above the house so that some water pressure is maintained if the power fails as a contingency.
- Metal piping and fittings shall be used for any above ground or ground level components to improve the likelihood of maintaining a water supply as a contingency.

#### Why

Adequate water supply is critical for any firefighting operation, particularly where property protection is envisaged. Water supplies often fail during a bushfire event from one of a combination of embers, radiation and flame. In some cases the failure of a combustible water tank can provide an additional heat or impact load to a building.

### 3.4. Electricity Supply

#### Objectives:

To reduce the risk of occupant electrocution and building fire.

#### Solution:

- Services shall be underground within the property boundary.

#### Why

While it is common that power fails as some stage during a bushfire event, it is common for power infrastructure to burn and collapse or be impacted by falling trees or branches while power lines are still live.

---

## 3.5. Gas Supply

### Objectives:

To reduce the risk of building fire from gas flaring or explosion.

To reduce the risk of death or injury from or gas flaring or explosion.

### Solution:

All gas cylinders are required to be installed and maintained in accordance with AS1596. This standard describes requirements for installation and use of both small portable cylinders (less than 10kg capacity typically used on outdoor appliances such as BBQ's) and larger gas cylinder installation such as use for domestic house supply. Because a bushfire circumstance provide additional risks and challenges than are generally assumed in this standard some additional requirements are provided:

#### **Minor Storage and Use (Portable gas cylinders containing less than 10kg of LP Gas)**

- *Portable gas cylinders shall not be used or stored within the township.*

#### **All other Domestic LP Gas Storage and Use**

- AS1596 requires a minimum separation of 6m from any combustible material. Combustible material shall mean all *heavy fuels* including buildings and *combustible retaining walls*.
- The safety release valve shall be directed away from all buildings and *access routes*.
- Where AS1596 requires a cylinder to be secured the tether shall be non-combustible (e.g. Chain).
- Metal piping and fittings shall be used on all piping inside the buildings cavities and enclosable occupied spaces.
- Metal piping and fittings shall be used on the high pressure side of any gas regulators.

### Good Practice:

- Use gas cylinders that vent in the vertical direction ensuring that 6m separation from the house is also achieved.
- After each gas bottle refill or replacement, check that the release valve is directed away from all buildings and access routes.
- Use a single large cylinder rather than multiple smaller cylinders.
- Install metal LP Gas pipe work in accordance with AS1596 to allow the use of BBQ and other gas appliances in your preferred locations around the outside of the house.

### Why

Gas cylinders which have either flared or ruptured are commonly found in post bushfire surveys. The heat from with the bushfire or consequential fire has been sufficient cause their pressure reach critical levels beyond which their pressure release value releases large quantities of LP Gas. If these gas cylinders fall over this pressure release valve may no longer function correctly, meaning that the gas cylinder may continue to increase in pressure with continued heating until the cylinder ruptures. The resulting explosion includes a pressure wave and large ball of flame which can threatening nearby life and buildings.

---

## 3.6. Landscaping, Maintenance & Access

### Objectives:

To minimize flame contact and radiant heat to buildings and access routes provided by combustible elements.

### Solution:

- Heavy fuels shall be excluded from areas under and adjacent to houses and access routes to a distance not less than 4m (as measured in plan) unless:
  - these heavy fuels are within the house or *fully enclosed* under the house.
  - stored in steel boxes or metal framed plaster lined enclosures with gaps less than 5mm and do not exceed a total of 1% of the enclosures total surface area when closed are exempt.
- Large heavy fuel items such as, boats, caravans, cars, combustible fences and combustible retain walls etc. shall be located a minimum of 6m away from the house and access routes (as measured in plan), except where:
  - 0m for non-combustible FRL 60/60/60 rate wall or;
  - 4m for BAL FZ rated walls;
  - They reside within the house or *fully enclosed* under the house.
- Shrubs and other plants shall not directly abut the dwelling unless they are classified as low-flammability plants when using the CFA plant key. The following link provides additional guidance as to suitable garden design approaches: <http://wyeseconnect.info/booklet-help-garden-landscaping/>

### Good Practice:

- Use non-combustible fences as heat shields between buildings and other fuels.
- Use non-combustible fencing and retaining walls throughout the township.

### Why

Landscaping and maintenance around the building should be designed and managed to minimize flame contact and radiant heat to buildings. Good maintenance increases the ability for fire fighters to defend properties and for people to move through areas if needed.

---

### 3.7. Private Bushfire Shelter

A private bushfire shelter may provide shelter for occupants from immediate life threatening effects of a bushfire event. The planning scheme provides for concessional construction requirements for a dwelling if an approved private bushfire shelter has been installed. The use of a shelter in some cases provides opportunity for construction to the next lower BAL level.

The list of accredited shelters is available online at <http://www.vba.vic.gov.au/practitioners/building-product-accreditation>

The shelters location and access path is considered to be an *access route* for the purposes of this guideline.