ARCHICENTRE AUSTRALIA TECHNICAL INFORMATION SHEET - DESIGN

BUSHFIRE DESIGN GUIDE

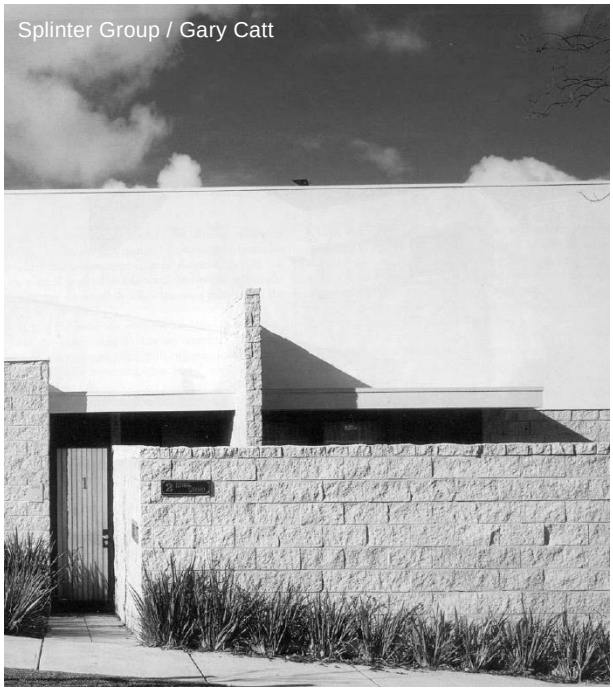
Protection from bushfires for both people and property has become an increasingly significant issue, with most states regulating construction in designated bushfire-prone areas.

Archicentre Australia architects have previously played pivotal roles in bushfire situations, sending teams of experts into fire zones to assess damage and to assist people who suddenly face the prospect of rebuilding.

During 2019-20 Australians witnessed a continuity of the "so-called" bushfire season – it is now a major part of our lives. Mitigation rather than prevention is a realistic architectural strategy – so the home can appropriately respond to the environment and at the same time minimise the threat of being lost to a bushfire. An Archicentre Australia architect can show you how. This guide is for anyone intending to build/rebuild, renovate or maintain their homes in bushfire prone areas. Before commencing a building project, we ask you to consider taking professional advice to ensure that a bushfire responsive design is put in place.

CHOOSING A SITE

Houses should be sited to minimise risk - this may mean keeping away from steep hillsides where the intensity of the fire can double for each 10 degrees of slope, or ensuring enough cleared land is available between the house and the bush. The extent of cleared land required varies according to the type of vegetation in proximity to the land. Where the available building area is limited, design issues for bushfire-prone areas become paramount and expert advice is required.



Splinter Group / Gary Catt

LANDSCAPING

Several landscaping features can slow the momentum of a bushfire. These include rivers, lakes, dams, swimming pools, irrigated or green summer crops, orchards, vegetable gardens, sporting ovals, or tennis courts. Many tree species have been classified as bushfire-resistant and can be used as wind breaks and barriers. These include native as well as imported species.

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DESIGN DEVELOPMENT

All bushfire design principles seek to protect the home from burning debris. The key differences between bushfire design and traditional architectural design are that bushfire design uses a plan with a simple roofline, a minimum of angles and a range of fire-resistant alternative construction materials. These measures are put in place to protect a home from burning debris.

Design for bushfire-prone areas seeks to protect the house and depending on bushfire severity, its occupants, from the five major dangers:

- Wind
- Radiant heat
- Direct flame
- Ember attack
- Smoke

Principles such as simple rooflines, uncomplicated layouts, window protection, inbuilt water storage, fire-resistant materials (where necessary) and sprinkler systems can be integrated to achieve some protection as well as improved design.

IMPORTANT NOTE: Australian Standard 3959-2018 has been published since this document was originally prepared and new requirements have been adopted in certain states.

Archicentre Australia recommends that you check with your state or municipal authority before commencing any design work.

Updated January 2024

ESSENTIAL CONSTRUCTION REQUIREMENTS

Houses are classified by legislation as being in low, medium, high or extreme bushfire attack areas, or as being in the flame zone. There are no requirements for the low category, and the flame zone category is always subject to separate assessment by authorities. For the medium, high and extreme categories of bushfire attack, the Building Code of Australia and Australian Standard AS3959-2018 set out levels of acceptable construction, summarised briefly below. Non-combustible materials are generally acceptable, but the use of timber is sometimes restricted as follows:

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FLOORS

Timber is acceptable in most categories of bushfire attack, however if the floor is not enclosed, or in the case of the extreme bushfire attack category, it must be sheeted underneath with non-flammable material or constructed using “bushfire-resistant timber”. If the floor is closer than 600mm to the ground, it should be enclosed or constructed using “bushfire-resistant timber”.

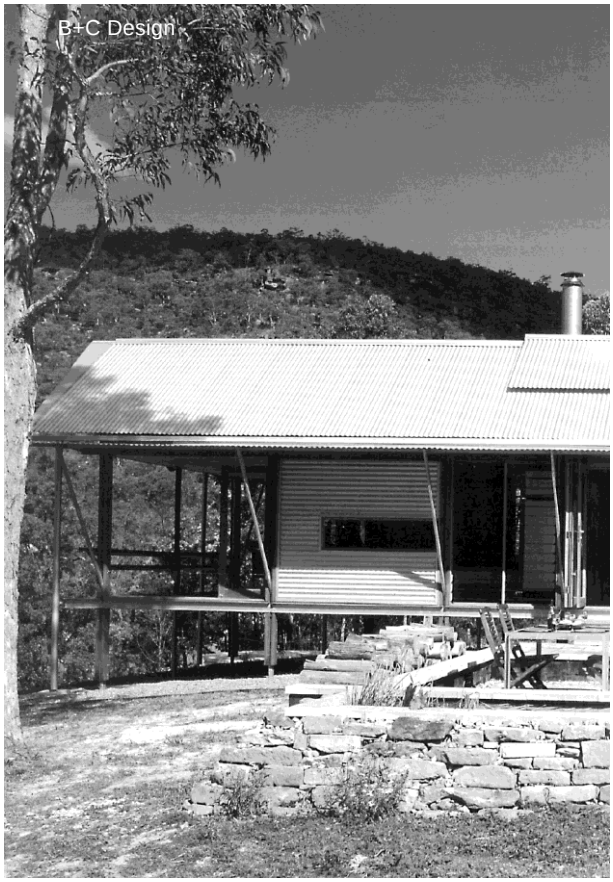
Whilst chemical treatment may be considered for this category (after testing), 7 species of timber comply with the criteria:

- Blackbutt
- Spotted Gum
- Merbau (imported rainforest timber)
- Turpentine
- Red Ironbark
- Red River Gum
- Silver Top Ash

Note that the term “treated timber” commonly refers to copper/chrome/arsenic treatment which is meant to protect against moisture, rotting and termites. It does not have any fire-retardant value and in fact the fumes from burnt “treated timber” could be toxic.

SUPPORTING POSTS

These can be timber provided they stand on 75mm high metal shoes or are constructed in “bushfire-resisting timber” for a minimum of 400mm above ground level. In the extreme bushfire attack category, they must be “bushfire-resisting timber” for the full height.



EAVES

Eaves must be enclosed, and gaps sealed. If timber is used in the high-risk category, it must be “fire-retardant treated”, while in the extreme risk category aluminium cannot be used.

EXTERNAL DOORS

External doors must have weather strips or draught excluders and tight-fitting metal flyscreens (aluminium, steel or bronze). For the high-risk category, aluminium mesh cannot be used, and any leadlight windows must be protected by non-combustible shutters or toughened glass. For the extreme category, timber doors must be “bushfire-resisting”, have a non-combustible covering, be protected by non-combustible shutters or be solid core doors at least 35mm thick.

ROOFING

Roofs can be tiled or sheeted, but timber shakes or shingles are not acceptable. All types of roofs must have all junctions sealed and be fully sarked. Sheeted roofs can only be metal or fibre-cement except in the extreme risk category where fibre-cement or aluminium sheeting cannot be used. Rooflights may be thermoplastic

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sheeting for the medium category but not for high or extreme risk categories, where wired glass (not toughened) is needed. It is better not to use rooflights.

FASCIAS

For the medium risk category fascia can be timber, but for the high-risk category they must be “fire-retardant treated”. For the extreme risk category, fibre-cement or aluminium sheet cannot be used.

GUTTERS AND DOWNPIPES

These should have metal leaf guards. Systems for water retention can help protect the eaves and dampen flying debris which may gather during fire. By connecting them to a recirculating sprinkler system the wetting time can be prolonged.

VERANDAHS AND DECKS

Verandahs and decks can be timber but sheeted or tongue and grooved flooring should be treated in the same way as floors. Where the height above ground is less than 400mm, all joints must be covered or sealed. Spaced decking boards must be 5mm apart and the underside must not be enclosed (to allow access for firefighting). For high and extreme categories, decking timbers must be “bushfire-resisting”. There must be a separation between decking timbers and the rest of the house to prevent the spread of fire into the building.

WATER AND GAS PIPES

All water and gas pipes should be metal where exposed or buried at least 300mm in the ground.

IDEAS FOR BUSHFIRE RESISTANT CONSTRUCTION

Simple shapes without too many re-entrant corners

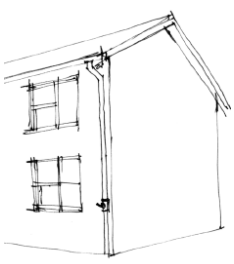
Metal cladding and roofing: avoid rooflights and dormer windows; use metal roller shutters for windows and doors

Water tank (10,000 litres minimum) with a diesel fuel pump helps avoid water pressure and power problems

Toughened glass or laminated glass with heat-absorbing interlayer
Concrete floors

Radiant heat barriers (fences, masonry walls) on the danger side of the house

Design for high wind strength



Downpipe valves to enable easy filling of gutters

Active, external sprinkler system with appropriate metal pipes and brass sprinkler heads

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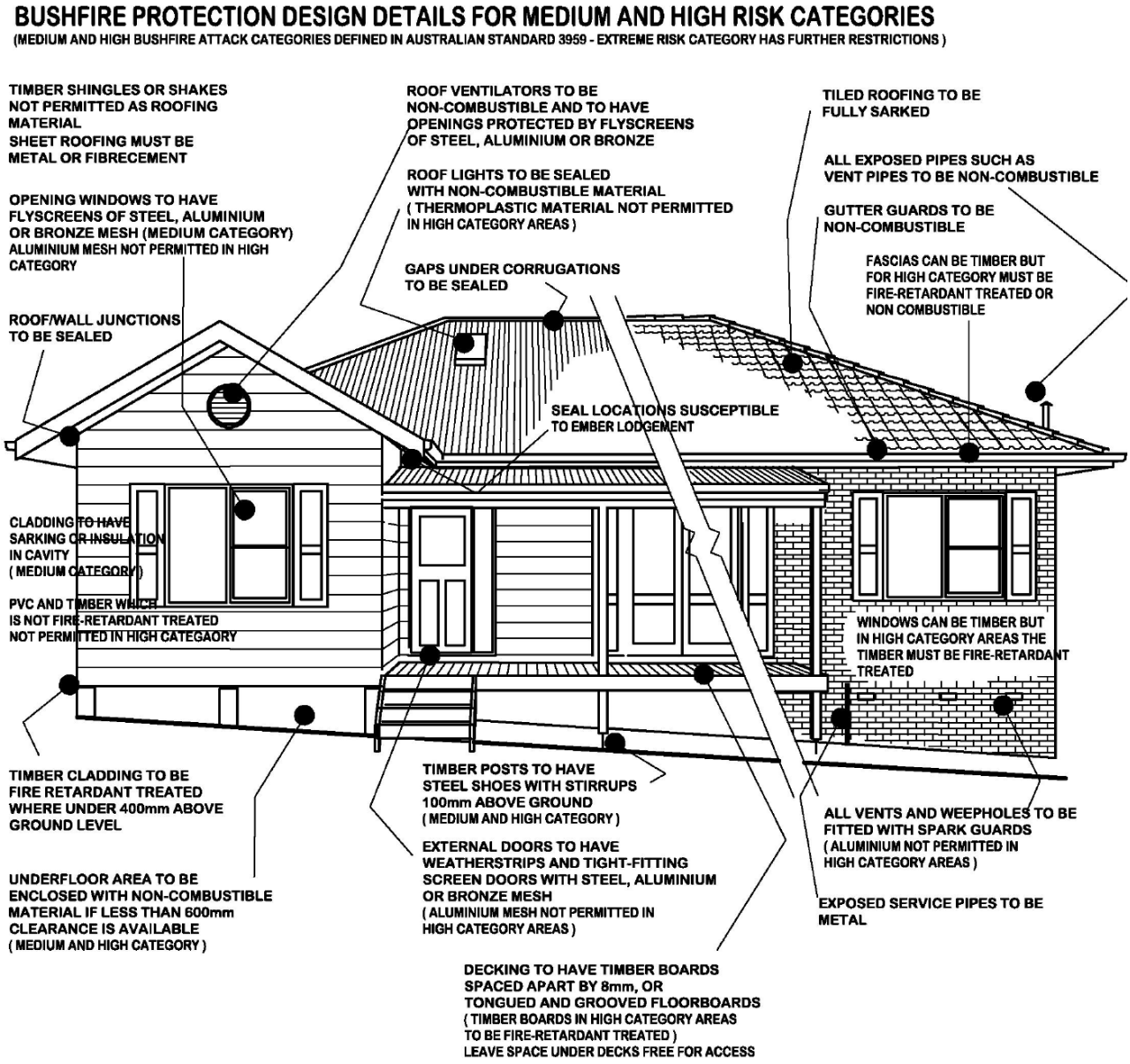

BUNKERS

Recent experiences have indicated that even the best designed buildings have fallen short, making consideration of Bunker design a realistic adjunct.

If you would like to talk to an Archicentre Australia architect about a particular matter, please call us on 1300 13 45 13 or go to archicentreaustralia.com.au

For information on regulations, refer to the Building Code of Australia under the heading Housing Provisions. Here you will learn how to build and what to build with under the heading ‘Acceptable Construction Practice’. All construction must be in accordance with Australian Standard AS 3959-2018 ‘Construction of Buildings in Bushfire-prone areas’. To find out if your home is situated in a designated Bushfire-prone area, contact your local council.

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