

BUSHFIRE PROTECTION

INTRODUCTION

Bushfires are a feature of the Australian environment. The impact of bushfire on life and property can be reduced with responsible preparation and bushfire management plans. Bushfire hazards exist not only in rural areas but also at the rural and urban interface, for example areas adjacent to parks, public reserves and golf courses.

FACTORS INFLUENCING BUSHFIRES

The following factors influence bushfires:

- Weather: Humidity, temperature, solar exposure and wind.
- Fuel: Fine fuel or coarse fuel.
- Ignition sources: Lightning strike, spontaneous combustion, deliberate or accidental ignition.
- Topography: Slope, e.g. fire intensity doubles with every 10° increase of upslope.

MAJOR MODES OF ATTACK

The five major modes of bushfire attack are:

- Embers: Small pieces of smouldering or flaming debris, carried ahead of the main fire by wind, are the predominant cause of building loss or damage.
- Radiant heat from fire.
- Flame contact: Determined by the fuel load, vegetation and any combustible material located adjacent to the building.
- Wind: Strong winds further intensify bushfires.
- Smoke.

PLANNING

The planning and development of subdivisions and buildings influence bushfire behaviour and can be used to minimise the threat, reducing the physical and emotional impact. Planning tools, such as development control plans and local environmental plans that integrate planning for road networks and fire trails, lot sizes, lot shapes and landscaping, can minimize bushfire hazards by including:

- Safe access and egress from all properties to the public road system and alternative egress where possible.
- A public road system accessible in all weather conditions and capable of accommodating fire trucks. A perimeter road in the inner protection area, separating bushland from urban areas.
- Asset protection zones (APZ) to reduce the fire's intensity.
- Adequate supply of water and other services to every lot in the subdivision. Hydrants above or below ground suitably marked where reticulated water supply is available.

AUS-SPEC worksections, *0013 Bushfire protection (Design)* and *0281 Fire access and fire trails* cover the above criteria in greater detail.

SITING, LANDSCAPING AND MAINTENANCE

Landscaping can provide a defensible space, reduce fire spread, deflect and filter embers, provide shelter from radiant heat and reduce wind speed.

Vegetation management and maintenance of assets are critical to prevent bushfire losses. Replacing flammable, volatile species with fire resistant trees and shrubs creates a greenbelt barrier, which then acts as a windbreak. Design landscaping to maximize water infiltration and retention. Maintain an asset protection zone (APZ).

BUILDING CONSTRUCTION

Requirements for bushfire protection differ by jurisdiction. Contact the local authority or local firefighting authority to determine which regulations and jurisdictions apply. Determine if the building is located in a designated bushfire prone area, as defined by the NCC, council and fire authorities, before assessing the Bushfire Attack Level (BAL).

AS 3959 provides two methods for determining the BAL of a site - a simplified procedure and a detailed procedure for sites where the effective downslope under the classified vegetation is more than 20°. Both procedures require determination of the following factors:

Definitions

Asset protection zone (APZ):

An area surrounding a development managed to reduce bushfire hazard. Also referred to as a fire protection zone and includes the IPA and OPA. Aims to protect human life, property and public assets.

Bushfire: An unplanned fire burning in forest, scrub or grassland, also referred to as a wildfire.

Bushfire attack level (BAL): A rating of the bushfire hazard of a site, determined by AS 3959.

Bushfire hazard: Potential severity of a fire.

Bushfire-prone area (BPA):

An area that is subject to, or likely to be subject to, bushfire attack.

Fire danger index (FDI): The chance of a fire starting, its rate of spread, intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects. The FDI is expressed in numerical ranges that correspond to the six FDRs.

Fire danger rating (FDR): Is determined by the FDI.

Fire intensity: The rate of heat release per unit length of fire front. The primary unit is kW/m of fire front.

Fire retardant: A substance applied to a material which delays the combustion of that material under specified conditions.

Fuel load: Fuel is any organic matter available for ignition. Fuel load is measured in tonnes/ha.

Inner protection area (IPA): A low fuel area immediately surrounding a building designed to minimise the likelihood of flame contact with buildings.

Outer protection area (OPA): An area that slows the rate of spread, filtering embers and suppressing the crown fire.

Radiant heat flux: A measure of heat energy impacting on an exposed surface, in kW/m².

State fire and emergency services

ACT

ACT Emergency Services Agency

www.esa.act.gov.au

NSW

NSW Rural Fire Service

www.rfs.nsw.gov.au

BUSHFIRE PROTECTION

- The fire danger index (FDI) (AS 3959 Table 2.1).
- The vegetation classification type(s) (AS 3959 Table 2.3 and Figure 2.4).
- Distance of site from the classified vegetation types (AS 3959 Figure 2.1).
- The effective slope(s) under the classified vegetation types (AS 3959 Figure 2.3).

Use these factors in the simplified procedure with the appropriate table to determine the BAL. The detailed procedure is based on calculations and algorithms contained in AS 3959 Appendix B.

AS 3959 provides *Deemed-to-Satisfy* construction requirements relating to specific structures and for each of the six BAL categories, from low to flame zone. Depending on the level of construction, the following building elements should conform to the construction requirements, as defined in AS 3959 and the NCC:

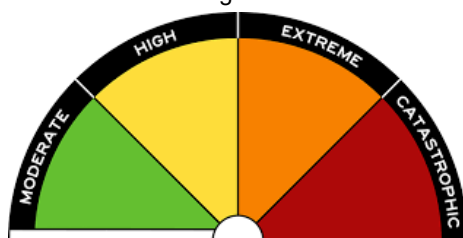
- Subfloor supports.
- Floors.
- External walls.
- External glazed elements, assemblies and doors (windows, shutters and screens).
- Roofs (including eaves, fascias, gables, gutters and downpipes).
- Verandahs, decks, steps and landings.
- Water, gas, electricity and communications services.

Fencing and screen walls are not covered in AS 3959 but they can be used to reduce the building's exposure.

The NCC includes *Performance Requirements* relating to the construction of Class 1, 2, 3, 9a, 9b, 9c, 10a and 10c buildings in designated bushfire prone areas (BPAs). The selection of non-combustible and robust materials for the building envelope reduces the risk of ignition, the fire spreading or adding to bushfire fuel. Robust and dense materials offer good resistance to heat and wind-borne embers. High priority should be given to sealing the building envelope against the ingress of wind-driven embers. Automatic fire sprinklers within the building (including roof and underfloor spaces) together with an external bushfire water spray system, in conformance with AS 5414, further protect the building against ember attack, and could be considered components of a holistic fire management plan. The ABCB Handbook *Bushfire verification method* provides guidance on demonstrating compliance with the NCC *Performance Requirements* for construction in bushfire prone areas using *BCA Verification Methods G5V1* and *H7V2*.

PREPARING FOR THE BUSHFIRE SEASON

A fire danger rating (FDR) is an early indicator of the potential danger of bushfire. The four FDRs range from Moderate to Catastrophic. It is forecast each day and updated by the Bureau of Meteorology, available at www.bom.gov.au. The fire danger index (FDI) is represented by the text in the black band across the top of the fire danger meter as shown in the figure below.



Prepare, Act, Survive

All state fire authorities have a guide for the preparation of a Bushfire Survival Plan to activate in the event of a bushfire. Prepare a Bushfire action plan to follow, if required.

Buildings or spaces within a community identified as providing some protection from radiant heat and smoke are called Neighbourhood Safer Places. State fire authorities identify places of last resort in emergencies, only in the local government areas. The NCC includes provisions for private bushfire shelters.

State fire and emergency services (continued)

Northern Territory
NT Police, Fire and Emergency Services
www.pfes.nt.gov.au

Queensland
Rural Fire Service
www.ruralfire.qld.gov.au

South Australia
SA Country Fire Service
www.cfs.sa.gov.au

Tasmania
Tasmania Fire Service
www.fire.tas.gov.au

Victoria
Country Fire Authority
www.cfa.vic.gov.au

Western Australia
Department of Fire and Emergency Services
www.dfes.wa.gov.au

Relevant websites

Australian Building Codes Board (ABCB)
www.abcb.gov.au
Bureau of Meteorology
www.bom.gov.au

Relevant documents

AS 3959 *Construction of buildings in bushfire-prone areas*.

AS 5414 *Bushfire water spray systems*.

BCA G5 and H7D4 *Construction in bushfire prone areas*.

BCA G5V1 and H7V2 *Buildings in bushfire prone areas*.

ABCB Handbook - *Bushfire verification method*.

AIA ACUMEN Note *Site planning and design for bushfire*.

NSW Rural Fire Service – *Fire trail design, construction and maintenance manual*.

NSW Rural Fire Service – *Fire trail standards*.

NSW Rural Fire Service – *Planning for bushfire protection - A guide for Councils, Planners, Fire Authorities and Developers*.

CCAA Briefing 10 – *Building in bushfire-prone areas*.

AUS-SPEC TECHguide TG 201 *Process and procedures for development and subdivision of land*

Relevant worksections

0013 *Bushfire protection (Design)*

0171 *General requirements*

0221 *Site preparation*

0281 *Fire access and fire trails*

0383 *Decking, sheet and panel flooring*

042 *Roofing subgroup*

0451 *Windows and glazed doors*

0453 *Doors and access panels*

1434 *Fire access and fire trails repairs*