ARCHICENTRE BUSHFIRE DESIGN GUIDE

Protection from bushfires for both people and property has become a significant issue, with legislation now in place in most states to regulate construction in designated bushfire-prone areas. Archicentre, the housing advisory service of the Royal Australian Institute of Architects, has played a pivotal role in bushfire situations, sending teams of experts into fire zones to assess damage and to assist people who suddenly face the prospect of rebuilding.

As bushfire risk grows, so does the need for good design. By using sound architectural design principles, the home can appropriately respond to the environment and at the same time minimise the threat of being lost to a bushfire. An Archicentre architect can show you how. This guide is for anyone intending to build, rebuild or renovate their homes in bushfire-prone areas. Before you begin your building project, Archicentre asks you to consider taking professional advice to ensure that a bushfire resistant design is put in place.

CHOOSING A SITE

Houses should be sited to minimise the 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.

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.
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.

Good design for bushfire-prone areas seeks to protect the house and 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 good protection as well as good design.

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 3959 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:

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 “fire-retardant treated timber”. If the floor is closer than 600mm to the ground, it should be enclosed or constructed using “fire-retardant treated timber”. “Fire-retardant treated timber” is not currently commercially available in Australia, however 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 “fire-retardant treated timber” for a minimum of 400mm above ground level. In the extreme bushfire attack category, they must be “fire-retardant treated timber” for the full height.
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 “fire-retardant treated”, 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 sheeting for the medium category but not for high or extreme risk categories, where wired glass (not toughened) is needed.

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.

Fascias
For the medium risk category fascias 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 “fire-retardant treated”. 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.
Bushfire Design Guide

Ideas for Bushfire Resistant Construction

- Simple shapes without too many re-entrant corners.
- Metal cladding and roofing: metal rooflights instead of dormer windows and metal roller shutters for windows and doors.
- Water tank (10,000 litre minimum) with a diesel fuel pump helps avoid water pressure and power problems.
- Toughened glass or laminated glass with heat-absorbing interlayer.
- Radiant heat barriers (fences,mascoy walls) on the danger side of the house.
- Design for high wind strength.

Bushfire Protection Design Details for Medium and High Risk Categories

- Timber Shinings or shakes not permitted as roofing material.
- Sheet roofing must be metal or fibreglass.
- Opening windows to have flyscreens of steel, aluminium or bronze mesh (medium category).
- Aluminium mesh not permitted in high category.
- Roof lights to be sealed with non-combustible material.
- Thermoplastic material not permitted in high category areas.
- Gaps under corrugations to be sealed.
- Seal locations susceptible to ember intrusion.
- Timber cladding to be fire-retardant treated where under 900mm above ground level.
- Timber posts to have steel shoes with straps above ground.
- Windows can be timber but in high category areas the timber must be fire retardant treated.
- Exposed service pipes to be metal.
- All vents and weepholes to be fitted with spark guards (aluminium not permitted in high category areas).

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 3956—"Construction of Buildings in Bushfire-prone areas." To find out if your house is situated in a designated Bushfire-prone Areas, contact your local council.

Archicentre is the largest provider of design reports and house inspections in Australia. Phone us today for advice on designing your fire-resistant dream home on 1300 13 45 13.

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