



BUSHFIRE ATTACK LEVEL

**FOR
FUTURE DWELLINGS**

**AT STAGE 5
BILLY'S LOOKOUT
TERALBA**

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Disclaimer

Notwithstanding the precautions adopted within this report, it should always be remembered that bushfires burn under a wide range of conditions. An element of risk, no matter how small always remains, and although the standard is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion.

Executive Summary

This report provides an assessment of the Bushfire Attack Level (BAL) at Stage 5 within Billy's Lookout, Teralba in accordance with AS3959 (2009) *Construction of Buildings in Bushfire Prone Areas* Appendix A – Method 1 and Appendix B - Detailed Method 2 has been used in this BAL assessment. Method 2 provides for a site specific and accurate determination of the hypothetical radiant heat flux levels a bushfire could be expected to generate under certain environmental conditions.

This report and mapping are not to be used to place wholesale restrictions on lots reflecting the resulting BAL mapping presented within.

This BAL report has shown that any future dwellings within the site will be able to meet the requirements of both AS3959-2009 and the addendum to Appendix 3 of Planning PBP 2006 (NSW Rural Fire Service NSW).



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Disclaimer:

The BALs as depicted within this report and mapping have been determined by management of vegetation to the east where land will be cleared for future stages. It should be noted that conditions may change over time that may result in different BALs for the lots.

Although every care has been taken in the preparation of this BAL Report, McCloy Teralba and the author accept no responsibility in errors in this report or damaged resulting from the information. It should be noted that upon lodgement of a Development Application (DA) with Council or Rural Fires Service they may recommend additional construction requirements (BALs).



Terms & Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419 -2005	Australian Standard – Fire Hydrant Installations
AS3959-2009	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPL Map	Bush Fire Prone Land Map
BPMs	Bush Fire Protection Measures
<i>EPA Act</i>	<i>NSW Environmental Planning and Assessment Act 1979</i>
FDI	Fire Danger Index
FMP	Fuel Management Plan
ha	hectare
IPA	Inner Protection Area
LMCC	Lake Macquarie City Council
LGA	Local Government Area
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection 2006
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation



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I INTRODUCTION

Firebird ecoSultants Pty Ltd has been engaged by Teralba McCloys Pty Ltd to undertake a Bushfire Attack Level (BAL) report for Stage 5 at Billy's Lookout, Teralba hereafter referred to as the "site". Refer to Appendix A for Sales Plan.

This BAL report assess the application of Australian Standard AS3959-2009 'Construction of Buildings on Bushfire Prone Land' and Appendix 3 of Planning for Bushfire Protection 2006 (PBP, 2006). AS3959 (2009) Appendix A – Method 1 has been used in this assessment.

This report has been prepared to provide guidance to prospective purchasers of what Bushfire Attack Levels (BALs) may be required for future dwellings within the site.

I.1 Site Particulars

Locality:	Stage 5 at Billy's Lookout, Teralba
LGA:	Lake Macquarie City Council (LMCC)
Forest Danger Index:	100
Current Land Use:	Approved subdivision



2 METHODOLOGY

The Australian Standard for assessing the BAL and providing the detailed requirements for construction has been reviewed and amended with the latest version being adopted for use in bushfire prone areas of NSW in May 2010. This version is titled AS 3959-2009 'Construction of Buildings in Bushfire Prone Areas' (standards Australia 2009, incorporating amendment 1 (November 2009) and amendment 2 (February 2011), with amendment 2 being used in this assessment.

In addition, the NSW method of determining the bushfire attack level, found in Appendix 3 of the document 'Planning for Bushfire Protection 2006' (NSW Rural Fire Service 2006) has also been reviewed and amended to come into line with the process within AS 3959. Therefore, in NSW the methodology with AS 3959 is to be used to determine the bushfire attack level.

Both AS3959 (2009) Appendix A – Method 1 and Appendix B - Detailed Method 2 has been used in this BAL assessment. Method 2 provides for a site specific and accurate determination of the hypothetical radiant heat flux levels a bushfire could be expected to generate under certain environmental conditions. Refer to Appendix D for Calculations.

2.1 Vegetation Assessment

Vegetation surveys and vegetation mapping carried out on the site has been undertaken as follows:

- Aerial Photograph Interpretation to map vegetation cover and extent.
- Confirmation of the vegetation assemblage typology present via a site inspection.

2.2 Slope Assessment

Slope assessment has been undertaken as follows:

- Aerial Photograph Interpretation in conjunction with analysis of electronic contour maps with a contour interval of 10m.
- On site confirmation of slope measurements.



3 SITE ASSESSMENT

A site inspection was undertaken on the site. The following assessment has been undertaken in accordance with the requirements of PBP (RFS, 2006) and AS3959-2009.

3.1 Vegetation and Slope Assessment

An assessment of the slope affecting the bushfire behaviour was undertaken for a distance of 100m from the edge of the lot boundaries in the direction of the bushfire hazard. The slopes leading away from the site have been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site. Refer to Table 1 for Vegetation and Slope Assessment.

Table 1 –Vegetation & Slope Assessment

Direction from Site	Vegetation Classification	Effective Slope
North-east	Remnant Vegetation associated with a drainage line with a fire run less than 50m directly towards any future dwelling therefore classified as Rainforest vegetation in accordance with pg 52 of PBP	Downslope 0 – 5 degrees
North	Open Forest	Upslope >11 degrees
East	Managed Land as an APZ for a distance of > 100m until such time that development occurs	N/A
South	Managed Land as an APZ for a distance of > 47m until such time that development occurs followed by Open Forest / Woodland	Downslope 0 – 5 degrees
West	Managed Land as an APZ for a distance of > 47m until such time that development occurs Open Forest / Woodland	Upslope



4 BUSHFIRE ATTACK ASSESSMENT

4.1 Bushfire Attack Assessment

To determine the bush fire attack and required Bushfire Attack Level (BAL) for the proposed subdivision the following steps were followed:

1. Determination of the vegetation types within 100m of the site, as assessed in section 3 of this report.
2. Determination of the distance between the vegetation and future dwellings has been assessed in section 4.2 of this report.
3. Determination of the effective slope as assessed in section 3 of this report.
4. A FDI of 100 was determined for LMCC LGA.

4.2 Determination of Bushfire Attack Levels

The results from the above steps were used to calculate the required BAL in accordance with both Method 1 and Method 2 of AS 3959 – 2009. Method 2 provides for a site specific and accurate determination of the hypothetical radiant heat flux levels a bushfire could be expected to generate under certain environmental conditions. Assessment Method 2 is an approved methodology for bushfire risk assessment as per AS3959 – 2009.

The results from this bush fire attack assessment are detailed below in Table 4-1– Bushfire Attack Level (BAL) Assessment and Figure 4-1 Bushfire Attack Level Map.

Table 4-1: Bushfire Attack Level Assessment

Vegetation Type within 100m & Direction from future dwellings	Average Slope of Land (degrees)	Separation Distance from Identified Vegetation	Bushfire Attack Level (BAL)	Construction Section	Method in accordance with AS3959-2009
Rainforest to the north-east	Downslope 0 – 5 degrees	14–<20	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	AS3959 (2009) Appendix A – Method 1
		20–<29	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	

Vegetation Type within 100m & Direction from future dwellings	Average Slope of Land (degrees)	Separation Distance from Identified Vegetation	Bushfire Attack Level (BAL)	Construction Section	Method in accordance with AS3959-2009
		29-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	
Open Forest to north	Upslope >11 degrees	15-<22	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	AS3959 (2009) <u>Appendix B - Detailed Method 2</u> Refer to Appendix D for Bushfire Attack Calculations
		23-<31	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	
		32-<69	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	
Open Forest to the south	Downslope 0 – 5 degrees	>47m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	AS3959 (2009) Appendix A – Method 1
Open Forest to the west	upslope	>47m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3	AS3959 (2009) Appendix A – Method 1

*To Note: The construction requirements for the next lower BAL than that determined for the site may be applied to an elevation of the building where the elevation is not exposed to the source of the bushfire attack. An elevation is deemed to be not exposed to the source of bushfire attack if all the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the building. However, this does not apply to BAL-12.

No BALs applies to any future dwelling built greater than 100m from vegetation determined as a bushfire hazard.



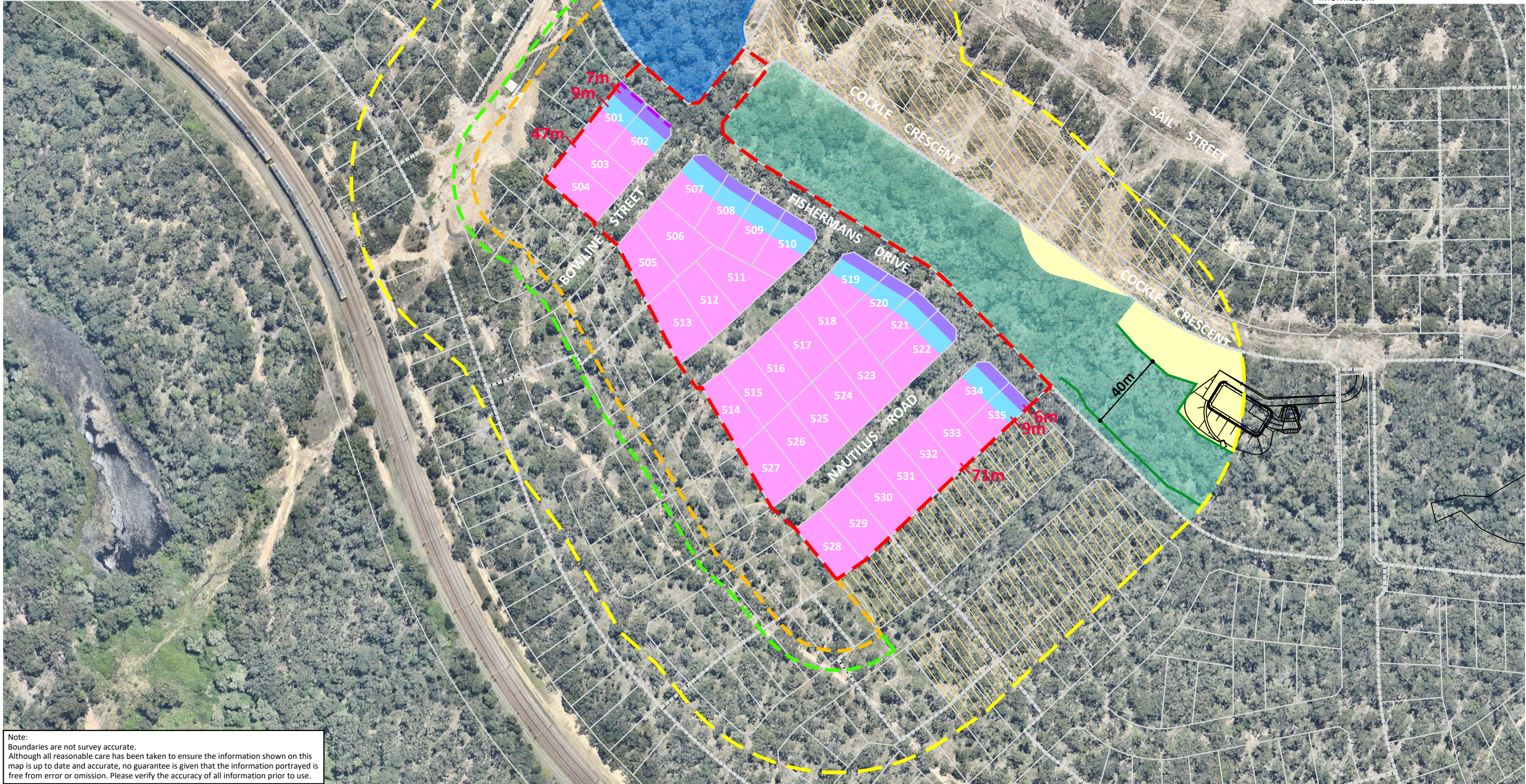
This report and mapping are not to be used to place wholesale restrictions on lots reflecting the resulting BAL mapping presented within. Building location and design will influence the application of the required BALs. For example, a lot indicated as being affected by BAL-29 may have those facades that are not exposed to the bushfire threat constructed to a lower BAL (i.e. BAL-19), reducing the costs of construction and providing more flexibility in choice of external building materials. Refer to Appendix B for Summary of AS3959-2009 Construction Standards and Appendix C for Additional Building Requirements. For further information please refer to the Document Construction of Buildings in Bushfire Prone Areas AS3959-2009.

Legend

- Stage 5
- 100m Buffer
- APZ
- 37m IPA
- 10m OPA
- Open Forest
- Rainforest Vegetation
- Cleared Land
- Land to be managed as APZ until development occurs

- BAL 40
- BAL 29
- BAL 19
- BAL 12.5

Disclaimer
 The BALS as depicted on this map have been determined by vegetation within 100m of Stage 5 at the time of the assessment in October 2016. It should be noted that conditions may change over time, that may result in different BALS for the site. Although every care has been taken in the preparation of this map the authors accept no responsibility for any misprints, errors, omissions, inaccuracies in these maps or damages resulting from the use of this information.

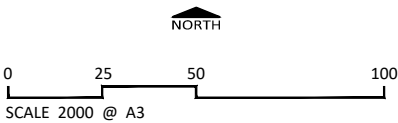


Note:
 Boundaries are not survey accurate. Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 4-1:BUSHFIRE ATTACK LEVELS MAP

CLIENT
 SITE DETAILS
 DATE

McCloys Pty Ltd
 Stage 5 Pitt Street & Myrtle Street Teralba
 25 October 2016



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5 CONCLUSION

This report provides an assessment of the Bushfire Attack Level (BAL) in accordance with AS3959-2009 Construction of Buildings in Bushfire Prone Areas for Stage 5 at Billy's Lookout, Teralba. This BAL report assesses the application of Australian Standard AS3959-2009 'Construction of Buildings in Bushfire Prone Land' and Appendix 3 of Planning for Bushfire Protection 2006 (PBP, 2006).

This report and mapping are not to be used to place wholesale restrictions on lots reflecting the resulting BAL mapping presented within. Future development of surrounding stages may result in lower BALs than detailed in this report.

This BAL report has shown that any future dwellings within the site will be able to meet the requirements of both AS3959-2009 and the addendum to Appendix 3 of Planning PBP 2006 (NSW Rural Fire Service NSW).



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Disclaimer:

The BALs as depicted within this report and mapping have been determined by vegetation within 100m of Stage 5 at the time of the assessment September 2016. It should be noted that conditions may change over time that may result in different BALs for the lots.



6 BIBLIOGRAPHY

NSW Rural Fire Service (RFS) 2006. Planning for Bushfire Protection: A guide for Councils, Planners, Fire Authorities, Developers and Home Owners. Australian Government Publishing Service, Canberra.

Standards Australia. 2009. Construction of buildings in bushfire-prone Areas, AS3959, Third Edition 2009, Incorporating Amendment 1, Standards Australia International Ltd Sydney



APPENDIX A SALE PLAN



APPENDIX B SUMMARY OF AS3959-2009 CONSTRUCTION REQUIREMENTS

TABLE F8.2

CONSTRUCTION REQUIREMENTS FOR BAL – LOW, BAL – 12.5, BAL – 19, BAL – 29, BAL – 40 AND BAL – FZ SITES

FLOORING SYSTEMS	
1. BAL – Low	
A flooring system must comply with one or a combination of the following:	
<ul style="list-style-type: none"> (a) A concrete slab-on-ground. (b) A suspended concrete floor. (c) A framed floor where, if the underside is greater than 600mm above finished ground or paving level, the sub-floor space is enclosed with – <ul style="list-style-type: none"> (i) a <i>non-combustible</i> sheet material. If fibre-cement sheets are used for this purpose, the sheets must have a minimum thickness of 6mm; or (ii) a wall that extends around the perimeter of the floor from the underside of the lowest framing member to finished ground or paving level and is constructed of one or a combination of the following: <ul style="list-style-type: none"> (aa) a <i>non-combustible</i> material, such as full masonry, brick veneer, mud brick, concrete or aerated concrete. (bb) a timber or steel-framed wall that is sarked on the outside of the frame with <i>sarking-type-material</i> having a <i>flammability index</i> of not more than 5, and clad with – <ul style="list-style-type: none"> (A) fibre-cement external sheeting with a minimum thickness of 6mm; or (B) steel sheet; or (C) bushfire-resisting-timber; or (D) a combination of (A), (B) or (C). (cc) a combination of (aa) and (bb). (iii) a vertical <i>non-combustible</i> sheet material that extends around the perimeter of the floor from the underside of the lowest framing member to finished ground or paving level. If fibre-cement sheets are used for this purpose, the sheets must have a minimum thickness of 6mm. (d) a framed floor where, if any joist and/or bearer is less than 600mm above finished ground or paving level, the sub-floor space is – <ul style="list-style-type: none"> (i) if unenclosed, constructed from flooring material, including bearers, joists and flooring that is – <ul style="list-style-type: none"> (A) non-combustible; or (B) bushfire-resisting-timber; or (C) particleboard or plywood flooring where the underside is lined with <i>sarking-type-material</i> or mineral wool insulation; or (D) a system complying with AS 1530.8.1; or (E) a combination of (A), (B), (C) or (D). (ii) enclosed with a wall complying with (c)(ii). (iii) enclosed with a mesh or perforated sheet made from corrosion-resistant steel, bronze or aluminium with a maximum aperture size of 2mm. (iv) enclosed with <i>non-combustible</i> sheet material that extends not less than 400mm above finished ground or paving level and to the bottom of the wall sheeting material. If fibre reinforced cement sheets are used for this purpose, the sheets must have a minimum thickness of 6mm. Refer Figure F8.2.1 	
A flooring system complying with (c) or (d) must have all joints in the external surface of walls covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3mm. Alternatively, <i>sarking-type-material</i> can be applied over the frame prior to fixing any external sheeting.	
2. BAL - 12.5	
As per the BAL – Low requirements of this table	
3. BAL – 19	
As per the BAL – Low requirements of this table	
4. BAL – 29	
As per the BAL – Low requirements of this table	
5. BAL – 40	
As per the BAL – Low requirements of this table with the following variation –	
A framed floor where the sub-floor space is unenclosed, must be constructed from flooring materials, including bearers, joists and flooring that are –	
<ul style="list-style-type: none"> (i) <i>non-combustible</i>; or (ii) have the underside of the combustible elements of the floor system protected with a <i>non-combustible</i> material; or (iii) a system complying with AS 1530.8.1; or (iv) a combination of (i), (ii) or (iii). 	

6. BAL – FZ
As per the BAL – Low requirements of this table with the following variation – A framed floor where the sub-floor space is unenclosed, must be constructed from flooring materials, including bearers, joists and flooring that – <ul style="list-style-type: none"> (i) have an FRL of at least 30/30/30 and the surface material must be non-combustible; or (ii) have the underside of the combustible elements of the floor system protected with a 30 minute resistance to the incipient spread of fire; or (iii) comply with AS 1530.8.2 when tested from the underside; or (iv) a combination of (i), (ii) or (iii).
SUPPORTING POSTS, COLUMNS, STUMPS, PIERS AND POLES
1. BAL – Low
Supporting posts, columns, stumps, piers and poles must comply with one or a combination of the following: <ul style="list-style-type: none"> (a) A non-combustible material. (b) A bushfire-resisting-timber for not less than 400mm above finished ground or paving level. (c) Timber mounted on metal stirrups with a clearance of not less than 75mm above finished ground or paving level. Refer Figure F8.2.2
2. BAL – 12.5
As per the BAL – Low requirements of this table
3. BAL – 19
As per the BAL – Low requirements of this table
4. BAL – 29
Supporting posts, columns, stumps, piers and poles must comply with one or a combination of the following: A non-combustible material; or Bushfire-resisting-timber.
5. BAL – 40
Supporting posts, columns, stumps, piers and poles must comply with one or a combination of the following: <ul style="list-style-type: none"> (a) A non-combustible material; or (b) A system complying with AS 1530.8.1.
6. BAL – FZ
Supporting posts, columns, stumps, piers and poles must comply with one or a combination of the following: <ul style="list-style-type: none"> (a) Have an FRL of at least 30/-/- and must be non-combustible; or (b) A system complying with AS 1530.8.2.
EXTERNAL WALLS
1. BAL – Low
No requirements
2. BAL- 12.5
External walls must comply with one or a combination of the following: <ul style="list-style-type: none"> (a) A non-combustible material such as full masonry, brick veneer, mud brick, concrete or aerated concrete. (b) A timber or steel-framed wall that – <ul style="list-style-type: none"> (i) is sarked on the outside of the frame with sarking-type-material having a flammability index of not more than 5; and (ii) clad within 400mm of finished ground or paving level, or any balcony or deck with solid flooring with – <ul style="list-style-type: none"> (A) non-combustible material; or (B) steel sheet; or (C) fibre-cement external sheeting with a minimum thickness of 6mm; or (D) bushfire-resisting-timber; or (E) a combination of (A), (B), (C) or (D). <p>All joints in the external surface of walls must be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3mm. Alternatively, sarking-type-material can be applied over the frame prior to fixing any external sheeting.</p>
3. BAL- 19
As per the BAL – 12.5 requirements of this table
4. BAL- 29
As per the BAL – 12.5 requirements of this table with the following variation – <ul style="list-style-type: none"> (a) All external cladding (less than and greater than 400mm above finished ground or paving level) must comply with (b) (ii)(A), (B), (C), (D) or (E) of the BAL – 12.5 requirements.

5. BAL- 40

As per the **BAL – 12.5** requirements of this table with the following variation –

- (a) All external cladding for timber or steel-framed walls (less than and greater than 400mm above finished ground or paving level) must be -
 - (i) fibre-cement sheeting with a minimum thickness of 9mm; or
 - (ii) steel sheet; or
 - (iii) a combination of (i) and (ii).

6. BAL – FZ

External walls must be one or a combination of the following:

- (a) A *non-combustible* material such as full masonry, brick veneer, mud brick, concrete or aerated concrete with a minimum thickness of 90mm.
- (b) A system complying with AS 1530.8.2 when tested from the outside.
- (c) A system with an FRL of 30/30/30 or -/30/30 when tested from the outside.

WINDOWS

1. BAL – Low

No requirements

2. BAL- 12.5

Window assemblies, and shutters and screens, must comply with one or a combination of the following:

- (a) *Window* assemblies must be completely protected by a bushfire shutter that complies with **F8.2(g)** and is made from -
 - (i) a *non-combustible* material; or
 - (ii) bushfire-resisting-timber; or
 - (iii) a combination of (i) and (ii).
- (b) *Window* assemblies must be completely protected externally by screens complying with F8.2(h).
- (c) *Window* assemblies must comply with the following –
 - (i) For *window* assemblies less than 400mm from the ground or less than 400mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110mm in width from the *window* frame, *window* frames and *window* joinery must be one of the following:
 - (A) bushfire-resisting-timber; or
 - (B) metal; or
 - (C) metal-reinforced PVC-U. The reinforcing members must be made from aluminium, stainless steel or corrosion-resistant steel and the frame and sash must 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 must be metal.
 - (iii) Where glazing is less than 400mm from the ground or less than 400mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110mm in width from the *window* frame, the glazing must be Grade A safety glazing with a minimum thickness of 4mm or glass blocks with no restriction on glazing methods.

Note: Where double glazing is used, the above requirements apply to the external face of the window assembly only.

- (iv) Where glazing is other than that specified in (iii) above, annealed glass may be used.
- (v) The openable portions of *windows* must be screened internally or externally with screens that comply with **F8.2(h)**.

3. BAL- 19

As per the **BAL – 12.5** requirements of this table with the following variations –

- (a) Where glazing is less than 400mm from the ground or less than 400mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110mm in width from the *window* frame, the glazing must be toughened glass with a minimum thickness of 5mm, or glass blocks with no restriction on glazing methods.

Note: Where double glazing is used, the above requirements apply to the external face of the window assembly only.

- (b) Where glazing is other than that specified in (iii) above, annealed glass may be used. Where annealed glass is used, the fixed and openable portions of *windows* must be screened externally with screens that comply with the **F8.2(h)**, with the exception that aluminium mesh must not be used in the window screens.
- (c) Where leadlight *windows* are installed, they must be protected with *non-combustible* shutters or toughened glass.
- (d) Where toughened glass is used, it must have a minimum thickness of 5mm and the openable portions of the *windows* must be screened internally or externally with screens that comply with the **F8.2(h)**.
- (e) Glazed elements that are designed to take internal screens must use toughened glass with a minimum thickness of 5mm and the openable portion must be screened with screens that comply with the **F8.2(h)**.

4. BAL- 29

Window assemblies, and shutters and screens, must comply with one or a combination of the following:

- (a) Window assemblies must be completely protected by a bushfire shutter that complies with F8.2(g) and is made from -
 - (i) a non-combustible material; or
 - (ii) bushfire-resisting-timber; or
 - (iii) a combination of (i) and (ii).
- (b) Window assemblies must comply with the following:
 - (i) Window frames and window joinery must be made from one of the following:
 - (A) bushfire-resisting-timber; or
 - (B) metal; or
 - (C) metal-reinforced PVC-U. The reinforcing members must be made from aluminium, stainless steel or corrosion-resistant steel and the frame and sash must 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 must be metal.
 - (iii) Glazing must be toughened glass with a minimum thickness of 5mm.
 - (iv) The openable portion of windows must be screened internally or externally with screens that comply with F8.2(h), with the exception that aluminium mesh must not be used in the window screens.

5. BAL- 40

Window assemblies, and shutters and screens, must comply with one or a combination of the following:

- (a) Window assemblies must be completely protected by a bushfire shutter that complies with F8.2(g) and is made from a non-combustible material.
- (b) Window assemblies must comply with the following:
 - (i) Window frames and hardware must be metal; and
 - (ii) Glazing must be toughened glass with a minimum thickness of 6mm; and
 - (iii) Both the openable and the fixed portions of the window must be screened externally with screens that comply with F8.2(h), with the exception that aluminium mesh must not be used in the window screens and the frame supporting the mesh or perforated sheet must be metal
 - (iv) Seals to stiles, heads and sills or thresholds must be manufactured from materials having a flammability index of not more than 5 or from silicone.

6. BAL – FZ

Window assemblies, and shutters and screens, must comply with one or a combination of the following:

- (a) Window assemblies must be completely protected by a bushfire shutter that complies with F8.2(g), with the exception that perforations are not acceptable over the door system, and AS 1530.8.2 when tested from the outside.
- (b) The openable portion of the window must be screened internally or externally with screens that comply with F8.2(i), with the exception that aluminium mesh must not be used in the window screens and the frame supporting the mesh or perforated sheet must be metal, and either –
 - (i) the window system must have an FRL of at least -/30/-; or
 - (ii) the window system must comply with AS 1530.8.2 when tested from the outside.

EXTERNAL DOORS

(including side-hung external doors such as French doors, panel fold and bi-fold doors, sliding doors and garage doors)

1. BAL – Low

No requirements

2. BAL - 12.5

SIDE HUNG DOORS

Side-hung external doors must comply with one or a combination of the following:

- (a) They must be completely protected by a bushfire shutter that complies with **F8.2(g)** and is made from -
 - (i) non-*combustible* material; or
 - (ii) bushfire-resisting-timber; or
 - (iii) a combination of (i) and (ii).
- (b) They must be completely protected externally by screens complying with **F8.2(h)**.
- (c) They must comply with the following –
 - (i) Doors must be -
 - (A) non-*combustible*; or
 - (B) a solid timber door with a minimum thickness of 35mm for the first 400mm above the threshold; or
 - (C) a door, including a hollow core door, with a non-*combustible* kick-plate on the outside for the first 400mm above the threshold; or
 - (D) a fully framed glazed door, where the framing is made from materials *required* for bushfire shutters.
 - (ii) Where doors incorporate glazing, the glazing must comply with the glazing requirements for *windows*.
 - (iii) Doors must 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 400mm from the ground or less than 400mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110mm in width from the door, that part of the door frame must be made from one of the following:
 - (A) bushfire-resisting-timber; or
 - (B) metal; or
 - (C) metal-reinforced PVC-U. The reinforcing members must be made from aluminium, stainless steel or corrosion-resistant steel and the frame and sash must satisfy the design load, performance and structural strength of the member.
 - (v) Weather strips, draught excluders or draught seals must be installed at the base of side-hung external doors.

SLIDING DOORS

Sliding doors must comply with one or a combination of the following:

- (a) They must be completely protected by a bushfire shutter that complies with **F8.2(g)** and is made from -
 - (i) non-*combustible* material; or
 - (ii) bushfire-resisting-timber; or
 - (iii) a combination of (i) and (ii).
- (b) They must be completely protected externally by screens complying with **F8.2(h)**.
- (c) They must comply with the following –
 - (i) Any glazing incorporated in sliding doors must be Grade A safety glass complying with AS 1288.
 - (ii) Both the door frame supporting the sliding door and the framing surrounding any glazing must be –
 - (A) bushfire-resisting-timber; or
 - (B) metal; or
 - (C) metal-reinforced PVC-U. The reinforcing members must be made from aluminium, stainless steel or corrosion-resistant steel and the frame and sash must satisfy the design load, performance and structural strength of the member.
 - (iii) If the openable part of the sliding door is screened, the screens must comply with **F8.2(h)**.
 - (iv) Sliding doors must be tight-fitting in the frames.

VEHICLE ACCESS DOORS

Vehicle access doors must comply with the following:

- (a) The portion of the vehicle access door that is within 400mm of the finished ground or paving when the door is closed must be made from -
 - (i) non-*combustible* material; or
 - (ii) bushfire-resisting-timber; or
 - (iii) fibre-cement sheet with a minimum thickness of 6mm; or
 - (iv) a combination of (i), (ii) or (iii).
- (b) Panel lift, tilt doors or side-hung doors must 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 3mm.
- (c) Roller doors must have guide tracks with a maximum gap no greater than 3mm and must be fitted with a nylon brush that is in contact with the door.
- (d) Vehicle access doors must not include ventilation slots.

3. BAL – 19

SIDE HUNG DOORS

As per the **BAL – 12.5** requirements of this table with the following variations –

- (a) Aluminium mesh must not be used in the door screens.
- (b) Where the doors incorporate glazing, the glazing must be toughened glass with a minimum thickness of 5mm.

SLIDING DOORS

As per the **BAL – 12.5** requirements of this table with the following variations –

- (a) Aluminium mesh must not be used in the door screens.
- (b) Any glazing incorporated in sliding doors must be toughened glass with a minimum thickness of 5mm.

VEHICLE ACCESS DOORS

Vehicle access doors must comply with the **BAL – 12.5** requirements of this table.

4. BAL – 29

SIDE HUNG DOORS

Side-hung external doors must comply with one or a combination of the following:

- (a) They must be completely protected by a bushfire shutter that complies with **F8.2(g)** and is *non-combustible*.
- (b) They must be completely protected externally by screens complying with **F8.2(h)**, with the exception that aluminium mesh must not be used in the door screens.
- (c) They must comply with the following –
 - (i) Doors must be –
 - (A) *non-combustible*; or
 - (B) a solid-core door with a minimum thickness of 35mm
 - (ii) Externally fitted hardware that supports the panel in its functions of opening and closing must be metal.
 - (iii) Where doors incorporate glazing, the glazing must be toughened glass with a minimum thickness of 6mm.
 - (iv) Door frames must be made from one of the following:
 - (A) bushfire-resisting-timber; or
 - (B) metal; or
 - (C) metal-reinforced PVC-U. The reinforcing members must be made from aluminium, stainless steel or corrosion-resistant steel and the frame and sash must satisfy the design load, performance and structural strength of the member.
 - (v) Doors must be tight-fitting to the door frame and to an abutting door, if applicable.
 - (vi) Weather strips, draught excluders or draught seals must be installed at the base of side-hung external doors.

SLIDING DOORS

Sliding doors must comply with one or a combination of the following:

- (a) They must be completely protected by a bushfire shutter that complies with **F8.2(g)** and is made from *non-combustible* material.
- (b) They must be completely protected externally by screens complying with **F8.2(h)**, with the exception that aluminium mesh must not be used in the door screens.
- (c) They must comply with the following:
 - (i) Both the door frame supporting the sliding door and the framing surrounding any glazing must be –
 - (A) bushfire-resisting-timber; or
 - (B) metal; or
 - (C) metal-reinforced PVC-U. The reinforcing members must be made from aluminium, stainless steel or corrosion-resistant steel and the frame and sash must satisfy the design load, performance and structural strength of the member.
 - (ii) Externally fitted hardware that supports the panel in its functions of opening and closing must be metal.
 - (iii) Where doors incorporate glazing, the glazing must be toughened glass with a minimum thickness of 6mm, except where both the fixed and openable portions of doors are screened externally with screens that comply with **F8.2(h)**, with the exception that aluminium mesh must not be used in the door screens.
 - (iv) Sliding doors must be tight-fitting in the frames.

VEHICLE ACCESS DOORS

Vehicle access doors must comply with the **BAL – 12.5** requirements of this table.

5. BAL – 40

SIDE HUNG DOORS

Side hung doors must comply with one or a combination of the following:

- (a) They must be protected by a shutter that complies with **F8.2(g)** and is *non-combustible*.
- (b) They must comply with the following:
 - (i) Doors must be –
 - (A) *non-combustible*; or
 - (B) a solid-core door with a minimum thickness of 35mm.
 - (ii) Externally fitted hardware that supports the panel in its functions of opening and closing must be made of materials that have an FRL of at least -/30/-.
 - (iii) Where doors incorporate glazing, the glazing must be toughened glass with a minimum thickness of 6mm and both the fixed and openable portions of doors must be screened externally with screens that comply with **F8.2(h)**, with the exception that aluminium mesh must not be used in the door screens.
 - (iv) Seals to stiles, heads and sills or threshold must be manufactured from materials with a *flammability index* no greater than 5 or from silicone.
 - (v) Door frames must be metal.
 - (vi) Doors must be tight-fitting to the door frame and to an abutting door, if applicable.
 - (vii) Weather strips, draught excluders or draught seals must be installed at the base of side-hung external doors.

SLIDING DOORS

Sliding doors must be one or a combination of the following:

- (a) They must be protected by a shutter that complies with **F8.2(g)** and is *non-combustible*.
- (b) They must comply with the following:
 - (i) Both the door frame supporting the sliding door and the framing surrounding any glazing must be metal.
 - (ii) Externally fitted hardware that supports the panel in its functions of opening and closing must be metal.
 - (iii) Where sliding doors incorporate glazing, the glazing must be toughened glass with a minimum thickness of 6mm and both the fixed and openable portions of doors must be screened externally with screens that comply with **F8.2(h)**, with the exception that aluminium mesh must not be used in the door screens.
 - (iv) Seals to stiles, heads and sills or threshold must be manufactured from materials with a flammability index no greater than 5 or from silicone.
 - (v) Sliding doors must be tight-fitting in the frames.

VEHICLE ACCESS DOORS

Vehicle access doors must comply with the **BAL – 12.5** requirements of this table with the following variation:

- (a) They must be *non-combustible*.

6. BAL- FZ

SIDE HUNG DOORS

Side hung doors must comply with one or a combination of the following:

- (a) They must be protected by a shutter that complies with **F8.2(g)** with the exception that perforations are not acceptable over the door system, and AS 1530.8.2 when tested from the outside.
- (b) They must comply with the following:
 - (i) All door systems, including door frames and doors with glazed panels, must –
 - (A) have an FRL of at least -/30/-; or
 - (B) comply with AS 1530.8.2 when tested from the outside.
 - (ii) Doors must be tight-fitting to the door frame and to an abutting door, if applicable.
 - (iii) Weather strips, draught excluders or draught seals must be installed at the base of side-hung external doors.
 - (iv) Seals must not compromise the FRL or the performance achieved in AS 1530.4.

SLIDING DOORS

Sliding doors must comply with one or a combination of the following:

- (a) They must be protected by a shutter that complies with **F8.2(g)** with the exception that perforations are not acceptable over the door system, and AS 1530.8.2 when tested from the outside.
- (b) They must comply with the following:
 - (i) All sliding door systems, including those with glazed panels must –
 - (A) have an FRL of at least -/30/-; or
 - (B) comply with AS 1530.8.2 when tested from the outside.
 - (ii) Sliding doors must be tight-fitting in the frames.

VEHICLE ACCESS DOORS

Vehicle access doors must comply with the **BAL – 40** requirements of this table with the following variation -

- (a) Where the garage is attached to the building, the requirements of **F8.2(b)(ii)** must apply.

VENTS AND WEEPHOLES

(including vents and weepholes located in *external walls* and sub-floor spaces)

1. BAL- Low

Vents to sub-floor spaces and weepholes must be fitted with ember guards made from corrosion-resistant steel, bronze or aluminium mesh or perforated sheet with a maximum aperture size of 2mm.

2. BAL – 12.5

As per the **BAL – Low** requirements of this table

3. BAL – 19

As per the **BAL – 12.5** requirements of this table with the following variation –

(a) Aluminium mesh or perforated sheet must not be used for the ember guards.

4. BAL – 29

As per the **BAL – 19** requirements of this table

5. BAL – 40

As per the **BAL – 19** requirements of this table

6. BAL – FZ

As per the **BAL – 19** requirements of this table

ROOFS

(including verandahs and attached carport roofs, eaves linings, fascias, gables)

1. BAL – Low

No requirements

2. BAL - 12.5

Roofs must comply with one or a combination of the following:

- (a) Roof tiles, roof sheets and roof-covering accessories must be *non-combustible*.
- (b) The roof/wall junction must be sealed to prevent openings greater than 3mm, 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. Refer **Figure F8.2.3**
- (c) Roof ventilation openings, such as gable and roof vents, must be fitted with ember guards made from corrosion-resistant steel or bronze mesh or perforated sheet with a maximum aperture of 2mm.
- (d) Tiled roofs must be –
 - (i) fully sarked over the entire roof area, including the ridge. The *sarking-type-material* must have a *flammability index* of not more than 5; and
 - (ii) located directly below the roof battens; and
 - (iii) cover the entire roof area including the ridge; and
 - (iii) installed so that there are no gaps that will allow entry of embers where the *sarking-type-material* meets fascias, gutters, valleys and the like.
- (e) Sheets roofs (metal or fibre-cement sheet) must be –
 - (i) fully sarked in accordance with (d)(i); or
 - (ii) have any gaps greater than 3mm, 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 –
 - (A) corrosion-resistant steel or bronze mesh or perforated sheet with a maximum aperture of 2mm; or
 - (B) mineral wool; or
 - (C) other *non-combustible* material; or
 - (D) a combination of **(A)**, **(B)** or **(C)**.
- (f) A verandah, carport or awning roof –
 - (i) forming part of the main roof space, must meet all the requirements of the main roof.
 - (ii) separated from the main roof space by an *external wall* complying with the **BAL - 12.5** requirements of this table, must have a *non-combustible* roof covering.
- (g) Gables must comply with the **BAL – 12.5** requirements of this table for *external walls*.
- (h) Eaves penetrations must be protected in accordance with the **BAL – 12.5** requirements of this table for roof penetrations.
- (i) Eaves ventilation openings greater than 3mm must be fitted with ember guards made from *non-combustible* material or corrosion-resistant steel or bronze mesh or perforated sheet with a maximum aperture of 2mm.
- (j) Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

3. BAL – 19

As per the **BAL – 12.5** requirements of this table with the following variations –

- (a) Sheet roofs (metal or fibre-cement sheet) must be fully sarked in accordance with (d)(i).
- (b) A verandah, carport or awning roof –
 - (i) forming part of the main roof space, must meet all the requirements of the main roof.
 - (ii) separated from the main roof space by an *external wall* complying with the **BAL – 19** requirements of this table, must have a non-combustible roof covering.
- (c) Gables must comply with the **BAL – 19** requirements of this table for *external walls*.
- (d) Eaves penetrations must be protected in accordance with the **BAL – 19** requirements of this table for roof penetrations.
- (e) Eaves linings must be –
 - (i) fibre-cement sheet, with a minimum thickness of 4.5mm; or
 - (ii) bushfire-resisting timber; or
 - (iii) a combination of (i) and (ii).
- (f) Joining strips in eaves linings, fascias and gables strips must be of bushfire-resisting timber.
- (g) Fascias and bargeboards must be –
 - (i) non-combustible or;
 - (ii) bushfire-resisting timber; or
 - (iii) a combination of (i) and (ii).

4. BAL – 29

As per the **BAL – 19** requirements of this table with the following variations–

- (a) A pipe or conduit that penetrates the roof covering must be non-combustible.
- (b) *Sarking-type-material* installed in tiled roofs must extend into gutters and valleys.
- (c) A verandah, carport or awning roof –
 - (i) forming part of the main roof space, must meet all the requirements of the main roof.
 - (ii) separated from the main roof space by an *external wall* complying with the **BAL – 29** requirements of this table, must have a non-combustible roof covering and the support structure must be –
 - (A) non-combustible material; or
 - (B) bushfire-resisting timber; or
 - (C) timber rafters lined on the underside with fibre-cement sheeting with a minimum thickness of 6mm, or with material complying with AS 1530.8.1; or
 - (D) a combination of (A), (B) or (C).
- (d) Gables must comply with the **BAL – 29** requirements of this table for *external walls*.
- (e) Eaves penetrations must be protected in accordance with the **BAL – 29** requirements of this table for roof penetrations.
- (f) Fibre-reinforced cement or aluminium must not be used for roof sheeting or fascias.
- (g) Aluminium must not be used for eaves linings.

5. BAL – 40

As per the **BAL – 29** requirements of this table with the following variations –

- (a) A verandah, carport or awning roof –
 - (i) forming part of the main roof space, must meet all the requirements of the main roof.
 - (ii) separated from the main roof space by an *external wall* complying with the **BAL – 40** requirements of this table, must have a non-combustible roof covering and the support structure must be –
 - (A) non-combustible material; or
 - (B) timber rafters lined on the underside with fibre-cement sheeting with a minimum thickness of 6mm, or with material complying with AS 1530.8.1; or
 - (C) a system complying with AS 1530.8.1; or
 - (D) a combination of (A), (B) or (C).
- (b) Gables must comply with the **BAL – 40** requirements of this table for *external walls*.
- (c) Fascias and bargeboards must comply with AS 1530.8.1.
- (d) Eaves penetrations must be protected in accordance with the **BAL – 40** requirements of this table for roof penetrations.
- (e) Eaves linings must be –
 - (i) fibre-cement sheet with a minimum 6mm thickness; or
 - (ii) calcium silicate sheet with a minimum 6mm thickness; or
 - (iii) a combination of (i) and (ii).

Note: Roof-mounted evaporative coolers are excluded from the **BAL – 40** level.

6. BAL – FZ

As per the **BAL – 40** requirements of this table with the following variations -

- (a) The roof or roofing system must comply with AS 1530.8.2 when tested from the outside.
- (b) A pipe or conduit that penetrates the roof covering must be metal, excluding aluminium.
- (c) A verandah, carport or awning roof –
 - (i) forming part of the main roof space, must meet all the requirements of the main roof.
 - (ii) separated from the main roof space by an *external wall* complying with the **BAL – FZ** requirements of this table, must have a non-combustible roof covering and the support structure must be –
 - (A) non-combustible material; or
 - (B) timber rafters lined on the underside with fibre-cement sheeting with a minimum thickness of 6mm, or with material complying with AS 1530.8.2; or
 - (C) a system complying with AS 1530.8.2; or
 - (D) a combination of (A), (B) or (C).
- (d) Gables must comply with the **BAL – FZ** requirements of this table for *external walls*.
- (e) Fascias and bargeboards must comply with AS 1530.8.2.
- (f) Eaves penetrations must be protected in accordance with the **BAL – FZ** requirements of this table for roof penetrations.
- (g) Eaves linings must be –
 - (i) a system with an FRL of -/30/30; or
 - (ii) a system complying with AS 1530.8.2; or
 - (iii) a combination of (i) and (ii).

Note: Roof-mounted evaporative coolers are excluded from the **BAL – FZ** level.

ROOF LIGHTS

(including vented roof lights and skylights)

1. BAL – Low

No requirements

2. BAL – 12.5

- (a) *Roof lights* and associated shafts through the roof space must be sealed –
 - (i) with a non-combustible sleeve or lining; and
 - (ii) at the roof penetration with non-combustible material to prevent gaps greater than 3mm.
- (b) Openings in vented *roof lights* must be fitted with ember guards made from corrosion-resistant steel or bronze mesh or perforated sheet with a maximum aperture of 2mm
- (c) All overhead glazing must be Grade A safety glazing 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), a minimum 4mm Grade A toughened safety glass, must be used in the outer pane of the IGU.
- (e) *Flashing* elements of tubular skylights may be of fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a *flammability index* not more than 5.

3. BAL – 19

As per the **BAL – 12.5** requirements of this table

4. BAL – 29

As per the **BAL – 12.5** requirements of this table with the following variation –

- (a) Where *roof lights* are installed in roofs having a pitch of less than 18 degrees to the horizontal, the glazing must be protected with ember guards made from corrosion-resistant steel or bronze mesh or perforated sheet with a maximum aperture of 2mm.

5. BAL – 40 (vented roof lights not permitted)

As per the **BAL – 29** requirements of this table with the following variation –

- (a) glazed assemblies for *roof lights* and skylights must have an FRL of -/30/-.

6. BAL – FZ

As per the **BAL – 40** requirements of this table with the following variations-

- (a) *Roof lights* and associated shafts must be sealed at the roof penetration with mineral fibre to prevent gaps greater than 3mm.
- (b) *Roof lights* must be one of the following -
 - (i) a system complying with AS 1530.8.2 when tested from the outside; or
 - (ii) a system with an FRL of 30/30/30 or -/30/30 when tested from the outside.

ROOF-MOUNTED EVAPORATIVE COOLING UNITS

1. BAL – Low

No requirements

2. BAL – 12.5

Evaporative coolers must be –

(a) sealed at the roof penetration with non-*combustible* material to prevent gaps greater than 3mm; and

(b) fitted with –

(i) butterfly closers at or near the ceiling level; or

(ii) non-*combustible* covers made from corrosion-resistant steel or bronze mesh or perforated sheet with a maximum aperture of 2mm.

3. BAL – 19

As per the **BAL – 12.5** requirements of this table

4. BAL – 29

As per the **BAL – 12.5** requirements of this table

5. BAL – 40

Evaporative coolers must not be used installed in **BAL – 40**

6. BAL – FZ

Evaporative coolers must not be used installed in **BAL – FZ**

OTHER ROOF PENETRATIONS

(including roof ventilators, aerials, vent pipes and supports for solar collectors)

1. BAL – Low

No requirements

2. BAL – 12.5

(a) All components of roof ventilators (including rotary ventilators), aerials, vent pipes and supports for solar collectors must be –

(i) of non-*combustible* material; and

(ii) be sealed at the roof penetration with non-*combustible* material to prevent gaps greater than 3mm.

(b) Openings in roof ventilators and vent pipes must be fitted with ember guards made from corrosion-resistant steel or bronze mesh or perforated sheet with a maximum aperture of 2mm.

(c) Vent pipes made from PVC are permitted.

3. BAL – 19

As per the **BAL – 12.5** requirements of this table - not including (c)

4. BAL – 29

As per the **BAL – 12.5** requirements of this table

5. BAL – 40

(a) All components of roof ventilators (including rotary ventilators), aerials, vent pipes and supports for solar collectors must be –

(i) of non-*combustible* material; and

(ii) be sealed at the roof penetration with non-*combustible* material to prevent gaps greater than 3mm.

6. BAL – FZ

(a) All components of aerials, vent pipes and supports for solar collectors must be –

(i) of non-*combustible* material; and

(ii) be sealed at the roof penetration with non-*combustible* material to prevent gaps greater than 3mm.

(b) Roof ventilators must be one of the following -

(i) a system complying with AS 1530.8.2 when tested from the outside; or

(ii) a system with an FRL of 30/30/30 or -/30/30 when tested from the outside.

GUTTERS AND DOWNPIPES

1. BAL – Low

No requirements

2. BAL – 12.5

(a) Gutter and valley leaf guards must be non-*combustible*.

(b) Box gutters must be non-*combustible* and flashed at the junction with the roof with non-*combustible* material.

3. BAL – 19

As per the **BAL – 12.5** requirements of this table

4. BAL – 29
As per the BAL – 12.5 requirements of this table with the following variation – (a) Gutters, other than box gutters, must be metal or PVC-U.
5. BAL – 40
As per the BAL – 12.5 requirements of this table with the following variation – (a) Gutters must be non-combustible.
6. BAL – FZ
As per the BAL – 40 requirements of this table
WATER AND GAS SUPPLY PIPES
1. BAL – Low
No requirements
2. BAL - 12.5
Above-ground, exposed water and gas supply pipes must be metal.
3. BAL – 19
As per the BAL – 12.5 requirements of this table
4. BAL – 29
As per the BAL – 12.5 requirements of this table
5. BAL – 40
As per the BAL – 12.5 requirements of this table
6. BAL – FZ
As per the BAL – 12.5 requirements of this table
VERANDAHS, DECKS, STEPS, RAMPS AND LANDINGS (including balustrades, handrails or other barriers)
1. BAL – Low
Verandahs, decks, steps and the trafficable surfaces of ramps and landings must comply with one or a combination of the following: (a) A concrete slab-on-ground. (b) A suspended concrete slab. (c) Any supporting posts or columns must comply with the BAL – Low requirements of this table for supporting posts, columns, stumps, piers and poles. (d) Any supporting walls must comply with the BAL – 12.5 requirements of this table for <i>external walls</i> . (e) Where sheeted or tongued and grooved solid flooring is used, the flooring system must comply with the BAL – Low requirements of this table for FLOORING SYSTEMS . (f) Where a timber deck is used – (i) The gap between the timber deck flooring must be not less than 5mm; and (ii) To facilitate access for extinguishment, the perimeter of the deck must not be enclosed or access to the space beneath the deck impeded; and (iii) The timber deck flooring must be separated from the remainder of the building in a manner that will not spread the fire into the building.
2. BAL - 12.5
Verandahs, decks, steps and the trafficable surfaces of ramps and landings must comply with the BAL – Low requirements of this table with the following variations - (a) Any supporting posts or columns must comply with the BAL – 12.5 requirements of this table for supporting posts, columns, stumps, piers and poles. (b) Where sheeted or tongued and grooved solid flooring is used, the flooring system must comply with the BAL – 12.5 requirements of this table for FLOORING SYSTEMS .
3. BAL – 19
Verandahs, decks, steps and the trafficable surfaces of ramps and landings must comply with the BAL – Low requirements of this table with the following variations - (a) Any supporting posts or columns must comply with the BAL – 19 requirements of this table for supporting posts, column stumps, piers and poles. (b) Any supporting walls must comply with the BAL – 19 requirements of this table for <i>external walls</i> . (c) Where sheeted or tongued and grooved solid flooring is used, the flooring system must comply with the BAL – 19 requirements of this table for FLOORING SYSTEMS . (d) Where spaced timber deck flooring is used, bushfire-resisting-timber must be used for the decking material.

4. BAL – 29

Verandahs, decks, steps and the trafficable surfaces of ramps and landings must comply with the **BAL – Low** requirements of this table with the following variations -

- (a) Any supporting posts or columns must comply with the **BAL – 29** requirements of this table for supporting posts, columns, stumps, piers and poles.
- (b) Any supporting walls must comply with the **BAL – 29** requirements of this table for *external walls*.
- (c) Where sheeted or tongued and grooved solid flooring is used, the flooring system must comply with the **BAL – 29** requirements of this table for **FLOORING SYSTEMS**.
- (d) Where spaced timber deck flooring is used, bushfire-resisting-timber must be used for the decking material.
- (e) Balustrades and handrails must be non-combustible, or if timber is used, it must be bushfire-resisting timber.

5. BAL – 40

Verandahs, decks, steps and the trafficable surfaces of ramps and landings must comply with the **BAL – Low** requirements of this table with the following variations -

- (a) Any supporting posts or columns must comply with the **BAL – 40** requirements of this table for supporting posts, column stumps, piers and poles.
- (b) Any supporting walls must comply with the **BAL – 40** requirements of this table for *external walls*.
- (c) Where sheeted or tongued and grooved solid flooring is used, the flooring system must comply with the **BAL – 40** requirements of this table for **FLOORING SYSTEMS**.
- (d) Decking must not be spaced and must be of –
 - (i) a non-combustible material; or
 - (ii) a system complying with AS 1530.8.1; or
 - (iii) a combination of (i) and (ii).
- (e) Balustrades and handrails must be non-combustible.

6. BAL – FZ

Verandahs, decks, steps and the trafficable surfaces of ramps and landings must comply with the **BAL – Low** requirements of this table with the following variations -

- (a) Any supporting posts or columns must comply with the **BAL – FZ** requirements of this table for supporting posts, column stumps, piers and poles.
- (b) Any supporting walls must comply with the **BAL – FZ** requirements of this table for *external walls*.
- (c) Where sheeted or tongued and grooved solid flooring is used, the flooring system must comply with the **BAL – FZ** requirements of this table for **FLOORING SYSTEMS**.
- (d) Decking must not be spaced and must be of –
 - (i) a non-combustible material; or
 - (ii) a system complying with AS 1530.8.2; or
 - (iii) a combination of (i) and (ii).
- (e) Balustrades and handrails must be non-combustible.

Seal between rafters with non-combustible material

Roof cladding

Rafter

Wall cladding

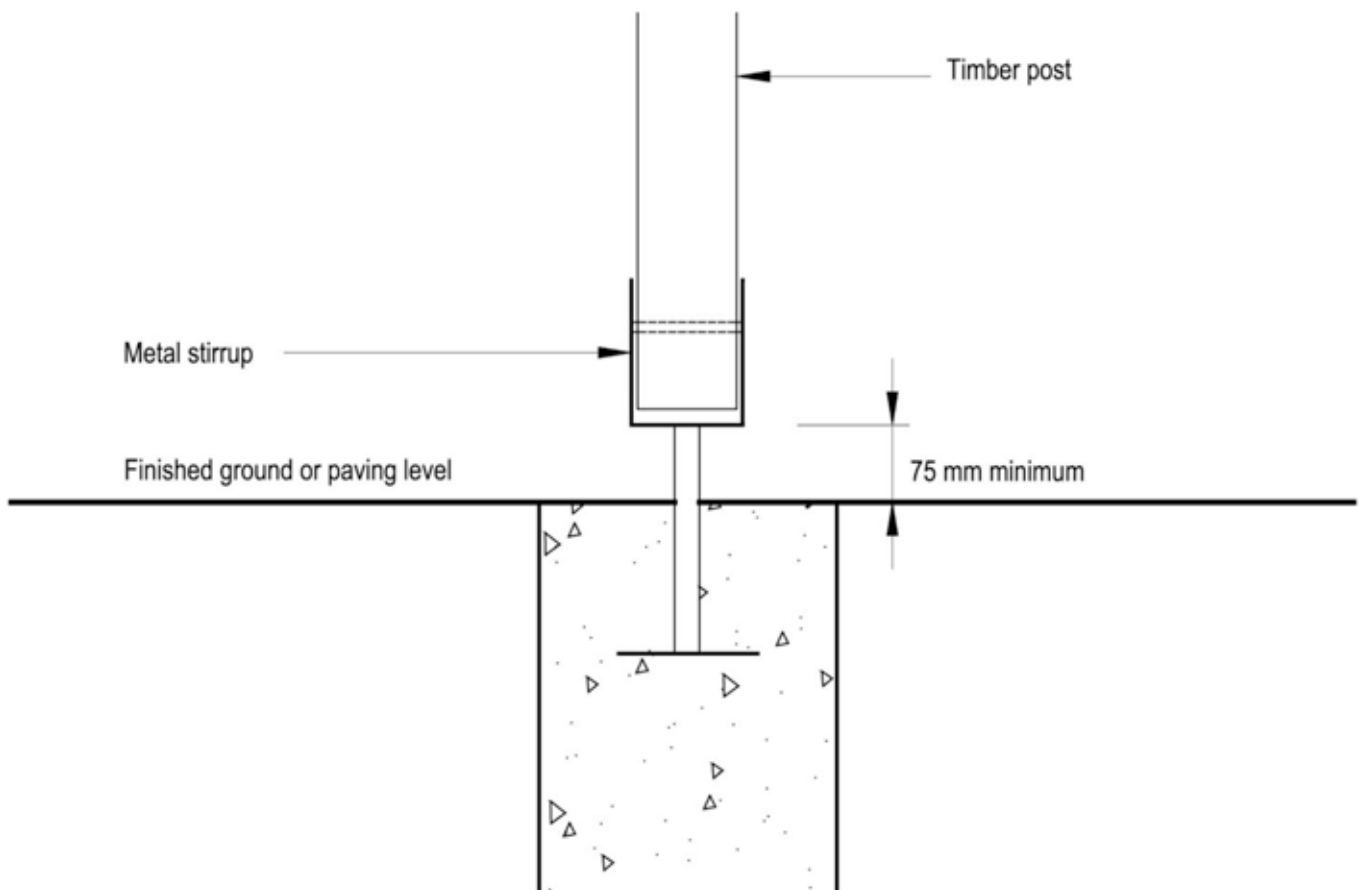
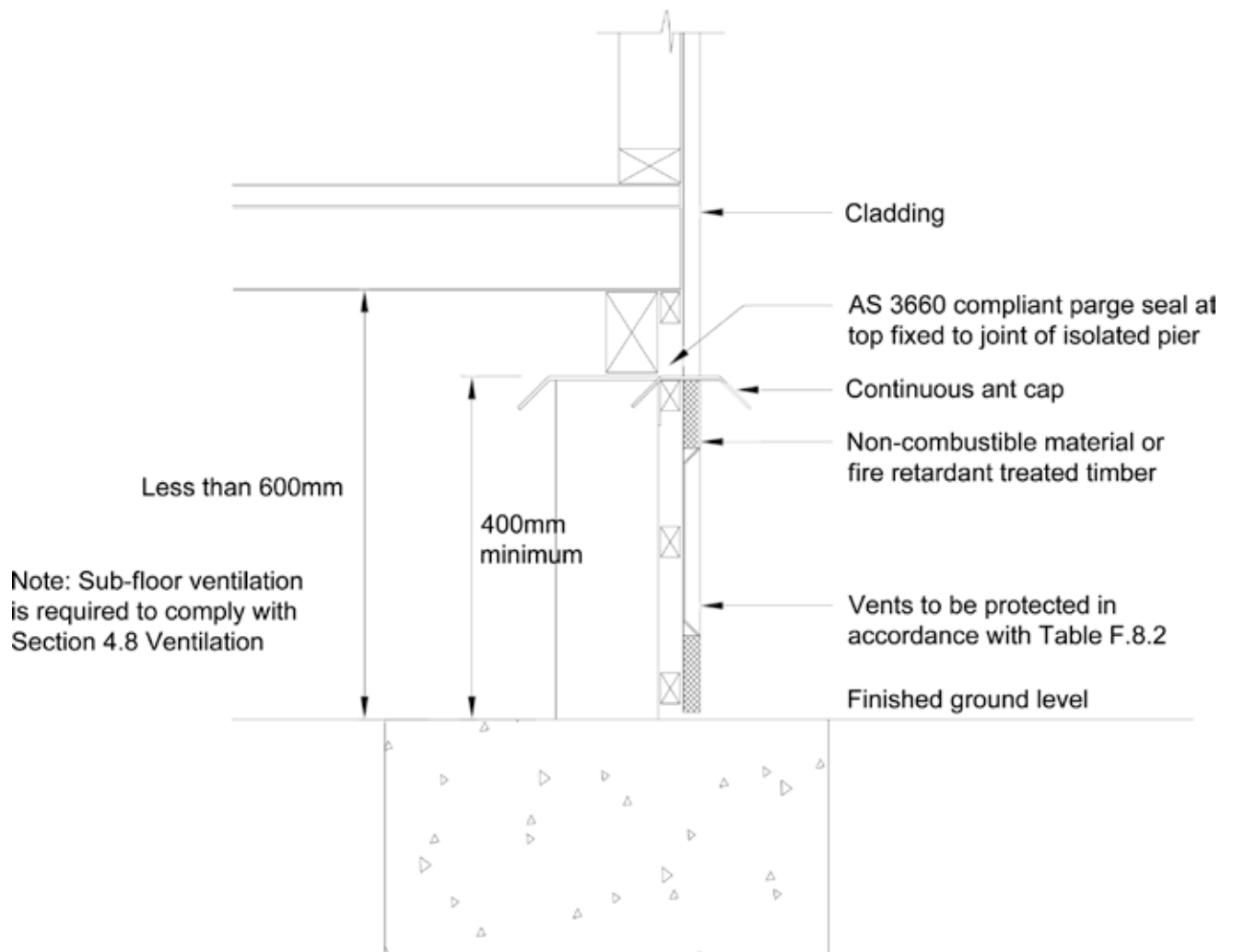
Gaps under corrugations sealed

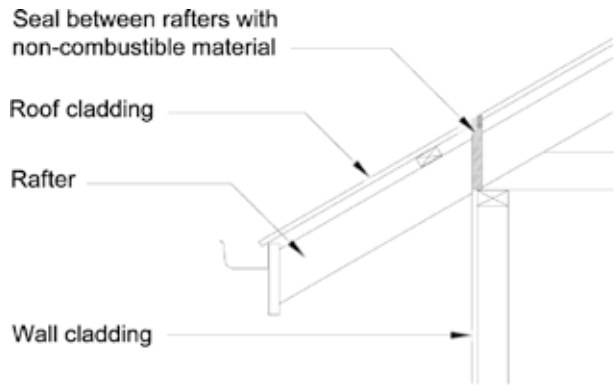
Fascia (non-combustible or fire-retardant treated timber in BAL 19, 29, 40 and FZ)

Eaves lining and jointing (non-combustible or fire-retardant treated timber in BAL 19, 29, 40 and FZ)

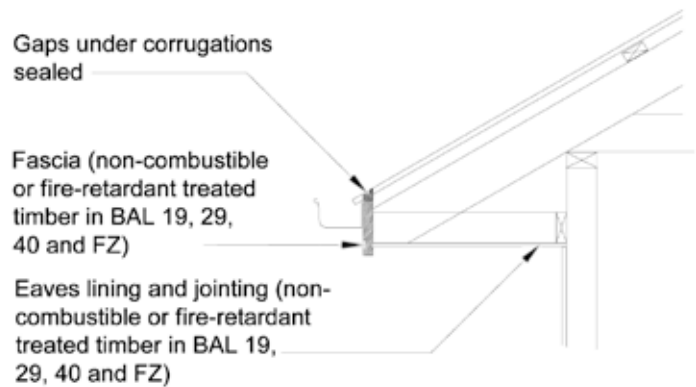
SEALING BETWEEN RAFTERS

SEALING WITH EAVES LINING AND FASCIA





SEALING BETWEEN RAFTERS



SEALING WITH EAVES LINING AND FASCIA

The “**Ministers Code**” applies to –

- Land Division in Bushfire protection areas,
- Development applications for Dwellings, Tourist accommodation or other habitable buildings (*including any alterations & additions to these buildings*).

Development applications for the above listed buildings are lodged with Council and then referred to SA Country Fire Service Development Assessment Unit for analysis and direction. The CFS DA Unit has a statutory period of **SIX WEEKS** to prepare a report to direct Council to approve (*with or without conditions*) or *refuse the application*.





APPENDIX C ADDENDUM TO APPENDIX 3 OF PBP 2006 – ADDITIONAL BUILDING REQUIREMENTS

Appendices

Table A3.5.1 – Conversion of vegetation classification from David Keith's *Ocean Shores to Desert Dunes* (used in PBP) to the AUSLIG Pictorial Analysis in AS3959-2009. This conversion is based on what is considered the best representation of similar bush fire behavior potential.

David Keith's <i>Ocean Shores to Desert Dunes</i>	AUSLIG (1990) Pictorial Analysis (AS3959-2009)
Forests (Wet & Dry Sclerophyll)	Forest
Pine Plantations	
Forested Wetlands	
Woodlands (Grassy, Semi-Arid)	Woodland
Tall Heath (Scrub)	Scrub
Freshwater Wetlands	
Short Heath (Open Scrub)	Shrubland
Arid Shrubland	Mallee/Mulga
Alpine Complex (Sedgeland)	Tussock Moorland
Rainforest	Rainforest
Grassland	Grassland

For the purposes of Table A2.6 in Appendix 2, the requirements for Alpine Resorts should be developed using Table 2.4.4 of AS3959-2009. Generally, most development applications within the Alpine Resorts consist of alterations and additions to existing buildings and therefore would be treated as infill development. Developments involving new leases or new alpine resorts must contact the RFS to determine the APZ requirements.

A3.6 Construction Considerations within the Flame Zone

There is potential for flames to ignite the external facade of a building which can continue to burn after the passage of the fire front. Therefore some degree of conservatism in relation to the exposure period is appropriate.

In NSW there are no recognized deemed-to-satisfy arrangements for construction of buildings within the Flame Zone. Where sustained flame contact is likely, the radiant heat and convective heat exposures are considerable and overwhelms most materials.

While AS3959 can be used as a guide to improve building safety, this is subject to additional control measures not included in this document. The design and construction of a building is just one means of mitigating the bush fire risk and will normally require supplementation by a range of other mitigation measures to the satisfaction of the authority having jurisdiction. The extent of additional measures required will be dependent upon the bush fire hazard and its proximity to the buildings. In addition to the construction requirement of AS3959, applicants should also address the Performance Requirements of the BCA and consider the siting and the design principles in Section 4.3.5 of PBP.

Where new testing regimes are developed and deemed appropriate by the NSW Rural Fire Service, these may be incorporated as part of

the process of developing alternative solutions. Alternative solutions will be considered on their merits.

A3.7 Additional Construction Requirements

Planning for Bush Fire Protection is designed to provide for improved bush fire protection outcomes through the planning system, whereas the construction requirements are established through the operation of the BCA. However, based on a review of AS3959-2009 and recent developments through the interim findings from the Victorian Royal Commission, the RFS has concerns over the levels of safety for ember protection at lower BAL levels (BALs 12.5 and 19) provided by AS3959-2009. The RFS is concerned that by adopting the new Standard there would be a reduction in safety created from that afforded by the previous NSW application of AS3959-1999 in relation to ember protection. In this regard, the RFS will aim to maintain the safety levels previously provided by AS3959-1999. In particular, the areas of concern arise from requirements for:

- Sarking
- Sub floor screening
- Floors
- Verandas, Decks, Steps, Ramps And Landings

In addition, in order to provide a suitable combination of bush fire protection measures the NSW Rural Fire Service will, as part of the planning assessment process, recommend / require additional construction requirements beyond those prescribed in AS3959-2009 as deemed appropriate.

Planning requirements for grasslands are contained within the main body of PBP.

As part of the planning requirements, the following will create part of the suite of protection

Appendices

measures required to form compliance with *Planning for Bush Fire Protection*.

SARKING

Any sarking used for BAL-12.5, BAL-19, BAL-29 or BAL-40 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.

SUBFLOOR SUPPORTS

For BAL-12.5 and BAL-19, Clause 5.2 and 6.2 shall be replaced by the provisions of Clause 7.2. In this regard, Clause 7.2 states:

“7.2 SUBFLOOR SUPPORTS

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

- a. *a wall that complies with (Clause 5.4 or 6.4 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 F); or*
- (iii) *a combination of Items (i) and (ii) above.*

NOTE: *This requirement applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 7.7)."*

ELEVATED FLOORS

For BAL-12.5 and BAL-19, Clause 5.3 and 6.3 shall be replaced by the provisions of clause 7.3. In this regard, clause 7.3.2 states:

“7.3.2 Elevated floors

7.3.2.1 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 or 6.4 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.*

7.3.2.2 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."

Appendices

VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

For BAL-12.5 and BAL-19, Clause 5.7 and 6.7 shall be replaced by the provisions of clause 7.7. In this regard, clause 7.7 states:

"7.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

7.7.1 General

Decking may be spaced.

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

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

7.7.2.1 Materials to enclose a subfloor space

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

- the material used to enclose the subfloor space complies with **(Clause 5.4 or 6.4 as appropriate)**; and*
- 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.*

7.7.2.2 Supports

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

7.7.2.3 Framing

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

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

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

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

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

7.7.3.1 Supports

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

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

7.7.3.2 Framing

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

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

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

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

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

7.7.4 Balustrades, handrails or other barriers

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

- of non-combustible material; or*
- bushfire-resisting timber (see Appendix F); or*
- 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."



APPENDIX D BUSHFIRE ATTACK CALCULATIONS

NBC Bushfire Attack Assessment Report V2.1

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 25/10/2016 Assessment Date: 5/10/2016

Site Street Address: Stage 5 Billy's Lookout, Teralba

Assessor: Mr Admin; admin

Local Government Area: Lake Macquarie

Alpine Area: No

Equations Used

Transmissivity: Fuss and Hammins, 2002

Flame Length: RFS PBP, 2001

Rate of Fire Spread: Noble et al., 1980

Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005

Peak Elevation of Receiver: Tan et al., 2005

Peak Flame Angle: Tan et al., 2005

Run Description: vegetation to the north

Vegetation Information

Vegetation Type:	Forest	Vegetation Group:	Forest and Woodland
Vegetation Slope:	11 Degrees	Vegetation Slope Type:	Upslope
Surface Fuel Load(t/ha):	25	Overall Fuel Load(t/ha):	35

Site Information

Site Slope	0 Degrees	Site Slope Type:	Downslope
Elevation of Receiver(m)	Default	APZ/Separation(m):	31

Fire Inputs

Veg./Flame Width(m):	100	Flame Temp(K)	1090
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Calculation Parameters

Flame Emissivity:	95	Relative Humidity(%):	25
Heat of Combustion(kJ/kg)	18600	Ambient Temp(K):	308
Moisture Factor:	5	FDI:	100

Program Outputs

Category of Attack:	LOW	Peak Elevation of Receiver(m):	6.47
Level of Construction:	BAL 12.5	Fire Intensity(kW/m):	25396
Radiant Heat(kW/m2):	12.37	Flame Angle (degrees):	76
Flame Length(m):	13.33	Maximum View Factor:	0.202
Rate Of Spread (km/h):	1.4	Inner Protection Area(m):	21
Transmissivity:	0.806	Outer Protection Area(m):	10

Run Description: vegetation to the north	
<u>Vegetation Information</u>	
Vegetation Type: Forest	Vegetation Group: Forest and Woodland
Vegetation Slope: 11 Degrees	Vegetation Slope Type: Upslope
Surface Fuel Load(t/ha): 25	Overall Fuel Load(t/ha): 35
<u>Site Information</u>	
Site Slope 0 Degrees	Site Slope Type: Downslope
Elevation of Receiver(m) Default	APZ/Separation(m): 22
<u>Fire Inputs</u>	
Veg./Flame Width(m): 100	Flame Temp(K) 1090
<u>Calculation Parameters</u>	
Flame Emissivity: 95	Relative Humidity(%): 25
Heat of Combustion(kJ/kg) 18600	Ambient Temp(K): 308
Moisture Factor: 5	FDI: 100
<u>Program Outputs</u>	
Category of Attack: MODERATE	Peak Elevation of Receiver(m): 6.3
Level of Construction: BAL 19	Fire Intensity(kW/m): 25396
Radiant Heat(kW/m2): 18.7	Flame Angle (degrees): 71
Flame Length(m): 13.33	Maximum View Factor: 0.296
Rate Of Spread (km/h): 1.4	Inner Protection Area(m): 15
Transmissivity: 0.832	Outer Protection Area(m): 7
Run Description: vegetation to the north	
<u>Vegetation Information</u>	
Vegetation Type: Forest	Vegetation Group: Forest and Woodland
Vegetation Slope: 11 Degrees	Vegetation Slope Type: Upslope
Surface Fuel Load(t/ha): 25	Overall Fuel Load(t/ha): 35
<u>Site Information</u>	
Site Slope 0 Degrees	Site Slope Type: Downslope
Elevation of Receiver(m) Default	APZ/Separation(m): 15
<u>Fire Inputs</u>	
Veg./Flame Width(m): 100	Flame Temp(K) 1090
<u>Calculation Parameters</u>	
Flame Emissivity: 95	Relative Humidity(%): 25
Heat of Combustion(kJ/kg) 18600	Ambient Temp(K): 308
Moisture Factor: 5	FDI: 100
<u>Program Outputs</u>	
Category of Attack: HIGH	Peak Elevation of Receiver(m): 5.94
Level of Construction: BAL 29	Fire Intensity(kW/m): 25396
Radiant Heat(kW/m2): 28.77	Flame Angle (degrees): 63
Flame Length(m): 13.33	Maximum View Factor: 0.442
Rate Of Spread (km/h): 1.4	Inner Protection Area(m): 10
Transmissivity: 0.857	Outer Protection Area(m): 5