AUSTRALIAN BUSHFIRE CONSULTING SERVICES



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Bush Fire Assessment Report



Proposed alterations and additions:

62 Riviera Avenue Avalon Beach NSW 2107

10th February 2020 Reference 20-034

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Abbreviations:

ABCS	Australian Bushfire Consulting Services Pty Ltd
APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2009 including amendments 1-3
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BPMs	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
BFSA	Bush Fire Safety Authority
Council	Northern Beaches Council
DA	Development Application
EP&A Act	Environmental Planning and Assessment Act - 1979
ESD	Ecologically Sustainable Development
FR NSW	Fire & Rescue NSW
IPA	Inner Protection Area
LGA	Local Government Area
NCC	National Construction Codes
NP	National Park
NSP	Neighbourhood Safer Place
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection – 2006
ROW	Right of Way
RF Act	Rural Fires Act - 1997
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SWS	Static Water Supply

1.0 Introduction.

The development seeks approval for the alterations and additions to an existing dwelling located within an existing environmental living zoned allotment at 62 Riviera Avenue, Avalon Beach, NSW. The subject site is mapped as bushfire prone land and therefore the application of Planning for Bush Fire Protection 2006 (PBP 2006) is relevant to the development proposal.

The aims of PBP 2006 are to provide for the protection of human life (including firefighters) and to minimise impacts on property from the threat of bush fire, while having due regard to development potential, on-site amenity and protection of the environment. This is achieved by determining available asset protection zones (APZs), applying the relevant construction requirements, ensuring adequate access and egress has been considered, providing safe service supply and adequate water provisions for occupants and attending emergency services.

2.0 Property details.

Address:62 Riviera Avenue, Avalon Beach, NSW 2107.Lot/DP:Lot 19 DP 209443Zoned:E4 Environmental LivingLGA:Northern Beaches Council

The site has street frontage to Riviera Avenue to the south and abuts similar developed residential properties to the remaining three aspects. Stapleton Park Reserve is located to the east of the subject site beyond neighbouring properties. The vegetation identified as the bushfire hazard was found to be located within the rear yards of private allotments to the east and has interconnection with Stapleton Park further east. I undertook an inspection of the property on 7/2/2020, at that time free access was available within the subject site and access to the hazard interface to the east was provided through neighbouring allotments.

3.0 Legislative context.

The development is classified as infill development and assessed under Section 4.14 of the Environmental Planning and Assessment Act 1979. Under this Act Council can determine a development application on bushfire prone land providing;

Council is satisfied that the development conforms to the specifications and requirements of *Planning for Bush Fire Protection* that are relevant to the development or

Council has been provided with a certificate by a person who is recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements *Planning for Bush Fire Protection*.

If the Council is satisfied that the development does not conform to the relevant specifications and requirements of *Planning for Bush Fire Protection* Council may grant consent but only if it has consulted with the Commissioner of the NSW Rural Fire Service concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire.

The highest bushfire attack level (BAL) to the proposed new works has been determined to be BAL 12.5. Suitable recommendations have been made herein to enable Council to issue development consent inclusive of conditions required to ensure compliance with both *AS3959 – 2009 Construction of buildings in bushfire prone areas* (AS3959-2009) and *Planning for Bush Fire Protection 2006* (PBP 2006).

The proposal meets the aims and objectives of PBP 2006 by means of compliance with the deemed to satisfy provisions of this document. I am a person who is recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment and I have attached a certificate to this report satisfying the requirements of s4.14. As such Council can approve the application without referral to the NSW Rural Fire Service.

4.0 Referenced documents and people.

The following documents have been referenced in the preparation of this report;

- Pittwater Local Environmental Plan 2014,
- Pittwater DCP 2004 (amended November 2015),
- Northern Beaches Council's Bushfire Prone Land Map,
- AS3959 2009 Construction of buildings in bushfire prone areas,
- Planning for Bush Fire Protection 2006,
- Rural Fires Act 1997
- Rural Fires Regulation 2013
- 10/50 Vegetation Clearing Code of Practice,
- NSW RFS Guide for bush fire prone land mapping V5b Nov 2015,
- Ocean Shores to Desert Dunes David Andrew Keith 2004,

5.0 Copyright, scope and disclaimer.

This assessment of possible bushfire impact (including smoke, ember, radiant heat and flame contact) and compliance with matters such as Asset Protection Zones, access and service supply is pertinent to the subject site only. Where reference has been made to the surrounding lands, this report does not assess impact to those lands rather it is an assessment of possible bushfire progression and impact on or from those lands towards the subject site.

Apart from any use permitted under the Copyright Act 1968 no part of this document, including any wording, images, or graphics, can be modified, changed or altered in any way without written permission from Australian Bushfire Consulting Services Pty Ltd. This report may only be referenced, distributed or forwarded to other parties in its original format.

This report has been prepared as a submission document in support of a development application to Council and cannot be relied upon for commencement of works or construction until it has been included within the consent conditions issued by Council as part of the DA determination. The onus is on the applicant to cross reference this document with any conditions of consent issued by Council or any comments provided by the NSW Rural Fire Service. I can review and cross reference these documents however the onus is on the applicant / client to provide them to me and request this review.

Where any difference between this document and the development consent (or the NSW Rural Fire Service comments) is found, the conditions of consent always take precedence until an application to review, amend or vary those conditions is approved.

The statements and opinions contained in this report are given in good faith and in the belief that such statements and opinions are correct and not misleading. AS3959 – 2009 states that "...there can be no guarantee that a building will survive a bushfire event of every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions". The NSW RFS state "Homes are not designed to withstand fires in catastrophic conditions". Correspondingly any representation, statement of opinion, or advice expressed or implied in this document is made on the basis that Australian Bushfire Consulting Services Pty Ltd is not liable to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice made by Australian Bushfire Consulting Services Pty Ltd.

6.0 Assessment summary table.

Aspect	North	East	South	West
Vegetation Structure	Maintained land	Forest	Maintained land	Maintained land
Hazard slope	n/a	8-9° downslope	n/a	n/a
Existing APZ	n/a	≥70 metres	n/a	n/a
Features that may mitigate the impact of bush fire on the proposed development.	The separation from the hazard interface includes maintained land within t subject property and existing maintained land within neighbouring resident allotments.		ned land within the abouring residential	
Noteworthy landform & environmental features.	Neighbouring dwelling / maintained curtilage.	Neighbouring dwellings / maintained curtilages Stapleton Park	Riviera Avenue	Neighbouring dwelling / maintained curtilage.
Threatened SpeciesAPZ ExistingExistingE		APZ Existing	APZ Existing	APZ Existing
Aboriginal Relics	APZ Existing	APZ Existing	APZ Existing	APZ Existing
Bushfire Attack Level	n/a	BAL 12.5	n/a	n/a
Required Construction Level	uction The highest Bushfire Attack Level to the proposed alterations and additions was determined from Table 2.4.2 of AS3959 – 2009 to be 'BAL 12.5'. The proposed new works are required to comply with section 3 and 5 BAL 12.5 of AS 3959 - 2009 and the additional requirements detailed within Addendum Appendix 3 under PBP 2010.		s and additions was 2.5'. The proposed . 12.5 of AS 3959 – endum Appendix 3	

Guideline Ref.	Proposed Development Determinations
Property Access	The most disadvantaged point of the existing dwelling and proposed new works is less than 70 metres from a public through road that supports the operational use of fire appliances (hydrants) and therefore the property access requirements of s4.1.3 (2) of PBP 2006 are not applicable.
Water Supply	The subject site is connected to reticulated water mains for domestic needs. Hydrants are located along Riviera Avenue and surrounding streets available for the replenishment of firefighting appliances, with the nearest hydrant located immediately east of the subject site. Existing water supply is considered satisfactory for this development and a static water supply is not required.
Gas & Electrical Supply	Existing above ground electrical supply is provided to the subject site and a reticulated gas network is available in this area. Recommendations will be included that any new gas or electrical connection complies with s4.1.3 of PBP 2006.
Evacuation	Occupants are encouraged to complete a Bush Fire Safety Plan addressing "Prepare, Act, Survive" as advocated by the NSW RFS http://www.rfs.nsw.gov.au/ under publications / bushfire safety.

7.0 Images and maps.



Image 01: Aerial image from NSW Gov SIXMaps dataset



Image 02: 1 metre topographic data from NSW Gov Elevation Foundation dataset



Image 03: 10 metre topographic image from NSW Gov SIXMaps dataset



Image 04: Extract of Councils Bushfire Prone Land Map from Dept. Planning Property Information



Image 05: Extract from street-directory.com.au



Image 06: Extract from Council LEP Zone Maps from Dept. Planning Property Information

8.0 Bushfire hazard assessment

Properties considered to be bushfire prone land are identified on Councils Bushfire Prone Land Map as being:

- within or within 100 m of Category 1 (high) hazards or,
- within or within 30 m of Category 2 (low) hazards or,
- within or within 30 m of Category 3 (medium) hazards.

The NSW RFS document PBP – 2006 is applicable to all development on bushfire prone land, this includes an assessment of the proposals adequacy in providing an appropriate combination of bushfire protection measures in terms of asset protections zones, landscaping, access and service supply. This document also provides a means of determining the necessary level of building construction under AS3959 - 2009. All infill development on bushfire prone land must be accompanied with a bushfire hazard assessment that includes;

- a statement that the site is bush fire prone land, where applicable,
- the location, extent and vegetation formation of any bushland on or within 100 metres of the site,
- the slope and aspect of the site and of any bush fire prone land within 100 metres of the site, which may determine the likely path of any bush fires,
- any features on or adjoining the site that may mitigate the impact of a high intensity bush fire on the proposed development, and
- a statement assessing the likely environmental impact of any proposed Bush Fire Protection Measures.
- whether any building is capable of complying with AS 3959-2009 in relation to the construction level for bush fire protection.

By incorporating bush fire protection measures into a development, the six objectives of PBP 2006 are addressed:

- 1. afford occupants of any building adequate protection from exposure to a bush fire
- 2. provide for a defendable space to be located around buildings
- 3. provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition
- 4. ensure that safe operational access and egress for emergency service personnel and residents is available
- 5. provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ)
- 6. ensure that utility services are adequate to meet the needs of fire fighters (and others assisting in bush firefighting).



Image 07: Extract from PBP 2006 illustrating bush fire protection measures in combination.

8.1 Site

The site has street frontage to Riviera Avenue to the south and abuts similar developed residential properties to the remaining three aspects. Stapleton Park Reserve is located to the east of the subject site beyond neighbouring property.

Councils Bushfire Prone Land Map identifies this property as being within the 100 metre buffer zone from Category 1 Vegetation and therefore it is appropriate to apply PBP 2006. The Bushfire Prone Land Map is not an indication of risk and is simply a trigger for a detailed site assessment and bushfire hazard analysis to be undertaken.





8.2 Vegetation

The vegetation must be assessed for a distance of 140 metres from the proposed development. Where a mix of vegetation types exist, the type providing the greater hazard is said to predominate.

The vegetation identified as the bushfire hazard was found to be located within the rear yards of private allotments to the east and has interconnection with Stapleton Park further east. Access to view and verify the hazard interface to the east was provided to me through neighbouring allotments.

The vegetation was found to consist of trees 15-25 metres tall with an understory of smaller trees, weeds and shrubs. For the purpose of assessment under Addendum Appendix 3 PBP 2006 and AS3959 – 2009 the vegetation has been determined to be a Forest.

8.3 Topography

The slope must be assessed over a distance of at least 100 m from the existing property boundary (or proposed building footprint) towards the various vegetation communities constituting the hazard. In assessing the slope, it may be found that there are a variety of slopes covering different distances. The gradient within the hazard (vegetation) which will most significantly influence the fire behaviour must be determined.

The most influential slope within the hazard has been assessed onsite using an inclinometer and verified by contour topographic mapping to be;

➢ 8-9° downslope to the north

8.4 Asset Protection Zones

The subject site and neighbouring residential allotments contain maintained land around the built assets. The separation from the hazard interface has been measured to be \geq 70 metres to the east and includes maintained land within the subject property and land considered equivalent to an asset protection zone being existing maintained land within the eastern neighbouring properties.

Recommendations for ongoing property maintenance within the subject site will be included within this report.



Image 08: Extract from PBP 2006 illustrating the components of and Asset Protection Zone.

8.5 Services

Existing above ground electrical supply is provided to the subject site and a reticulated gas network is available in this area. Recommendations will be included that any new gas or electrical connection complies with s4.1.3 of PBP 2006.

The subject site is connected to reticulated water mains for domestic needs. Hydrants are located along Riviera Avenue and surrounding streets available for the replenishment of firefighting appliances, with the nearest hydrant located immediately east of the subject site. Existing water supply is considered satisfactory for this development and a static water supply is not required.

8.6 Access & egress

Fire services will have free pedestrian access around the existing and future building footprints. Access to the hazard interface is available via neighbouring private allotments without the need to enter the subject site.

The most disadvantaged point of the existing dwelling and proposed new works is less than 70 metres from a public through road that supports the operational use of fire appliances (hydrants) and therefore the property access requirements of s4.1.3 (2) of PBP 2006 are not applicable.

Occupants are encouraged to complete a Bush Fire Safety Plan addressing "Prepare, Act, Survive" as advocated by the NSW RFS http://www.rfs.nsw.gov.au/ under publications / bushfire safety.

8.7 Construction

Australian Standard 3959 – 2009 'Construction of buildings in bushfire-prone areas' provides for six (6) levels of building construction these being BAL - Low, BAL - 12.5, BAL - 19, BAL - 29, BAL - 40 and BAL - FZ. The Australian Standard 3959 specifies construction standards for buildings within various Bushfire Attack Levels as determined by the Planning for Bushfire Protection – 2006 document. The NSW Rural Fire Service will not accept deemed to satisfy provisions for BAL Flame Zone and therefore have a NSW variation to the listed standard provisions of BAL FZ under AS3959 - 2009.

The highest Bushfire Attack Level to the proposed alterations and additions was determined from Table 2.4.2 of AS3959 – 2009 to be 'BAL 12.5'. The proposed new works are required to comply with section 3 and 5 BAL 12.5 of AS 3959 – 2009 and the additional requirements detailed within Addendum Appendix 3 under PBP 2010.

8.8 Risk

The level of risk is determined using the combination of likelihood and consequences. The purpose of analysing risk is to establish an understanding of the level of bushfire threat and will help to evaluate the appropriateness of bushfire protection measures recommended for a development application.

This section of the report is a predictive risk evaluation only and assumes development consent includes the recommendations contained within this report. It has been based on an abridged version of the assessment process detailed within the Bush Fire Risk Management Planning Guidelines for Bushfire Risk Management Committees. This evaluation does not reflect the Bushfire Attack Level determined under PBP 2006 or AS3959 - 2009.

The likelihood of a bush fire occurring can be determined using fire history data or local knowledge. The likelihood must be considered in the context of long term planning and not simply if a bush fire is likely to occur during the next five years. The consequences of a bush fire event can be determined by considering the vulnerability of the asset. Vulnerability is related to the capacity of an asset to cope with or recover from the impacts of a bush fire.

Likelihood Rating	Description and indicative probability
Almost certain	Expected to occur, many recorded incidents, strong anecdotal evidence, high opportunity, reason or means to occur; may occur or be exceeded once in every 5 years.
Likely	Will probably occur; consistent record of incidents and good anecdotal evidence; considerable opportunity, reason or means to occur; may occur or be exceeded once in every 10 years.
Possible	Might occur; a few recorded incidents in each locality and some anecdotal evidence; some opportunity, reason or means to occur; may occur or be exceeded once in every 20 years.
Unlikely	Is not expected to occur; isolated recorded incidents in this community, anecdotal evidence in other communities; little opportunity, reason or means to occur;
Consequence Rating	Description and indicative result
Minor	Inconsequential or no damage. Little or no disruption to occupation. Little or no financial loss.
Moderate	Localised damage that is rectified by routine arrangements. Normal functioning with some inconvenience. Localised displacement of people who return within 24 hours. Personal support satisfied through local arrangements.
Major	Significant damage that requires external resources. Displacement for more than 24 hours duration. Extensive resources required for personal support.
Cotostrophia	Extensive damage. Extensive personal support. General and widespread

Consequence Likelihood	Minor	Moderate	Major	Catastrophic
Almost certain	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	Extreme
Possible	Insignificant	Low	Medium	High
Unlikely	Insignificant	Insignificant	Low	Medium

displacement for extended durations.

The bushfire risk to this development is determined to be <u>insignificant</u> and the package of bushfire protection measures recommended in section 9 of this report for the proposed new works are considered <u>satisfactory</u>.

9.0 **Recommendations**

9.1 Asset Protection Zones / landscaping

- 1. That all grounds within the subject property continue to be maintained as an Asset Protection Zone / Inner Protection Area as detailed in the NSW Rural Fire Service's document 'Standards for Asset Protection Zones' and Appendix 2 of Planning for Bushfire Protection 2006.
- 2. That any new landscaping is to comply with Appendix 5 'Landscaping and Property Maintenance' under Planning for Bushfire Protection 2006.

9.2 Construction

- 3. That the proposed new works shall comply with section 3 and 5 (BAL 12.5) Australian Standard AS3959-2009 "*Construction of buildings in bush fire-prone areas*'.
- 4. That the proposed new works shall also comply section A3.7 Addendum Appendix 3 of "Planning for Bush Fire Protection (2010).

9.3 Services

Electricity

5. That any new electricity supply is to comply with section 4.1.3 of Planning for Bush Fire Protection 2006, in particular;

The location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings

- Where practicable, electrical transmission lines are underground.
- Where overhead electrical transmission lines are proposed:
 - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and
 - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).

Gas

6. That any new reticulated or bottled gas supply is to comply with section 4.1.3 of Planning for Bush Fire Protection 2006, in particular;

The location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings

- reticulated or bottled gas is installed and maintained in accordance with AS 1596 and the requirements of relevant authorities. Metal piping is to be used.
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation.
- if gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion.
- Connections to and from gas cylinders are metal.
- Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not us

10.0 Conclusion

The National Construction Code 2016 (NCC) Volume 2 requires that a Class 1 building or a Class 10a building or deck associated with a Class 1 building that is constructed in a designated bushfire prone area must, to the degree necessary, be designed and constructed to reduce the risk of ignition from a bushfire, appropriate to the potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire; and intensity of the bushfire attack on the building.

The subject property is determined to be bushfire prone land and the proposal must achieve compliance with the NCC by meeting the aims and objectives of PBP 2006. This is achieved by providing construction measures to mitigate against the impacts from bush fire including smoke, embers, radiant heat and flame contact, and also including suitable access, services supply and means of maintaining the bushfire protection measures for the life of the development.

This bushfire hazard and determination has been made on a site-specific basis which includes an assessment of the local bushland area and its possible impact to the subject property. The highest Bushfire Attack Level to the proposed new works was determined from Table 2.4.2 of AS3959 - 2009 to be 'BAL 12.5'. Suitable recommendations have been made herein to enable Council to issue development consent inclusive of conditions required to ensure compliance with the construction requirements of AS3959 – 2009 and all other requirements of PBP 2006.

The proposal meets the aims and objectives of PBP 2006 and AS3959-2009 by means of compliance with the deemed to satisfy provisions of these documents. I am a person who is recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment and I have attached a certificate to this report satisfying the requirements of s4.14. As such Council can approve the application without referral to the NSW Rural Fire Service.

In consideration of the bushfire risk posed to the proposed development and in conjunction with the recommended bushfire protection measures contained within this report I am satisfied they will provide a reasonable and satisfactory level of bushfire protection to the proposed development.

I am therefore in support of the development application.

Australian Bushfire Consulting Services Pty Ltd

Wayne Tucker Managing Director G. D. Design in Bushfire Prone Areas. Certificate IV Fire Technology Ass Dip Applied Science FPA Australia BPAD Level 3 Accredited Practitioner BPAD Accreditation No. BPAD9399



List of attachments

Attachment 01: s4.14 Certificate

AUSTRALIAN BUSHFIRE



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BUSHFIRE RISK ASSESSMENT CERTIFICATE

Issued in accordance with Section 4.14 of the Environmental Planning Act 1979 No.203

PROPERTY DETAILS	62 Riviera Avenue, Avalon Beach, NSW 2107 Lot 19 DP 209443			
DEVELOPMENT TYPE	Infill residential development – alterations and additions to existing dwelling			
PLAN REFERENCE	n/a BAL assessment taken from site boundary and BAL 12.5 applies to the entire allotment.			
BAL RATING	BAL 12.5	<u>NOTE</u> - If BAL FZ the application is to be referred to the NSW RFS.		
ARE ALTERNATE SOLUTIONS REQUIRED	No	<u>NOTE</u> - If YES the application is to be referred to the NSW RFS.		
IS REFERRAL TO NSW RFS REQUIRED	No	ABCS REF. 20-034		

I *Wayne Tucker,* of Australian Bushfire Consulting Services Pty. Ltd., hereby certify in accordance with Section 4.14 of the Environmental Planning Act 1979 No.203 that –

- 1. I am a person recognized by the NSW Rural Fire Service as a qualified consultant in bushfire risk assessment and
- Subject to the recommendations contained in the Bushfire Risk Assessment Report, the proposed development conforms to specifications and requirements of the document entitled Planning for Bushfire *Protection* (prepared by the NSW Rural Fire Service in co-operation with the Department of Planning) and any other documents as prescribed by Section 4.14 of the Environmental Planning and Assessment Act 1979 No.203.

Further, I am aware that the Bushfire Risk Assessment Report prepared for the abovementioned site is to be submitted in support of a Development Application for this site. This report will be relied upon by Council as the basis for ensuring that the bushfire risk management aspects of the proposed development have been addressed in accordance with the document entitled Planning for Bushfire Protection 2006 (assessed using PBP 2019 as a means of compliance with PBP 2006).

Issue date: 10th February 2020.

Australian Bushfire Consulting Services;

BPAD

Wayne Tucker Managing Director. G. D. Design in Bushfire Prone Areas. Certificate IV Fire Technology Ass Dip Applied Science FPA Australia BPAD Level 3 Accredited Practitioner BPAD Accreditation No. BPAD9399

SECTION 3: CONSTRUCTION GENERAL

3.3 EXTERNAL MOULDINGS

Unless otherwise required in Sections 4 to 9, combustible external mouldings, jointing strips, trims and sealants may be used for decorative purposes or to cover joints between sheeting material.

3.6 VENTS, WEEPHOLES AND GAPS

Where a circular probe of 3 mm diameter is capable of being passed through external vents, weepholes or gaps, the vents, weepholes and gaps shall be screened as specified in Sections 3, 5, 6, 7, 8 and 9, except for weepholes from the frames of windows and glazed doors.

To determine the maximum aperture size of screening material, it shall not be possible to pass a circular probe of 2 mm diameter through the aperture.

Gaps between doors and the door jambs, heads or sills (thresholds) shall be as shown in Figure 3.2. Alternatively, gaps shall be protected by draught excluders.

C3.6 Weepholes from the frames of windows and glazed doors and those gaps between doors and door jambs, heads or sills (thresholds) that may exceed 3 mm (see Figure 3.2) are exempt from screening because they do not provide a direct passage for embers to the interior of the building or building cavity.

3.7 BUSHFIRE SHUTTERS

Bushfire shutters shall—

- (a) be fixed to the building and be non-removable;
- (b) when in the closed position, have no gap greater than 3 mm between the shutter and the wall, the sill or the head;
- (c) be readily manually operable from either inside or outside;
- (d) protect the entire window assembly or door assembly;
- (e) consist of materials specified in Clauses 5.5.1, 6.5.1, 7.5.1, 8.5.1 and 9.5.1 for the relevant BAL; and
- (f) where perforated, have-

(i) uniformly distributed perforations with a maximum aperture of 3 mm when the shutter is providing radiant heat protection or 2 mm when the shutter is also providing ember protection (such as where the openable portion of the window is not screened in accordance with the requirements of the respective BAL); and

(ii) a perforated area no greater than 20% of the shutter.

If bushfire shutters are fitted to all external doors then at least one of those shutters shall be operable from the inside to facilitate safe egress from the building.

SECTION 5 CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL 12.5 (BAL - 12.5)

5.1 GENERAL

A building assessed in Section 2 as being BAL—12.5 shall comply with Section 3 and Clauses 5.2 to 5.8. There are a number of Standards that specify requirements for construction; however, where this Standard does not provide construction requirements for a particular element, the other Standards apply.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 5.2 to 5.8 (see Clause 3.8).

NOTE: BAL—12.5 is primarily concerned with protection from ember attack and radiant heat up to and including 12.5 kW/m2 where the site is less than 100 m from the source of bushfire attack.

5.2 SUBFLOOR SUPPORTS

NSW RURAL FIRE SERVICE VARIATION

This Standard does not provide construction requirements for subfloor supports where the subfloor space is enclosed with—

- (a) wall that complies with (Clause 5.4 as appropriate); or
- (b) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or
- (c) a combination of Items (a) and (b) above.

Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles shall be-

- (i) of non-combustible material; or
- (ii) of bushfire-resisting timber (see Appendix (ii) F); or
- (iii) a combination of Items (i) and (ii) above. (iii)

NOTE: This requirement applies to the principal building only and not to verandas, decks, steps, ramps and landings.

5.3 FLOORS

5.3.1 Concrete slabs on ground

This Standard does not provide construction requirements for concrete slabs on the ground.

5.3.2 Elevated floors

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring.

See NSW Variation Following Page

NSW RURAL FIRE SERVICE VARIATION

Enclosed Subfloor Space

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with—

- (a) a wall that complies with (Clause 5.4 appropriate); or
- (b) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; *or*
- (c) a combination of Items (a) and (b) above.

Unenclosed subfloor space

Where the subfloor space is unenclosed, the bearers, joists and flooring, less than 400 mm above finished ground level, shall be one of the following:

- (a) Materials that comply with the following:
 - (i) Bearers and joists shall be—
 - A. non-combustible; or
 - B. bushfire-resisting timber (see Appendix F); or
 - C. a combination of Items (A) and (B) above
 - (ii) Flooring shall be-
 - A. non-combustible; or
 - B. bushfire-resisting timber (see Appendix F); or

C. timber (other than bushfire-resisting timber), particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; *or*

- D. a combination of any of Items (A), (B) or (C) above or
- (b) A system complying with AS 1530.8.1

This Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400 mm or more above finished ground level.

5.4 EXTERNAL WALLS

5.4.1 Walls

The exposed components of an external wall that are less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D) shall be:

(a) Non-combustible material.

NOTE: Examples include, but are not limited to, the following (with a minimum of 90 mm in thickness):

(a) Full masonry or masonry veneer walls with an outer leaf of clay, concrete, calcium silicate or natural stone.

- (b) Precast or in situ walls of concrete or aerated concrete.
- (c) Earth wall including mud brick.

or

(b) Timber logs of a species with a density of 680 kg/m3 or greater at a 12 percent moisture content; of a minimum nominal overall thickness of 90 mm and a minimum thickness of 70 mm (see Clause 3.11); and gauge planed.

or

- (c) Cladding that is fixed externally to a timber-framed or a steel-framed wall and is-
 - (i) non-combustible material; or
 - (ii) fibre-cement a minimum of 6 mm in thickness; or
 - (iii) bushfire-resisting timber (see Appendix F); or
 - (iv) a timber species as specified in Paragraph E1, Appendix E; or
 - (v) a combination of any of Items (i), (ii), (iii) or (iv) above.

or

(d) A combination of any of Items (a), (b) or (c) above.

This Standard does not provide construction requirements for the exposed components of an external wall that are 400 mm or more from the ground or 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D).'

5.4.2 Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or buttjointed to prevent gaps greater than 3 mm.

5.4.3 Vents and weepholes

Vents and weepholes in external walls shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where the vents and weepholes have an aperture less than 3 mm (see Clause 3.6), or are located in an external wall of a subfloor space.

5.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS

5.5.1 Bushfire shutters

Where fitted, bushfire shutters shall comply with Clause 3.7 and be made from-

- (a) non-combustible material; or
- (b) a timber species as specified in Paragraph E1, Appendix E; or
- (b) bushfire-resisting timber (see Appendix F); or
- (d) a combination of any of Items (a), (b) or (c) above.

5.5.1A Screens for windows and doors

Where fitted, screens for windows and doors shall have a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium. Gaps between the perimeter of the screen assembly and the building element to which it is fitted shall not exceed 3 mm.

The frame supporting the mesh or perforated sheet shall be made from—

- (a) metal; or
- (b) bushfire-resisting timber (see Appendix F); or
- (c) a timber species as specified in Paragraph E2, Appendix E.

5.5.2 Windows

Window assemblies shall comply with one of the following:

- (a) They shall be completely protected by a bushfire shutter that complies with Clause 5.5.1. *or*
- (b) They shall be completely protected externally by screens that comply with Clause 5.5.1A. *or*
- (c) They shall comply with the following:
 - (i) For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), window frames and window joinery shall be made from:

- (A) Bushfire-resisting timber (see Appendix F).*or*
- (B) A timber species as specified in Paragraph E2, Appendix E.or
- (C) Metal. Or
- (D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the frame and sash shall satisfy the design load, performance and structural strength of the member.
- (ii) Externally fitted hardware that supports the sash in its functions of opening and closing shall be metal.
- (iii) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), the glazing shall be Grade A safety glass minimum 4 mm thickness, or glass blocks with no restriction on glazing methods.

NOTE: Where double glazed units are used the above requirements apply to the external face of the window assembly only.

- (iv) Where glazing is other than that specified in Item (iii) above, annealed glass may be used.
- (v) The openable portions of windows shall be screened internally or externally with screens that comply with Clause 5.5.1A.

5.5.3 Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

- (a) Doors and door frames shall be protected by bushfire shutters that comply with Clause 5.5.1.
- òr
- (b) Doors and door frames shall be protected externally by screens that comply with Clause 5.5.1A. or
- (c) Doors and door frames shall comply with the following:
 - (i) Doors shall be-
 - (A) non-combustible; or
 - (B) a solid timber, laminated timber or reconstituted timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or
 - (C) a door, including a hollow core door, with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or
 - (D) a door, including a hollow core door, protected externally by a screen that complies with Clause 5.5.1A; or
 - (E) a fully framed glazed door, where the framing is made from materials specified for bushfire shutters (see Clause 5.5.1), or from a timber species as specified in Paragraph E2, Appendix E.
 - (ii) Where doors incorporate glazing, the glazing shall comply with the glazing requirements for windows.
 - (iii) Doors shall be tight-fitting to the door frame and to an abutting door, if applicable.
 - (iv) Where any part of the door frame is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the door (see Figure D3, Appendix D), that part of the door frame shall be made from:
 - (A) Bushfire-resisting timber (see Appendix F). or
 - (B) A timber species as specified in Paragraph E2, Appendix E. or
 - (C) Metal. Or

- (D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the door assembly shall satisfy the design load, performance and structural strength of the member.
- (v) Weather strips, draught excluders or draught seals shall be installed at the base of sidehung external doors.

5.5.4 Doors—Sliding doors

Sliding doors shall comply with one of the following:

- (a) They shall be completely protected by a bushfire shutter that complies with Clause 5.5.1.
- or
- (b) They shall be completely protected externally by screens that comply with Clause 5.5.1A.
- or(c) They shall comply with the following:
 - (i) Any glazing incorporated in sliding doors shall be Grade A safety glass complying with AS 1288.
 - (ii) Both the door frame supporting the sliding door and the framing surrounding any glazing shall be made from:
 - (A) Bushfire-resisting timber (see Appendix F). or
 - (B) A timber species as specified in Paragraph E2, Appendix E. or
 - (C) Metal. or
 - (D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the frame and the sash shall satisfy the design load, performance and structural strength of the member.
 - (iii) There is no requirement to screen the openable part of the sliding door. However, if screened, the screens shall comply with Clause 5.5.1A.

NOTE: The construction of manufactured sliding doors should prevent the entry of embers when the door is closed. There is no requirement to provide screens to the openable part of these doors as it is assumed that a sliding door will be closed if occupants are not present during a bushfire event. Screens of materials other than those specified may not resist ember attack.

(iv) Sliding doors shall be tight-fitting in the frames.

5.5.5 Doors—Vehicle access doors (garage doors)

The following apply to vehicle access doors:

- (a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from—
 - (i) non-combustible material; or
 - (ii) bushfire-resisting timber (see Appendix F); or
 - (iii) fibre-cement sheet, a minimum of 6 mm in thickness; or
 - (iv) a timber species as specified in Paragraph E1, Appendix E; or
 - (v) a combination of any of Items (i), (ii), (iii) or (iv) above.
- (b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.
- (c) Roller doors shall have guide tracks with a maximum gap no greater than 3 mm and shall be fitted with a nylon brush that is in contact with the door (see Figure D4, Appendix D).
- (d) Vehicle access doors shall not include ventilation slots.

5.6 ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)

5.6.1 General

The following apply to all types of roofs and roofing systems:

- (a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.
- (b) The roof/wall junction shall be sealed, to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.
- (c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

NSW RURAL FIRE SERVICE VARIATION

Any sarking used shall be:

- (a) Non-combustible; or
- (b) Breather-type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS1530.2) and sarked on the outside of the frame; or
- (c) An insulation material conforming to the appropriate Australian Standard for that material.

5.6.2 Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall—

- (a) be located on top of the roof framing, except that the roof battens may be fixed above the sarking;
- (b) cover the entire roof area including ridges and hips; and
- (c) extend into gutters and valleys.

5.6.3 Sheet roofs

Sheet roofs shall—

- (a) be fully sarked in accordance with Clause 5.6.2, except that foil-backed insulation blankets may be installed over the battens; and
- (b) have any gaps greater than 3 mm (such as under corrugations or ribs of sheet roofing and between roof components) sealed at the fascia or wall line and at valleys, hips and ridges by—
 - (i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or
 - (ii) mineral wool; or
 - (iii) other non-combustible material; or
 - (iv) a combination of any of Items (i), (ii) or (iii) above.

5.6.4 Veranda, carport and awning roofs

The following apply to veranda, carport and awning roofs:

- (a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 5.6.1, 5.6.2, 5.6.3, 5.6.5 and 5.6.6.
- (b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] complying with Clause 5.4 shall have a non-combustible roof covering.

NOTE: There is no requirement to line the underside of a veranda, carport or awning roof that is separated from the main roof space.

5.6.5 Roof penetrations

The following apply to roof penetrations:

- (a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors, shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to seal the penetration shall be non-combustible.
- (b) Openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium. This requirement does not apply to the exhaust flues of heating or cooking devices with closed combustion chambers. In the case of gas appliance flues, ember guards shall not be fitted.

NOTE: Gasfitters are required to provide a metal flue pipe above the roof and terminate with a certified gas flue cowl complying with AS 4566. Advice may be obtained from State gas technical regulators.

- (c) All overhead glazing shall be Grade A safety glass complying with AS 1288.
- (d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass minimum 4 mm thickness, shall be used in the outer pane of the IGU.
- (e) Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a flammability index no greater than 5.
- (f) Evaporative cooling units shall be fitted with non-combustible butterfly closers as close as practicable to the roof level or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.
- (g) Vent pipes made from PVC are permitted.

5.6.6 Eaves linings, fascias and gables

The following apply to eaves linings, fascias and gables:

- (a) Gables shall comply with Clause 5.4.
- (b) Eaves penetrations shall be protected the same as for roof penetrations, as specified in Clause 5.6.5.
- (c) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of noncombustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

This Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

5.6.7 Gutters and downpipes

This Standard does not provide requirements for—

- (a) gutters, with the exception of box gutters; and
- (b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible. Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

5.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

5.7.1 General

Decking may be spaced.

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

C5.7.1 Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0–5 mm during service. The preferred dimension for gaps is 3 mm (which is in line with other 'permissible gaps') in other parts of this Standard.

It should be noted that recent research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacings of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.

5.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings

5.7.2.1 Materials to enclose a subfloor space

NSW RURAL FIRE SERVICE VARIATION

The subfloor spaces of verandas, decks, steps, ramps and landings are considered to be 'enclosed' when —

- (a) the material used to enclose the subfloor space complies with **(Clause 5.4 as appropriate)**; and
- (b) all openings greater than 3 mm are screened with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

5.7.2.2 Supports

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

5.7.2.3 Framing

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

5.7.2.4 Decking, stair treads and the trafficable surfaces of ramps and landings

NSW RURAL FIRE SERVICE VARIATION

Decking, stair treads and the trafficable surfaces of ramps and landings shall be-

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

5.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings

5.7.3.1 Supports

NSW RURAL FIRE SERVICE VARIATION

Support posts, columns, stumps, stringers, piers and poles shall be-

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

5.7.3.2 Framing

NSW RURAL FIRE SERVICE VARIATION

Framing of verandas, decks, ramps or landings (i.e., bearers and joists) shall be-

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

5.7.3.3 Decking, stair treads and the trafficable surfaces of ramps and landings

NSW RURAL FIRE SERVICE VARIATION

Decking, stair treads and the trafficable surfaces of ramps and landings shall be-

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

5.7.4 Balustrades, handrails or other barriers

NSW RURAL FIRE SERVICE VARIATION

Those parts of the handrails and balustrades less than 125 mm from any glazing or any combustible wall shall be—

- (a) of non-combustible material; or
- (b) bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (i) and (ii) above.

Those parts of the handrails and balustrades that are 125 mm or more from the building have no requirements.

5.8 WATER AND GAS SUPPLY PIPES

Above-ground, exposed water and gas supply pipes shall be metal.

APPENDIX E

E1 General construction

Timber with a density of 750 kg/m3 or greater at a 12 percent moisture content is suitable for construction where specified in Sections 5 and 6 of AS3959 - 2009. Examples of suitable timber species are listed in Table E1. Densities of timber species not listed in Table E1 may be found in AS 1720.2.

TABLE E1

TIMBER SPECIES WITH A DENSITY OF 750 kg/m3 OR GREATER

Standard trade name	Botanical name
Ash, Crow's	Flindersia australis
Ash, silvertop	Eucalyptus sieberi
Balau (selangan batu)	Shorea spp.
Bangkirai	Shorea laevifolia
Belian	Eusideroxylon zwageri
Blackbutt	Eucalyptus pilularis
Blackbutt, New England	Eucalyptus andrewsii
	Eucalyptus
	campanulata
Box, brush	Lophostemon
	confertus
Box, grey	Eucalyptus microcarpa
Box, grey, coast	Eucalyptus bosistoana
Box, white-topped	Eucalyptus
	quadrangulata
Box, yellow	Eucalyptus melliodora
Brownbarrel	Eucalyptus fastigata
Candlebark	Eucalyptus rubida
Gum, blue, southern	Eucalyptus globulus
Gum, blue, Sydney	Eucalyptus saligna
Gum, grey	Eucalyptus propinqua
Gum, grey, mountain	Eucalyptus
	cypellocarpa
Gum, Maiden's	Eucalyptus maidenii
Gum, manna	Eucalyptus viminalis
Gum, red, forest	Eucalyptus tereticornis
Gum, red, river	Eucalyptus
	camaldulensis
Gum, rose	Eucalyptus grandis
Gum, spotted	Corymbia maculata
	Corymbia henryi
	Corymbia citriodora
Gum, sugar	Eucalyptus cladocalyx
Hardwood, Johnstone	Backhousia bancroftii
River	
Ironbark, grey	Eucalyptus paniculate
Ironbark, red	Eucalyptus sideroxylon
Jarrah	Eucalyptus marginata

Standard trade name	Botanical name
Kapur	Dryobalanops spp.
Karri	Eucalyptus diversicolor
Kempas	Koompassia
	malaccensis
Keruing	Dipterocarpus spp.
Kwila (Merbau)	Intsia bijuga
Mahogany red	Eucalyptus resinifera
Mahogany, southern	Eucalyptus botryoides
Mahogany, white	Eucalyptus
	acmenoides
Messmate	Eucalyptus obliqua
Messmate, Gympie	Eucalyptus cloeziana
Northern Box (Pelawan)	Tristaniopsis spp.
Oak, American	Quercus spp.
Peppermint, narrow-	Eucalyptus australiana
leaved	
Satinay	Syncarpia hillii
Stringybark, Blackdown	Eucalyptus
	sphaerocarpa
Stringybark, blue-leaved	Eucalyptus
	agglomerata
Stringybark, brown	Eucalyptus baxteri
Stringybark, silvertop	Eucalyptus laevopinea
Stringybark, white	Eucalyptus
	eugenioides
Stringybark, yellow	Eucalyptus muelleriana
Tallowwood	Eucalyptus microcorys
Turpentine	Syncarpia glomulifera
Woollvbutt	Eucalvotus longifolia

E2 Windows and doors

Timber species with a density of 650 kg/m3 or greater at a 12 percent moisture content is suitable for window joinery, door frames and the framing surrounding any glazing where specified in Sections 5 and 6. Examples of suitable timber species are listed in Table E2. Densities of timber species not listed in Table E2 may be found in AS 1720.2.

TABLE E2

SOME TIMBER SPECIES WITH A DENSITY OF 650 kg/m3 OR GREATER

Standard trade name	Betenied nome
Standard trade name	Botanical name
Ash, alpine	Eucalyptus
	delegatensis
Ash, Crow's	Flindersia australis
Ash, mountain	Eucalyptus regnans
Ash, silvertop	Eucalyptus sieberi
Balau (selangan batu)	Shorea spp.
Bangkirai	Shorea laevifolia
Beech, myrtle	Nothofagus
	cunninghamii
Belian	Eusideroxylon zwageri
Blackbutt	Eucalyptus pilularis
Blackbutt, New England	Eucalyptus andrewsii
g	Eucalyptus
	campanulata
Blackwood	Acacia melanoxylon
Box brush	Lophostemon
	confertus
Box grey	Eucalyptus microcarpa
Box, grey	Eucalyptus microcarpa
Box, grey, coast	Eucalyptus bosistoaria
Box, white-topped	Eucalypius
Dev vellew	
Box, yellow	Eucalyptus melliodora
Brownbarrel	Eucalyptus fastigata
Candlebark	Eucalyptus rubida
Cypress	Callitris glaucophylla
Gum, blue, southern	Eucalyptus globulus
Gum, blue, Sydney	Eucalyptus saligna
Gum, grey	Eucalyptus propinqua
Gum, grey, mountain	Eucalyptus
	cypellocarpa
Gum, Maiden's	Eucalyptus maidenii
Gum, manna	Eucalyptus viminalis
Gum, mountain	Eucalyptus
	dalrympleana
Gum, red, forest	Eucalyptus tereticornis
Gum, red, river	Eucalyptus
	camaldulensis
Gum, rose	Eucalyptus grandis
Gum, shinning	Eucalyptus nitens
Gum, spotted	Corvmbia maculata
	Corvmbia henryi
	Corymbia citriodora
Gum sugar	Eucalyptus cladocalyy
Hardwood Johnstone	Backhousia bancroftii
River	
Ironbark grey	Eucalyptus papieulata
nonbaik, yiey	Lucalyplus particulate

Standard trade name	Botanical name
Ironbark, red	Eucalyptus sideroxylon
Jarrah	Eucalyptus marginata
Kapur	Dryobalanops spp.
Karri	Eucalyptus diversicolor
Kempas	Koompassia
	malaccensis
Keruing	Dipterocarpus spp.
Kwila (Merbau)	Intsia bijuga
Mahogany, Philippine	Shorea spp.
red, dark	
Mahogany red	Eucalyptus resinifera
Mahogany, southern	Eucalyptus botryoides
Mahogany, white	Eucalyptus
	acmenoides
Messmate	Eucalyptus obliqua
Messmate, Gympie	Eucalyptus cloeziana
Northern Box (Pelawan)	Tristaniopsis spp.
Oak, American	Quercus spp.
Peppermint, narrow-	Eucalyptus australiana
leaved	
Pine, celery-top	Phyllocladus
	asplenifolius
Pine, slash	Pinus elliottii
Ramin	Gonystylus spp.
Rosewood, New Guinea	Pterocarpus indicus
Satinay	Syncarpia hillii
Stringybark, Blackdown	Eucalyptus
	sphaerocarpa
Stringybark, blue-leaved	Eucalyptus
	agglomerata
Stringybark, brown	Eucalyptus baxteri
Stringybark, silvertop	Eucalyptus laevopinea
Stringybark, white	Eucalyptus
	eugenioides
Stringybark, yellow	Eucalyptus muelleriana
Tallowwood	Eucalyptus microcorys
Taun	Pometia pinnata
Turpentine	Syncarpia glomulifera
Vitex, New Guinea	Vitex cofassus
Woollybutt	Eucalyptus longifolia

APPENDIX F

F1 General

Bushfire resisting timber is timber that is deemed to be acceptable to withstand exposure up to BAL 29 condition.

Timber may be bushfire resisting timber by means of one or more of;

- (a) The inherent properties of the material itself or,
- (b) Being impregnated with fire retardant chemicals or,
- (c) The application of fire retardant coatings or substrates.

APPENDIX H

The following species have been tested and have met the requirements of Paragraph F2 within Appendix F for Bushfire Resisting Timber;

Standard trade name	Botanical name
Ash, silvertop	Eucalyptus sieberi
Blackbutt	Eucalyptus pilularis
Gum, red, river	Eucalyptus
	camaldulensis
Gum, spotted	Corymbia maculata
	Corymbia henryi
	Corymbia citriodora
Ironbark, red	Eucalyptus sideroxylon
Kwila (Merbau)	Intsia bijuga
Turpentine	Syncarpia glomulifera