Bushfire

Manage your risk

In the wake of the devastating bushfires in Victoria earlier this year, we thought it timely to bring you up to date on the latest changes to the legislation pertinent to building.

There are many things to consider that will help in defending your home should it be threatened by bushfire: location on your property, design of your house, the materials you use and the landscaping surrounding your home all contribute to the overall success of your plan.

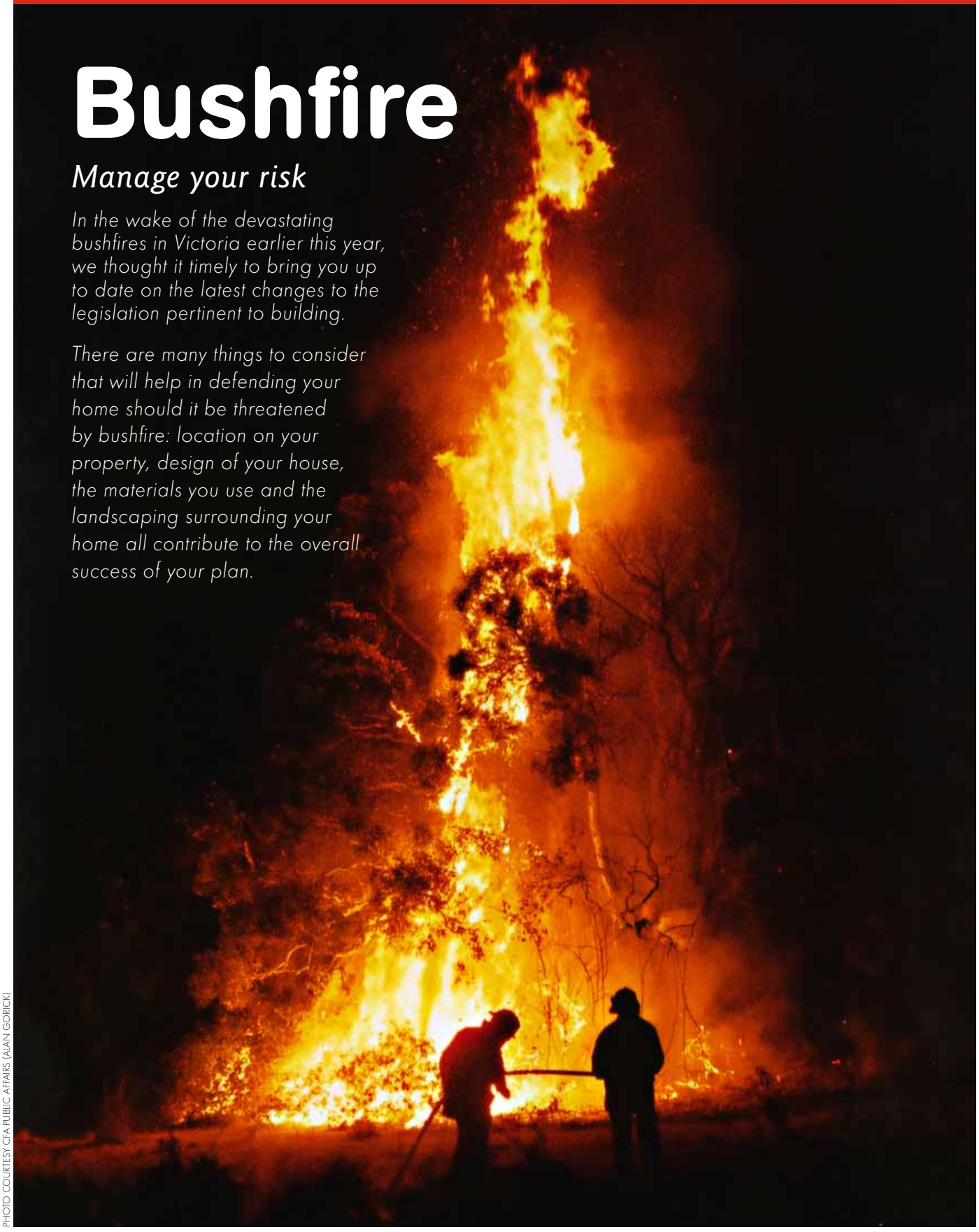


PHOTO COURTESY CFA PUBLIC AFFAIRS (ALAN GORICK)

The time for change has come

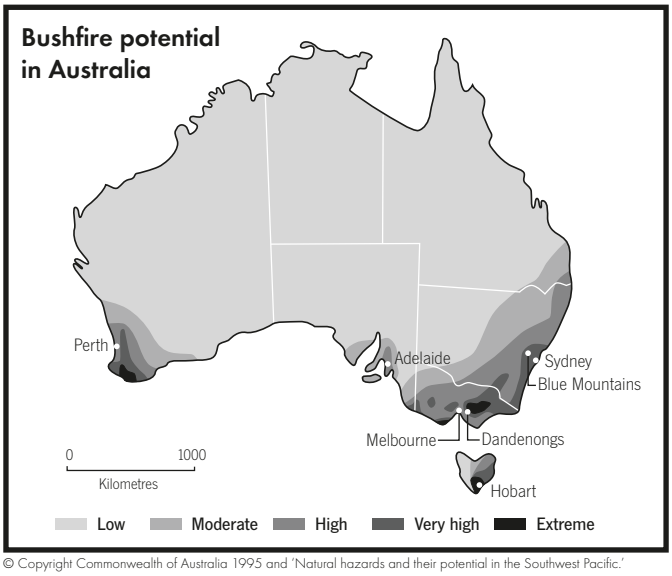
In Victoria, the Building Amendment (Bushfire Construction) Interim Regulations 2009 have been incorporated into the Building Regulations 2006. The new regulations adopt the new standard *AS 3959–2009 Construction of buildings in bushfire-prone areas.* Tracey Toohey attended one of the information seminars put on by the Building Commission, and provided us with this summary.

- The new regulations do not fire proof a house; they are to reduce the risk of ignition from a bushfire while the fire front passes.
- All Victoria is now classified as a fire prone area and must have an assessment to determine its Bushfire Attack Level (BAL). 80% of buildings will be classed as BAL–LOW and will require no additional measures *(see BAL table on p.29).*
- There are amendments to both Planning Regulations and Building Regulations. All of Australia will be subject to the new fire regulations in the Building Code as of 1 May 2010. You can achieve compliance by using one of the prescriptive methods in the Australian Standard *AS 3959–2009* (Deemed-to-Satisfy Provisions) or adopt an approved alternative solution (Alternative Solution to Deemed-to-Satisfy Provisions).
- Every Building Permit submitted must include the BAL. The BAL can be determined by the designer or builder and must be approved by the building surveyor. The BAL is determined by assessing the vegetation, slope and distance from the vegetation and the Fire Danger Index as per *AS 3959–2009.*
- Designs that have been significantly started before the new regulation came in do not need to be modified, as long as the building surveyor is willing to sign off on it. The building surveyor must put this in writing and the owner must know about it.
- A planning permit is still required to remove trees.
- Wildfire Management Overlays still apply to all new houses except those houses being re-built after the fires as per interim planning regulations.
- Mud brick, brick and concrete (with a minimum thickness of 90mm) are all specifically mentioned as acceptable wall fabrics for higher BAL's, as are other materials (including timber) with a Fire Resistance Level of –/30/30 or that have been tested for bushfire resistance to *AS 1530.8.2.* Straw bale construction is not specifically mentioned, no doubt this will be rectified in the future.
- Owners must understand their responsibility to maintain the building.
- Architects and designers must place enough information on the plans so the builder knows the exact products to use, in those areas where specific requirements are essential. ■

Tracey Toohey Design & Drafting – energy efficient, environmentally conscious and intuitive design. Wangaratta 03 5725 7305.

Various guides and fact sheets on building and retrofitting in bushfire-prone areas are available from the following institutions:

- **Building Commission**
  1300 360 380, www.buildingcommission.com.au >Consumer Information >Bushfire advice
- **Country Fire Authority**
  03 9262 8444, www.cfa.vic.gov.au >Residents >Building a Home > Bushfire Risk Areas



Fire Resistance Level (FRL)

As defined in the Building Code of Australia, the FRL is the grading period in minutes for three criteria: structural adequacy, integrity and insulation.

- **Structural adequacy** is ability to withstand fire without collapse
- **Integrity** is the ability to withstand flames breaking through
- **Insulation** is the ability to maintain temperature below specified limits.

For example, an FRL of 90/60/60

- Withstand fire for at least 90 minutes before collapse
- Withstand flame breakthrough for at least 60 minutes
- Maintain acceptable temperature for at least 60 minutes

Steel products and bushfire

Helping to make homes and buildings more bushfire resistant

BY NATIONAL ASSOCIATION OF STEEL-FRAMED HOUSING (NASH)

In the aftermath of the devastating Victorian bushfires, much has been said and written about building standards – both past and future. The Victorian Government has been quick to act, amending the Victorian Building Regulations 2006 immediately to include the requirements of *AS 3959–2009* (Construction of buildings in bushfire-prone areas), in advance of its inclusion in the Building Code of Australia (BCA). This means that all rebuilding work in the fire affected areas, all other new building work and many alterations and additions anywhere in Victoria are subject to the new requirements from Wednesday 11 March 2009. Construction requirements also apply to attached structures and to outbuildings that were previously exempt in some cases. The requirements of the revised Standard also apply immediately in the ACT, and the new standard is scheduled to be referenced in BCA 2010.

Although every new Victorian home will require a Bushfire Attack Level (BAL) assessment under the new regulations, not all new homes will automatically attract additional construction requirements. Based on 2008 building permit data, the Victorian Government estimates that 80 percent of new home building applications will be assessed as falling into the lowest level of bushfire risk, requiring no special construction measures.

Whether you live in Victoria, the ACT or elsewhere in Australia, you need to consider the new requirements if your new or renovated home is located in a bushfire prone area – and for simplicity, that means any site within 100 metres of significant vegetation.

How buildings ignite

To appreciate the contribution of construction materials in preventing house loss in bushfires, a good place to start is to examine – as bushfire researchers do – exactly how buildings ignite. Contrary to popular belief, houses are not consumed by bushfires, but by house-fires started by the bushfire. Former CSIRO fire researcher Dr Caird Ramsay notes that:

'Research has shown that, during bushfires, most building fires start with small ignitions. These ignitions progress slowly at first, accelerate and progressively involve the whole building. If the small ignitions can be prevented in the first place the larger fire will not follow.' (*Landscape and Building Design for Bushfire Areas*, Ramsay & Rudolph, 2003, CSIRO Publishing, ISBN 9780643069046)

A building element ignites when it is exposed to a source of flame or heat and reaches its ignition point. Commonly the source of flame is provided by embers and burning debris, assisted by the wind. If this burning material is in contact with flammable material on the building envelope, or ignites adjacent litter or kindling, building ignition can occur with or without accompanying radiation.

Kindling tends to build up in predictable places, driven by wind in the minutes, hours or days preceding the bushfire. Even before the peak radiation level, the combined effects of radiant heat and hot dry winds act to dry out moist materials and make them easier to ignite.

At peak levels, radiation can crack and distort windows, doors and cladding materials, allowing breaches of the building envelope and ember attack on flammable contents if bushfire screens or shutters are not fitted or are not functional. Radiant heat from a verandah or adjacent combustible structure fire can be even more hazardous to glazing than radiant heat from the fire front itself. Flame contact can cause building ignition when exposed materials, dried and prepared by sustained wind and radiation, are contacted directly by flames.

At the peak of the bushfire, as the flame front passes or reaches its closest approach to the building, large quantities of windborne embers and debris may be present around, on and under the building. At this point, if the weakest link in the building's defence is breached it may be impossible to save the building even if it is occupied and well prepared.

Ember attack and building ignition

It is well known that bushfire attack on a building comprises three modes: burning embers, radiant heat and flame contact. The three modes occur over different timeframes in the fire event, and are quite different in their effects on the building. Furthermore, construction materials respond differently to the three modes, so what you select really makes a difference to the performance of the building in a bushfire.

When it comes to reducing property losses in bushfires, CSIRO research has consistently shown the importance of resistance to ember attack, which accounts for over 90 percent of house loss in Australian bushfires (Source: *Development of a Risk Model for Bushfire Attack on Housing,* Leonard et al, Risk Conference 2004, Melbourne Australia). Ember attack is the most prolonged and persistent mode of bushfire attack, commencing before the fire front arrives and persisting for several hours afterwards. Radiant heat, on the other hand, is at significant levels for perhaps five to twenty minutes before and after the flame front passes, and may also be produced by adjacent burning buildings. High intensity flame contact may impinge on the building for just a few minutes, or not at all in many cases. Strong winds associated with fires tend to increase the effects of all three modes of attack.

The message is clear and consistent: the biggest threat to buildings in a bushfire is from embers. Of some concern therefore is the increased emphasis the revised *AS 3959–2009* places on radiant heat over ember attack. This has resulted in some concessions at lower levels of bushfire attack, where

many types of combustible materials may now be used on the building envelope for wall cladding and bushfire shutters. This may encourage owners of homes assessed as subject to a low BAL to disregard the possibility of ember attack.

How can we prevent ignition?

Good design principles

Building design elements and details that encourage wind-driven debris build-up should be avoided. Remember that if the house does not ignite, it will not be destroyed by fire. Roof structure, eaves, verandahs, walls and sub-floor spaces are the most vulnerable to ember attack, and will benefit most from good design and material selection. As with other exposed features, the less flammable material, the less to ignite, burn and spread to undamaged property and the less to extinguish. Poorly built or poorly maintained buildings and those with large quantities of combustible material increase the hazard to other buildings in the vicinity.

It sounds simple, and it is. It's your house, so follow these general principles:

- Keep embers out of the dwelling and its structure by blocking, screening or shielding openings, voids and build-up points with proven non-combustible materials
- Use non-combustible materials for any permanent part of the dwelling with which embers could come into sustained contact
- Use high-quality, durable structural and exterior materials to ensure long-term strength and fire resistance with minimum maintenance
- Minimise or avoid the use of combustible elements within roof, wall and subfloor regions of the structure.

Don't give the fire any encouragement

Building elements not at direct risk of ignition can also be made from non-combustible materials, limiting the spread of any fire. A small fire is easier to extinguish and puts other structures – including your neighbour's house – at less risk. If there is any possibility of a spreading fire, the design features of the house should make fighting the fire as easy as possible. For example, sub-floor spaces, if not fully screened should be completely accessible to allow rapid extinguishing of spot fires and to facilitate the removal of combustible debris.

Strength and integrity

In an ideal world, the building exterior or 'envelope' should neither break nor ignite when attacked by a bushfire. If the house envelope breaks, for example through an extreme wind gust or impact by a tree limb, the break should preferably not allow penetration of the building envelope and access to flammable components or contents. If the house envelope ignites, for example through a larger than expected build-up of burning debris, the ignited components should preferably be self-extinguishing or be unconnected to other combustible building components. Durable materials that require minimum maintenance and have the least number of joins help to ensure the house will always be as strong and secure as possible. *AS 3959–2009* allows joins and gaps between construction materials to be covered by combustible moulds and trims. The use of steel or aluminium trims provides greater protection from ember entry than combustible trims.

How steel can help

While products such as shutters, window frames and claddings made from combustible materials may meet the requirements for some levels of attack under the revised standard, this is only part of the story. Steel is a non-combustible material, and steel products are highly resistant to all three modes of bushfire attack. Steel framing, cladding and building accessories won't ignite or give off smoke or heat and are strong, durable and easy to maintain.

In many cases, a single cost-effective system of steel construction meets all requirements from BAL–12.5 through to BAL–40. With maximum use of strong, durable, non-combustible steel materials on the building envelope, combined with better glazing, durable door and window screens and effective sub-floor ember screening, the probability of ignition, fire spread and house loss is almost eliminated for properly sited and well-prepared buildings. The use of a steel frame for the structure can provide roof spaces, wall cavities and subfloor areas that are essentially free of combustible elements, providing another layer of protection for your home.

Here is a brief summary of steel product applications that meet the requirements of *AS 3959–2009* when correctly designed and installed:

Sub-floor framing: Using conventional steel bearers and joists on steel, concrete or masonry stumps easily meets all *AS 3959–2009* requirements up to and including BAL–40. Additional requirements may apply in Flame Zone situations (BAL–FZ).

External walls: A steel framed wall clad with brick or other non-combustible cladding system generally meets all requirements up to and including BAL–FZ.

Bushfire shutters (where fitted): Flat or profiled steel sheeting fixed to a tubular steel frame is a simple and cost-effective solution for bushfire shutters. Shutters are normally opaque, but may be perforated with 2 or 3mm holes in some situations.

Roofs: A fully sarked steel sheet roof easily meets all *AS 3959–2009* requirements up to and including BAL–40. Additional requirements may apply in BAL–FZ situations.

Fascias and gutters: Steel fascia products as widely used throughout Australia meet *AS 3959–2009* requirements up to and including BAL–29 when fixed at appropriate spacing. Steel gutters may be used in all situations up to and including BAL–FZ.

Verandahs, decks, stairs & ramps: Using steel bearers and joists with steel columns and posts, in combination with a non-combustible or other approved treads and decking materials, covers most situations up to and including BAL–FZ.

Fencing: Although not falling within the scope of *AS 3959–2009*, landscaping features such as steel fencing can intercept and trap embers and fine fuels away from the building, and also provide some shielding from radiant heat such as from an adjoining building fire.

NASH believes that homes in bushfire-prone areas that resist ignition and flame spread, add no fuel to a fire and remain strong, secure and ember resistant with minimum maintenance represent better value for their owners and the community.■

• National Association of Steel-Framed Housing

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