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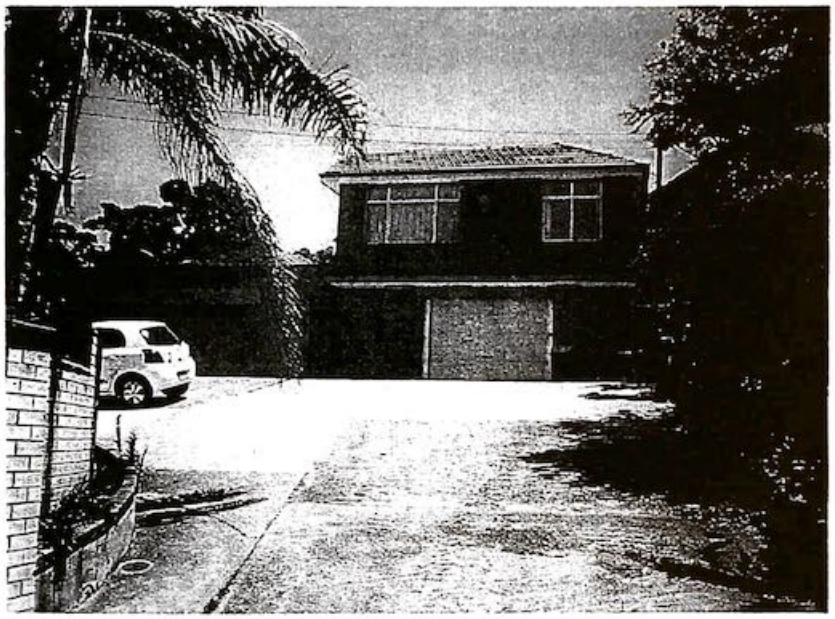
BUSHFIRE HAZARD ASSESSMENT



Lot 2317, DP 752038
No. 69 Binalong Avenue
Allambie Heights

Mr & Mrs Bowtell C/- Masterton Homes
76 Heathcote Road
Moorebank NSW 2170

Construction of a new two storey dwelling

CONTENTS

PROJECT BRIEF

We have been engaged by Masterton Homes to prepare a bush fire assessment report for the proposed dwelling at Lot 2317, DP 752038, Binalong Avenue, Allambie Heights, NSW. This report will supplement the development application to Warringah Shire Council for the proposed development of a two storey dwelling.

The purpose of this report is to assess the proposed dwelling in accordance with the requirements of the document, Planning for Bushfire Protection (2006) as issued by the NSW Rural Fire Service and Planning NSW

The report relies upon the following information:

(a) Inspection of the site on the 13th November 2007

(b) Details of the proposed dwelling as provided by Masterton Homes.

The report has been prepared and checked by certifiers accredited by the Department of Planning (DOP).

INTRODUCTION

As required by Warringah Shire Council, a bushfire assessment of the proposed dwelling has been carried out and outlined in this document to determine the compliance with the document "Planning for Bushfire Protection 2006".

The assessment of the site found that in accordance with the document "Planning for Bushfire Protection, 2006" the eastern and western facades at the closet point is considered an medium risk of bushfire attack and the proposed dwelling should be constructed as to comply with Level 1 requirements as outlined in AS 3959 – 1999 Construction of buildings in bushfire prone areas.

This report will address the measures that should be undertaken to ensure compliance with the standards as measured in this document.

THE PROPOSED DEVELOPMENT

The proposed development is a new two storey dwelling with a double garage and four bedrooms. The development will have a built upon area totalling 161m^2. Landscaped gardens and lawns are proposed to cover 481m^2 of the site.

The residence itself will be two storey dwelling with brick veneer walls and concrete tile roofing.

A 8000 litre, below ground rainwater tank is to be located on site to collect rainwater from the roof area.

ASSESSMENT OF SITE CHARACTERISTICS

The site is located in the suburb of Allambie Heights, in the Warringah Shire Local Government Area. The subject site is located in a residential area with Single and two storey dwellings constructed in the area. The majority of lots throughout the area are occupied. To the east and west of the subject property is an area of vegetation that will pose a threat to the proposed dwelling in the event of a bushfire. This vegetation is located approximately 58m to the east and 75m to the west of the proposed dwelling and would be classified as "Tall Woodland" Classification 3 in AS 3959-1999.

The subject site is rectangular in shape with a frontage to Binalong Avenue of 19.6m and side depths of 39.4m, creating a land area of 809.40m^2.

The site, Lot 2317, 69 Binalong Avenue, Allambie Heights, has a significant slope from the western boundary to the eastern boundary, this is shown of the site plan. Currently the site is occupied and is being prepared for demolition.

The site plan of the proposed development shows access to the site via the eastern boundary and is to have a easterly aspect towards Binalong Avenue.

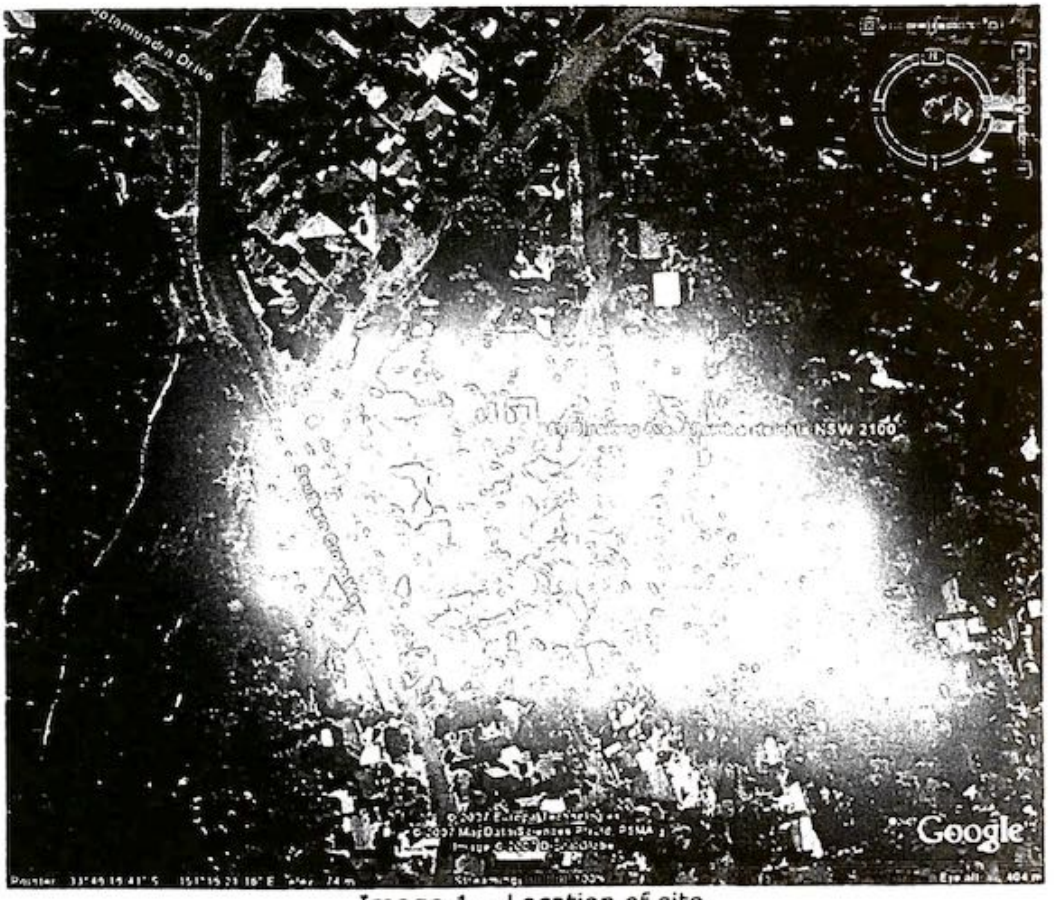
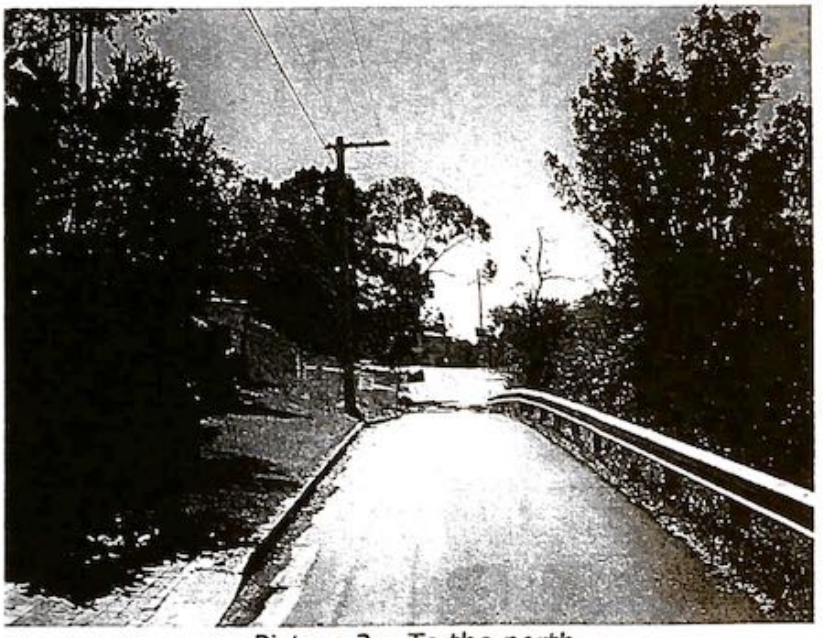


Image 1 – Location of site

To the west of the proposed dwelling, are more residential dwellings. Further on from these dwellings is an area of vegetation that may pose a threat to the proposed dwelling in the event of a bushfire.

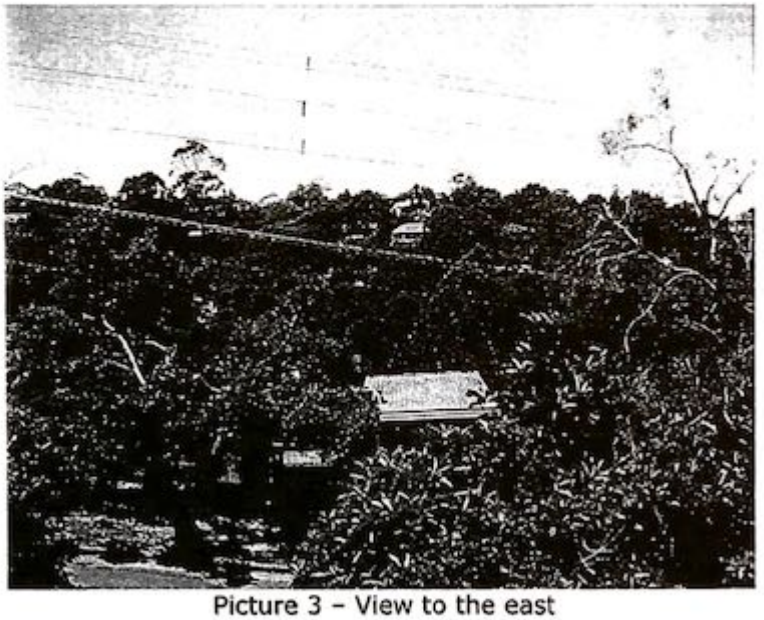
Picture 1 – View to the West

To the north of the proposed dwelling, is a residential area containing single and two storey dwellings. These properties all contain well maintained lawns and gardens, however there are a number of large trees scattered throughout the area. These trees do not have linking canopies and will pose little threat to the proposed dwelling in the event of a bushfire.



Picture 2 – To the north

To the east of the proposed dwelling, are more residential dwellings. Further on from these dwellings is an area of vegetation that may pose a threat to the proposed dwelling in the event of a bushfire.



Picture 3 – View to the east

To the south of the proposed dwelling, is a residential area containing single and two storey dwellings. These properties all contain well maintained lawns and gardens, however there are a number of large trees scattered throughout the area. These trees do not have linking canopies and will pose little threat to the proposed dwelling in the event of a bushfire.

Picture 4 – View south of the property along Binalong Avenue

3.1 SLOPE

The intensity and rate of spread of fires burning uphill increases markedly with increasing slope. This is reflected in an increase in the fire hazard index for a particular fuel type with an increasing slope. Similarly the rate of spread and intensity of fires decreases when they burn downhill.

The table below outlines the general slope for 100m surrounding the proposed dwelling:

Direction	Slope	Degrees (°)
North	Upslope	5-10°
East	Downslope	10-15°
South	Downslope	5-10°
West	Upslope	5-10°

The land has a consistent slope from the western boundary of the site to the eastern boundary of the site, this slope was determined to be 9.5°, this is based on a site inspection on the 13/11/07 and a Site Plan prepared by Masterton Homes, drawing no. 36059, dated 20/09/07.

In regards to the proposed development, the vegetation threatening bushfire attack is located to the east and west of the site and the proposed dwelling. The average slope from the site to the east of the vegetation has been determined as an downslope of 10-15°, this has been based on a site inspection on the 13/11/07, and a Site Plan prepared by Masterton Homes, drawing no. 36059, dated 20/09/07.

3.2 FUEL TYPES

The fuel categories on the Planning for Bushfires Protection document are described using botanical terminology, such as "forest" and "dry sclerophyll forest". It should be noted that when used for bushfire hazard assessment these terms refer to the fuel production capacity and flammability of different vegetation types. Therefore their meaning and application for bushfire hazard assessment may differ from their use in a strictly botanical context.

The subject land is currently occupied. The land directly surrounding the site is occupied. The surrounding blocks all have well-maintained lawns and gardens, however there are a number of large trees scattered throughout the area. These trees do not have linking canopies and will pose little threat to the proposed dwelling in the event of a bushfire.

The predominant vegetation in the area is to the east and west of the proposed dwelling. This vegetation can be classified as "Tall Woodland" vegetation, classification 3, as defined as defined in Appendix 2 in Planning for Bushfire Protection.

Picture 5 – vegetation to the west

Picture 6 – vegetation to the east

Using the information provided on the site plan provided by Masterton Homes Pty Ltd, drawing no. 36059, dated 20/09/07 and by measuring distances as part of the site inspection on the 13/11/07, the distance of each façade of the proposed development to the threatening vegetation was determined these are outlined as follows:

Facade	Distance to Predominant Vegetation
North	Not in line of site
South	Not in line of site
East	58m
West	75m

3.3 CATEGORY OF BUSHFIRE ATTACK

In accordance with the Table A3.3 of Appendix 3 of the Planning for Bushfire Protection the proposed dwelling will be located within an area of medium risk bushfire zone as described by this Table and therefore in the event of bushfire from the north, south and west, the proposed development could be subjected to significant ember attack and radiation heat not greater than 12.5kWm^3.

The Category of Bushfire Risk cannot be determined due to the proximity of the proposed development to the vegetation threatening bushfire attack; the following construction requirements should be adhered to:

Facade	Assessed Bushfire Risk	Level of Construction as per AS 3959-1999
North	Low	Level 1
South	Low	Level 1
East	Medium	Level 1
West	Medium	Level 1

Although the northern and southern facades could be assessed as a low bushfire risk, the level of constructed required has been escalated to level 1 due to the risk posed to the eastern and western façades.

RECOMMENDATIONS

The Planning for Bushfire Protection Guidelines recommend that an Asset Protection Zone (APZ) be established and maintained on the hazard side of buildings in bushfire prone areas. As the proposed development will be surrounded in vegetation that poses a risk to the development, asset protection zone will be required to be put into place and maintained around the entire dwelling.

The Planning for Bushfire Protection Guidelines recommend various Asset Protection Zones (APZ) be establish for each façade of the proposed development based on the risk faced by each from the surrounding vegetation. These APZ are required to be made up of Inner Protection Zones (IPZ) and Outer Protection Zones (OPZ) as determined by Planning for Bushfire Protection, Appendix 3, Table A2. These APZ are outlined below:

Façade	APZ (meters)	IPZ (meters)	OPZ (meters)
North	-	-	-
South	-	-	-
East	25	25	-
West	20	20	-

Due to the size to the subject site the APZ's recommended are unable to be established on site. However, low fuel loads are provided between the proposed dwelling and the predominant vegetation. To maintain these low fuel loads, it is recommended that the yard of the property be maintained as an IPZ so as to provide for a defendable space.

Landscaping within the in the Inner Protection Zone and defendable space around the dwelling should aim to achieve a fuel component that is both discontinuous and of low flammability. General requirements for landscaping include:

- Use only mown lawn, bared ground or non flammable succulents ground cover plants immediately adjacent to dwellings,
- Maximum tree cover should be less than 30%
- Maximum shrub cover should be less than 20%
- Trees and shrubs should be isolated or in small clumps, continuous canopies are to be avoided.
- Select plants species of low flammability.
- Avoid planting trees and shrubs that retain dead material in there canopies,
- Locate any combustible materials (woodpiles or fuel stores) outside the area.
- Avoid brush fencing
- Avoid flammable garden wood chips/ mulches
- Avoid planting trees and shrubs with rough fibrous bark, or which retain shed bark in long strips (Ribbonbark)
- Avoid planting trees and shrubs that deposit large quantities of litter in short periods particularly spring and summer

Construction standards for building within bushfire-prone areas are set out in Australian Standard 3959 – 1999 *Construction of Buildings in Bushfire Prone Areas*. Appendix 3 of the Planning for Bushfire protection contains a procedure for determining the category of bushfire attack and the appropriate level of construction. The proposed development has been assessed to have an medium risk of bushfire attack and accordingly, the following requirements of construction should be carried out:

- All facades should be constructed so as to comply with level 1 construction requirements under AS 3959-1999

CONCLUSION

In conclusion it is considered the dwelling is located within an area of medium risk category of bushfire attack and in accordance with AS3959-1999, all facades should be constructed so as to comply with level 1 construction requirements under AS 3959-1999.

Paul Gearin
B.App.Sc.(Env.Health)

November, 2007

REFERENCES

1. Australian Standard 3959 –1999 *Construction of Buildings in Bushfire-prone Areas*. Standards Australia, Sydney

2. NSW Rural Fire Service (2001) *Planning for Bushfire Protection, A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners*. NSW Rural Fire Service

3. Ramsay C & Dawkins D (1993) *Building in Bushfire Prone areas – Information and Advice*. CSIRO and Standards Australia.

APPENDIX

1. Addendum to Specifications for Construction under Level 1 – AS3959-1999

MASTERTON HOMES

Owner/s _____

Address _____

_____

Our Reference: _____

Development Consent Number: _____

Construction Certificate Number: _____

ADDENDUM TO

SPECIFICATION

BUSHFIRE REQUIREMENTS FOR LEVEL 1 CONSTRUCTION

FLOORING SYSTEMS (one or more of the following)

a) A concrete slab on ground
b) A suspended floor supported by:
   - Posts and/or
   - Columns and/or
   - Stumps and/or
   - Piers and/or
   - Poles
     i. A concrete floor
     ii. A framed floor where the underside if any one bearer at any point is greater then 600mm above the finished ground level

Note:
These must comply with the specification for Supporting posts, columns, stumps, piers and poles as outlined the section below.

c) The suspended timber floor, framed with timber or metal, where the underside of any one bearer, at any point is not greater then 600mm above finished ground level and which has:
   i. the subfloor space enclosed and any timber flooring, bearers and joists of fire retardant-treated-timber; or
   ii. the subfloor space fully enclosed, either by a wall that complies with Clause 3.5.1.(a), or by the use of non-combustible sheet material, which extends for at least 400mm above the finished ground level.

   Where non-combustible fibre-reinforced cement sheets are used to enclose the subfloor space, the material shall have a minimum thickness of 6mm and all joints be covered or sealed. The non-combustible sheet material shall meet the bottom of the cladding material to ensure there are no gaps on the exterior face of the building.

Notes:
Subfloor space
It is generally agreed that there is a need to completely enclose subfloor spaces close to the ground as they are prone to attack from burning debris. This chosen cut-off distance of 600mm from the finished ground level to the underside of the lowest structural member is intended to represent the height below which access to extinguish burning debris would be difficult. In such cases of the reduced accessibility, the 400mm high barrier is intended to prevent the entry of burning debris to the subfloor.

Sheeting of the underside of suspended floors
There are a number of options concerning the ignition risks presented by the exposed subfloors. One option is that bearer and joists pose few problems because they are large in section. Another opinion is that the underside of the suspended floors should be clad with non-combustible cement sheet or equivalent material on the underside of the floor joists or on top of the joists and under floor boards, to prevent the wind borne burning debris from contacting the floors. Although sheeting the underside can cause ventilation difficulties, it could help protect the floor in cases where items stored in the under floor space are ignited. Such house keeping measures were considered, however, to be outside the scope of this Standard and in view o the potential difficulties and additional cost involved, sheeting requirements are not included for Level 1 construction.

SUPPORTING POSTS, COLUMNS, STUMPS, PIERS AND POLES

Supporting posts, columns, stumps, piers and poles are required to be one or more of the following
a) Non-combustible
b) Fire-retardant-treated timber for a minimum of 400mm above the finished ground level.
c) Timber mounted on galvanized metal shoes with a clearance of not less than 75mm above the adjacent finished ground level or paving level.

Note:
This does not apply to where the subfloor space is totally enclosed.

EXTERNAL WALLS

a) External Walls are required to be one or more of the following:
   i. A wall having an external leaf of masonry, concrete pise, rammed earth or stablised earth
   ii. A framed wall that incorporated either:
      1. breather-type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS 1530.2) installed immediately behind the external cladding; or
      2. an insulation material conforming to the appropriate Australian Standard for that material

Note:
No restrictions apply to cladding material

   iii. A wall of timber logs that have the butting faces of adjacent logs, gauge-planed, and the space between the logs sealed in a manner that prevents the entry of burning debris and which allows for building movement.

Note:
There is little evidence on the performance of timber log construction under attack from burning debris. The requirements for gauge-planing and sealing are considered necessary to prevent the passage of burning debris to the interior of the building.

b) Where the external leaf or cladding is of a combustible sheet material and is less than 400mm above finished ground level, the cladding shall be protected for not less then 400mm above the adjacent finished ground level
   i. By covering it with a suitable non-combustible material, or fore-retardant-treated timber suitably sealed to the existing cladding so as to prevent the entry of burning debris.
   ii. By substituting with a suitable non-combustible sheet material, or fire-retardant-treated timber; or
   iii. Where the external cladding is timber, by using fire-retardant-treated timber.

Note:
Combustible cladding is acceptable, but as for supporting posts, columns, stumps , piers and poles, protection is required to 400mm above the finished ground level. Protection would normally only be necessary with concrete slab-on-ground- construction as it would be simpler to raise the floor level of a suspended floor and protect the subfloor area.

WINDOWS

All openable windows, including louvers are required to be screened with corrosion-resistant steel, bronze or aluminum mesh with a maximum aperture size of 1.8 mm in such a way that the entire opening remains screened when the window is open.

EXTERNAL DOORS

External doors shall be fitted with:

a) weather strips or draught excluders to prevent the penetration or build-up of burning debris beneath the door.
b) Tight fitting screens fitted with corrosion-resistant steel, bronze or aluminum mesh with a maximum aperture size if 1.8mm

Note:
a maximum aperture size of 1.8mm was selected for mesh to be used as screening in order to facilitate the use of the screen as an insect-screen.

VENTS AND WEEPHOLES

Vents and weepholes are required to be protected with spark guards made from corrosion-resistant-steel, bronze or aluminum mesh with a maximum aperture size of 1.8mm.

ROOFS

General – there requirements apply to all roofing systems
a) Timber shakes or shingles shall not be used for the roof covering.
b) The roof/wall junction shall be sealed either by the use of fascias and eaves linings, or by sealing the gaps between the rafters with a suitable non-combustible material
c) Sarking shall have a flammability index of not more then 5 (see AS 1530.2).

Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall be located directly below the tiling battens and shall cover the entire roof area including the ridge.

Note:
Where roofing systems are fully sarked, effectively restricting or excluding airflow, it may be necessary to provide ventilation to prevent moisture (condensation) from occurring in the roof space. If roof vents need to be provided to address moisture, they need to be sealed, to protect against the entry of sparks and embers, with corrosion-resistant resistant steel or bronze mesh having a maximum aperture size of 1.8mm.

Sheeted roofs

The requirements for sheeted roofs are as follows:
a) Only metal or fibre-cement sheet shall be used.
b) All gaps under the corrugations or ribs of the roofing material where it meets the fascia or wall line shall be sealed or protected:
    i. By fully sarking the roof; or
    ii. By providing corrosion-resistant steel or bronze mesh, with a maximum aperture size of 1.8mm, profiled metal sheet, neoprene seal, compressed mineral wool or similar material.

Note:
1. *The method of protection in Item b(ii) con only be achieved on a roof without valleys and having the deck fixed directly to, but not structurally supported by, the fascia.*
2. *It is generally recognized that where compressed mineral wool is used for sealing against bushfire attack or for other purposes, adequate ventilation should be provided to stop condensation on the mineral fibre causing corrosion in the roof sheeting or supporting structure.*

c) Rob cage and ridge capping shall be sealed in accordance with clause b, or performed rib caps or ridge capping shall be used.

ROOFLIGHTS

The requirements are as follows:

a) All penetrations of the roof space for the installation of rooflights and associated shafts be sealed with a non-combustible sleeve or lining.

Thermoplastic sheet in a metal frame may be used for a rooflight, but the diffuser installed at ceiling level shall be of wired or toughened glass in a metal frame.

AS 1288 and AS 4285 sets out specific requirements for glazing and skylights.

b) Vented rooflights shall be provided with corrosion-resistant steel or bronze mesh having a maximum aperture of 1.8mm.

Roof Ventilators

All components of roof ventilators, including the rotary type shall be constructed of non-combustible material and shall be sealed against the entry of sparks and embers with corrosion-resistant steel or bronze mesh having a maximum aperture of 1.8mm.

Roof-mounted evaporative cooling units

Roof-mounted evaporative cooling units shall only be used if the openings to the cooling unit are encased in corrosion-resistant steel or bronze mesh having a maximum aperture of 1.8mm.

Eaves

All eaves are to be enclosed and the fascia or the gaps between the rafters shall be sealed.

Fascias

There are no requirements.

Gutter and Downpipes

Any materials or devices used to stop leaves collecting in the gutters shall have a flammability index of not greater than 5 when tested in accordance with AS 1530.

Verandas and Decks

Verandas, decks and the like, forming part of a building shall comply with one or more of the following:

a) *Slab*
A reinforced concrete suspended slab floor, supported by posts or columns (complying with specifications outlined above) or walls (complying with specifications outlined above) or a slab-on-the-ground floor (complying with specifications outlined above).

b) *Sheeted or tongued and grooved solid flooring*
The requirements are as follows:
   a. Flooring requirements are as outlined above
   b. Where the distance between the finished ground levels and the under side of the floor is not greater then 400mm above the finished ground level, all joints in the flooring shall be covered (above the floor level) or shall be sealed.

c) *Spaced decking*
The requirements for spaced decking are as follows:

a. The decking timbers shall be fixed with a clearance of not less than 5mm between adjacent timbers.
b. The external perimeter beneath the decking shall not be enclosed nor shall access to the space beneath the decking be impeded.

Note:
This requirement is designed to ensure that access to the extinguished fires and remove burning material is maintained.

c. Any supports for the decking shall be treated as outlined above.
d. Decking timbers shall not be allowed to connect with the remainder of the building unless measures are used to prevent the spread of fire into the building.

Note:
The dangers represented by timber decks is significantly different to other parts of the building such as roofs due to the timber species, method of fixing, elevation and conditions of exposure. For these reasons, timber decking is not excluded.

The required spacing, for decking, of at least 5mm between deck timbers is nominal as was selected to allow water to be sprayed up from underneath the deck and reach both the deck surface and adjacent walls. This is facilitated by the external perimeter ground/floor gap not being sealed.

These requirements apply to low level verandas and decks even though access for firefighting purposes may be more restricted.

SERVICE PIPES (WATER AND GAS)

All exposed piping, for water and gas supplies are required to be buried to a depth of at least 300mm below the finished ground level.