Building in BUSHFIRE AREAS

Timber Buildings in Bushfire-Prone Areas.
Australian Standard AS3959- 1999.

Introduction.

This information bulletin summarises timber product requirements for bushfire prone areas - as defined in AS3959 (Note: requirements incorporate changes defined in 'Amendment 3').

AS3959 should be applied to BCA building classes for detached residential buildings (Class 1), attached dwellings, hotels and motels (Class *2* & 3). There are no specific requirements for building classes covering shops and offices.

State legislation may create separate compliance needs. For instance in New South Wales,

'Planning for Bushfire Protection' (2001) creates an over-riding basis for defining bushfire requirements. As with all regulations, it is necessary to check with the local approving authority for specific requirements.

Site Assessment.

Site assessment using AS3959 is required to determine the potential risk of bush fire hazard. The 'site' refers to the siting of the proposed building on the property. There are currently four categories of risk in AS3959:-

Low -Insignificant hazard - no special construction required.

Medium -Resist ember attack - Level 1 construction required.

High -Resist ember and radiant heat - Level 2 construction required.

Extreme -Resist ember, radiant heat and flame attack - Level 3 construction required.

A building is categorised in one these classes according to a combination of the classification of vegetation type; distance from vegetation to the building; slope leading to the building. As a common example, vegetation types such as forest, woodlands and tall shrubs, represent mid to upper range fuel sources.

Focusing on these types:

• Buildings less than 15m from the vegetation represent 'extreme' risk, therefore Level 3 construction is required - this is the case no matter what the land slope.

• Buildings ranging from 15-40m represent 'high' risk, therefore Level 2 construction is required - this is also the case no matter what the land slope.

• Building ranging from 40-100m vary in risk according to land slope i.e. sites sloping greater than 100 represent 'medium' risk, therefore Level 1 construction is required; sites sloping less than 100 represent 'low' risk therefore no special construction is required.

• Buildings greater than 100m represent 'low' risk irrespective of the degree of slope of the land.

NSW Requirements

New South Wales has its own special requirements for site assessment as detailed in 'Planning for Bushfire Protection' (Planning NSW, 2001). It overrides AS3959 and differs in some notable ways. For instance, it uses the same category names as AS3959 but different criteria for determining which category a site fits into. 'Planning for Bushfire Protection' also has an extra category termed 'flame zone'. Once a site is categorised, users of 'Planning for Bushfire Protection' are referred back to AS3959 to determine the Level of construction required to match the site risk. It is notable that levels of construction are only provided for 'medium', 'high' and 'extreme' categories. No level of construction is provided for sites in the 'flame zone' category, thus making these sites unsuitable for building unless the building can be moved from the vegetation.

Levels of Construction.

Some details on different levels of construction

• **Level 1 Construction** (dealing with ember attack) - Permits use of timber for exterior cladding, window frames, eaves, fascia, deck boards and exposed posts, but does apply restrictions to elements that are close to the ground (refer Table 1 for height details). They must be fire retardant treated or naturally resistant.

• **Level 2 Construction** (dealing with ember and radiant heat attack) - Permits use of timber for exterior cladding, window frames, eaves, fascia, deck boards and exposed posts, provided it is treated with fire retardant or naturally resistant. Timber near the ground also require the same attention (refer Table 1 for height details)

• **Level 3 Construction** (dealing with ember, radiant heat and flame attack) - Permits timber as for Level 2, but in addition requires fire retardant treated timber or naturally resistant timber for exposed balustrade and open subfloor timbers.

Further to the above, AS3959 does not impose any special requirements on interior timbers or wall and roof framing. Nor are there requirements for other elements commonly found in backyard structures such as pergolas, gazebos, pool surrounds, fences, garden sheds, or similar structures.

What is Fire Retardant Timber?

According to AS3959 'Fire retardant treated timber' can be used to meet the previous construction level requirements but must obtain a certain level of performance described in Clause 15.6 of the standard. This is measured using a cone calorimeter in accordance to AS/NZS3 837. A cone calorimeter is a relatively new method the BCA uses to measure the ignitability and heat release rate of materials. Two methods of applying the fire retardant to timber are available. The first involves coating the timber by brush or spray, and the other is pressure impregnation as used in factory processed products. Before testing, timbers to be used in exposed applications attract as special test requirement. They must be artificially weathered before undertaking the test, to help ensure the test results incorporate long term exposure conditions. Figure 1 helps determine where this additional requirement is necessary. In general, all fire retardant treatments must be applied and used in accordance with the manufacturer's recommendations.

Some naturally resistant timbers meet the above performance levels without being treated. These naturally resistant timbers offer an alternate solution that meets the requirements of the previously mentioned levels of construction. These are high density timbers and include Blackbutt, Mebau (Kwila), Iron Bark, Silver Top Ash, Spotted Gum, River Red Gum and Turpentine. In order to meet AS3959 requirements the timber must be at least 18mm thick. It is expected more timbers will be added to the list as needs become clearer and timber availability improves (refer to www.timber.org.au for a copy of the report or latest additions).

Site control should be carried out in conjunction with AS3959. The idea is to implement continuing fuel (vegetation) reduction activities around the building to minimise the intensity of bushfire attack. As a result, the building has a better chance of surviving a bushfire. This can be enhanced by subdivision layout; use of appropriate landscaping species and the location of buildings relative to surrounding vegetation.

The use of AS3959 **aims to improve the performance of buildings in bushfires, there are no guarantees because of the variability of bushfire characteristics.**

Figure 1.

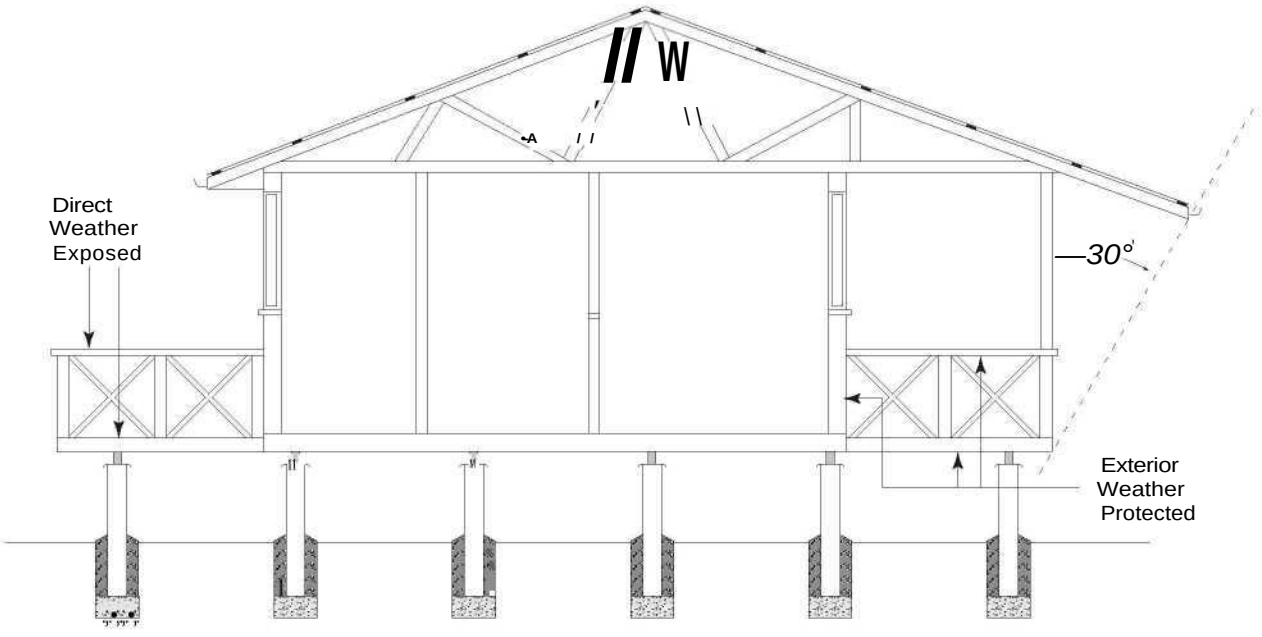

TABLE 1 REQUIREMENTS FOR TIMBER IN BUSHFIRE-PRONE AREA BUILDINGS				
		LEVEL ONE CONSTRUCTION	LEVEL TWO CONSTRUCTION	LEVEL THREE CONSTRUCTION
FLOORING SYSTEMS	ENCLOSED SUBFLOOR OR NON-COMBUSTIBLE SHEET TO UNDERSIDE OF JOISTS	NO REQUIREMENTS	NO REQUIREMENTS	NO REQUIREMENTS
	OPEN SUBFLOOR	FRAMING MEMBER LESS THAN 600MM FROM GROUND REQUIRED TO BE FIRE RETARDANT TREATED OR NATURALLY RESISTANT	FRAMING MEMBER LESS THAN 600MM FROM GROUND REQUIRED TO BE FIRE RETARDANT TREATED OR NATURALLY RESISTANT	ONLY FRAMING MEMBER (BEARERS AND JOISTS) REQUIRED TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT
SUPPORTING POSTS, COLUMNS, STUMPS, PIERS AND POLES		TIMBER POSTS, COLUMNS, STUMPS, PIERS AND POLES THAT ARE NOT ENCLOSED WITHIN THE BUILDING (ENCLOSED SUBFLOOR SPACE) ARE REQUIRED TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT FOR THE FIRST 400MM ABOVE THE GROUND OR MOUNTED ON GALVANISED METAL STIRRUPS WITH A CLEARANCE OF NOT LESS THAN 75MM.	TIMBER POSTS, COLUMNS, STUMPS, PIERS AND POLES THAT ARE NOT ENCLOSED WITHIN THE BUILDING (ENCLOSED SUBFLOOR SPACE) ARE REQUIRED TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT FOR THE FIRST 400MM ABOVE THE GROUND OR MOUNTED ON GALVANISED METAL STIRRUPS WITH A CLEARANCE OF NOT LESS THAN 75MM.	TIMBER POSTS, COLUMNS, STUMPS, PIERS AND POLES THAT ARE NOT ENCLOSED WITHIN THE BUILDING (ENCLOSED SUBFLOOR SPACE) ARE REQUIRED TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT.
EXTERNAL WALLS	FRAMING MEMBERS	THE FRAME TO HAVE BREATHER-TYPE SARKING OR INSULATION INCORPORATED	THE FRAME TO HAVE BREATHER-TYPE SARKING OR INSULATION INCORPORATED	THE FRAME TO HAVE BREATHER-TYPE SARKING OR INSULATION INCORPORATED
	TIMBER CLADDING	ANY CLADDING WITHIN 400MM FROM THE GROUND REQUIRES TO BE FIRE RETARDANT TIMBER, NATURALLY RESISTANT, OR COVERED BY NON-COMBUSTIBLE MATERIAL, EG FIBRE CEMENT SHEET	ALL TIMBER CLADDING TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT	ALL TIMBER CLADDING TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT
WINDOWS		NO MATERIAL RESTRICTIONS	TIMBER WINDOWS FRAMES TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT EXCEPT WHERE PROTECTED BY NON-COMBUSTIBLE SHUTTERS	TIMBER WINDOWS FRAMES TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT EXCEPT WHERE PROTECTED BY NON-COMBUSTIBLE SHUTTERS
EXTERNAL DOORS		NO RESTRICTIONS ON THE USE OF TIMBER	NO RESTRICTIONS ON THE USE OF TIMBER	TIMBER DOORS ARE REQUIRED TO BE FIRE RETARDANT TIMBER, OR NATURALLY RESISTANT, OR COVERED BY A NON-COMBUSTIBLE COVERING, OR PROTECTED BY NON-COMBUSTIBLE SHUTTERS, OR BE 35MM SOLID-CORE DOOR
ROOF	FRAMING MEMBERS	NO MATERIAL RESTRICTIONS	NO MATERIAL RESTRICTIONS	NO MATERIAL RESTRICTIONS
	ROOF COVERINGS	MUST BE NON-COMBUSTIBLE AND FULLY SARKED	MUST BE NON-COMBUSTIBLE AND FULLY SARKED	MUST BE NON-COMBUSTIBLE AND FULLY SARKED
EAVES		NO RESTRICTIONS ON THE USE OF TIMBER	TIMBER EAVES LINING TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT	TIMBER EAVES LINING TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT
FASCIAS		NO MATERIAL RESTRICTIONS	TIMBER FASCIAS TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT	TIMBER FASCIAS TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT
VERANDAHS AND DECKS	SHEETED OR T & G DECKS:	WHERE THE DECK SURFACE IS 400MM OR LESS ABOVE GROUND, ALL JOINTS TO BE COVERED OR SEALED.	WHERE THE DECK SURFACE IS 400MM OR LESS ABOVE GROUND, ALL JOINTS TO BE COVERED OR SEALED.	ALL TIMBER TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT; AND WHERE THE DECK SURFACE IS 400MM OR LESS ABOVE GROUND ALL JOINTS TO BE LESS THAN 2MM WIDE.
	SPACED DECKING:	DECK BOARDS TO HAVE A MINIMUM CLEARANCE OF 5MM BETWEEN EACH BOARD AND THE DECK SUPPORT STRUCTURE CANNOT BE ENCLOSED. POSTS, COLUMNS, STUMPS, PIERS AND POLES ARE REQUIRED TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT FOR THE FIRST 400MM ABOVE THE GROUND, OR MOUNTED ON GALVANISED METAL STIRRUPS WITH A CLEARANCE OF NOT LESS THAN 75MM. TIMBER ELEMENTS ARE NOT TO BE CONNECTED DIRECTLY TO THE REMAINDER OF THE HOUSE	DECK BOARDS ONLY ARE REQUIRED TO BE FIRE RETARDANT TIMBER AND HAVE A MINIMUM CLEARANCE OF 5MM BETWEEN EACH BOARD. THE DECK SUPPORT STRUCTURE CANNOT BE ENCLOSED. POSTS, COLUMNS, STUMPS, PIERS AND POLES ARE REQUIRED TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT FOR THE FIRST 400MM ABOVE THE GROUND, OR MOUNTED ON GALVANISED METAL STIRRUPS WITH A CLEARANCE OF NOT LESS THAN 75MM. TIMBER ELEMENTS ARE NOT TO BE CONNECTED DIRECTLY TO THE REMAINDER OF THE HOUSE	ALL TIMBER (DECKING, BEARERS AND JOISTS) TO BE FIRE RETARDANT TIMBER. DECK BOARDS TO HAVE A MINIMUM CLEARANCE OF 5MM BETWEEN EACH BOARD AND THE DECK SUPPORT STRUCTURE CANNOT BE ENCLOSED. POSTS, COLUMNS, STUMPS, PIERS AND POLES ARE REQUIRED TO BE FIRE RETARDANT TIMBER OR NATURALLY RESISTANT. TIMBER ELEMENTS ARE NOT TO BE CONNECTED DIRECTLY TO THE REMAINDER OF THE HOUSE
PERGOLAS		NO MATERIAL RESTRICTIONS	NO MATERIAL RESTRICTIONS	NO MATERIAL RESTRICTIONS

Reference Material

Construction of Buildings in Bushfire-Prone Areas-1999, Australian Standards (AS3959 - 1999).

Planning for Bushfire Protection-2001, Planning New South Wales.

Technical Assistance

Further technical information and assistance is available from the following Timber Advisory Services.

NEW SOUTH WALES
Timber Development Association NSW Ltd
13-29 Nichols Street
Surry Hills NSW 2011
Tel: (02) 9360 3088 Fax: (02) 9360 3464

QUEENSLAND
Timber Queensland
500 Brunswick Street, Fortitude Valley Qld 4006
Tel (07) 3254 1989 Fax: (07) 3254 1964

VICTORIA
Timber Promotion Council
320 Russell Street, Melbourne Vic 3000
Tel: (03) 9665 9255 Fax: (03) 9665 9266

SOUTH AUSTRALIA
Timber Development Association of SA
113 Anzac Highway, Ashford, SA 5035
Tel: (08) 8297 0044 Fax: (08) 8297 2772

WESTERN AUSTRALIA
Timber Advisory Centre
Cnr Salvado Road & Harborne Street,
Wembly WA6014
Tel: (08) 9380 4411 Fax: (08) 9380 4477

TASMANIA
Tasmanian Timber Promotion Board
38 Montpelier Retreat, Battery Point Tas 7004
Tel: (03) 6224 1033 Fax: (03) 6224 1030

Plywood Association of Australia
3 Dunlop Street, Newstead, Old 4006
Tel: (07) 3854 1228 Fax: (07) 3252 4769

Important Notice

The information and advice provided in the publication is intended as a guide only. As successful design and construction depends upon numerous factors outside the scope ofthis publication, the Forest and Wood Product Research Corporation accepts no responsibility for specifications in, nor work done or omitted to be done in reliance on this information sheet. Whilst all care has been taken to ensure the accuracy of the information contained in this publication, the Forest and Wood Product Research Corporation disclaims, to the full extent permitted by law, all and any liability for any damage or loss, whether direct, indirect, special or consequential, arising directly or indirectly out of use of or reliance on this guide, whether as a result of the Forest and Wood Product Research Corporation negligence or otherwise.

Australian Government
Forest and Wood Products Research and Development Corporation