BUSHFIRE ASSESSMENT REPORT CERTIFICATE

THIS CERTIFICATE HAS BEEN COMPLETED BY A RECOGNISED CONSULTANT IN BUSHFIRE RISK ASSESSMENT IN ACCORDANCE WITH SECTION *4.14* 1(b) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 NO 203

PROPERTY ADDRESS:	Lot 1 DP 1018193 Flatrock Road Mundamia
DESCRIPTION OF PROPOSAL:	PROPOSED RESOURCE RECOVERY LEARNING CENTRE (RRLC)
PLAN REFERENCE: **(relied upon in report preparation)**	SITE PLAN
BAL RATING:	12.5
DOES THE PROPOSAL RELY ON ALTERNATE SOLUTIONS:	~~**YES**~~ **NO**

I David Cannon of SET Consultants Pty Ltd have carried out a bushfire risk assessment on the above mentioned proposal and property. A detailed Bushfire Assessment Report is attached which includes the submission requirements set out in *Appendix 2* of *Planning for Bushfire Protection 2019* together with recommendations as to how the relevant specifications and requirements are to be achieved.

REPORT REFERENCE:	BRA – L104083
REPORT DATE:	6 September 2023
CERTIFICATION NO/ACCREDITED SCHEME:	BPAD 23829 (LEVEL 3)

I David Cannon hereby certify, in accordance with *Section 4.14 of the Environmental Planning and Assessment Act 1979 No 203*:

1. That I am a person recognised by the *NSW Rural Fire Service* as a qualified consultant in bushfire risk assessment; and
2. That subject to the recommendations contained in the attached Bushfire Risk Assessment Report the proposed development conforms to the relevant specifications and requirements.

I am aware that the Bushfire Assessment Report, prepared for the abovementioned site is to be submitted in support of a development application for this site and will be relied upon by Shoalhaven City Council as the basis for ensuring that the bushfire risk management aspects of the proposed development have been addressed in accordance with *Planning for Bushfire Protection 2019*.

SIGNATURE: _____ DATE: 6 September 2023

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

BUSHFIRE RISK ASSESSMENT

Proposed Resource Recovery Learning Centre (RRLC)

Lot 1 DP 1018193
Flatrock Road
Mundamia

6 September 2023
Reference: L104083

BPAD Bushfire Planning & Design
Accredited Practitioner
Level 3

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		Ver 1.0 Final Issue	6 September 2023

The assessment has been prepared in accordance with Planning for Bushfire Protection - A Guide for Councils, Planners, Fire Authorities and Developers, 2019, NSW Rural Fire Service (RFS) and Planning NSW.

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TABLE OF CONTENTS

Attachments

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1 INTRODUCTION

This Bushfire Assessment Report has been prepared for *Terroir,* on behalf of their client, to accompany a development application for the construction of a Resource Recovery Learning Centre (RRLC) at Flatrock Road, Mundamia. The subject property is legally described as Lot 1 DP 1018193. Shoalhaven City Council's Bushfire Prone Land Map indicates the subject site as bushfire prone (Figure 1). According to the NCC's building classification system, the development's buildings would fall under the Class 9b category. Since the NCC does not have any specific bush fire construction requirements for Class 9 building identified as not being Special Fire Protection Purpose (SFPP), AS3959 and the NASH Standard are not regarded as Deemed to Satisfy provisions.

Although Public Assembly Buildings are not considered as SFPP under the Rural Fire Regulations, they still require referral under the EP&A Act s.4.14 to the NSW RFS. For buildings used for public assembly with a floor area greater than 500m², bush fire construction requirements must be taken into account. However, as the proposal is not considered SFPP development and has a publicly available floor area less than 500m², the Resource Recovery Learning Centre does not need to consider bush fire construction requirements. Nevertheless, compliance with AS3959 and the NASH Standard must still be considered to meet the aims and objectives of PBP.

Figure 1: Shoalhaven City Councils Bushfire Prone Land Map. The subject lot is outlined in blue.

The assessment of the site is based on the results of a field survey conducted by Mr. David Cannon on Tuesday 8th June 2022. The following pieces of current legislation and guidelines were referred to when preparing this report:

- Planning for Bushfire Protection, A Guide for Council, Planner, Fire Authorities and Developers' (NSW Rural Fire Service (RFS) in cooperation with the Department of Planning (2019);
- Rural Fires Act 1997;
- Australian Standard 3959-2018 Construction of Buildings in Bushfire Prone Areas; and
- Rural Fires Regulation 2022.

NOTE: *that the 'Planning for Bushfire Protection, A Guide for Council, Planners, Fire Authorities, and Developers (NSW Rural Fire Service (RFS) in cooperation with the Department of Planning (NSW) (2019) mentioned above, will herein be referred to as the* ***'PBP 2019****".*

1.1 OBJECTIVES

All development on Bushfire Prone Land must satisfy the aim and objectives of PBP 2019. PBP 2019 states:

"The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.

More specifically, the objectives are to:

a) afford buildings and their occupants protection from exposure to a bush fire;
b) provide for a defendable space to be located around buildings;
c) provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
d) ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
e) provide for ongoing management and maintenance of BPMs; and
f) ensure that utility services are adequate to meet the needs of firefighters.

Whilst bush fire construction requirements is not captured in the NCC for Class 5-8 buildings, the following objectives will be applied in relation to access, water supply and services, and emergency and evacuation planning:

- to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation;
- to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development;
- to provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building; and
- provide for the storage of hazardous materials away from the hazard wherever possible.

The general fire safety construction provisions of the NCC are taken as acceptable solutions however construction requirements for bush fire protection will need to be considered on a case-by-case basis.

This assessment includes an analysis of the potential hazard persisting and affecting the subject site and the standards and bushfire mitigation measures that should be introduced to address the objectives of the PBP 2019 and AS3959-2018. The mitigation measures have been derived from the provisions (performance criteria and acceptable solutions) as outlined within the PBP 2019 and AS3959-2018.

1.2 PROPOSAL

The development is for a learning centre this will be a resource recovery learning centre located in the existing Shoalhaven City Council Waste Facility at West Nowra (Mundamia), the learning centre will comprise three detached single storey buildings set around a suspended deck to be used as an outdoor learning area. The proposed floor level of the buildings and outdoor learning area are generally indicated to be at or above existing surface levels. Around the eastern and southern wides of the buildings some gabion feature walls are proposed. South of the learning centre, a new carpark is proposed to service the learning centre with disabled parking, bus drop off and pathways and associated landscaping. Figure 2 shows an extract of the site plan prepared by *Terrior* (**Attachment 1**).

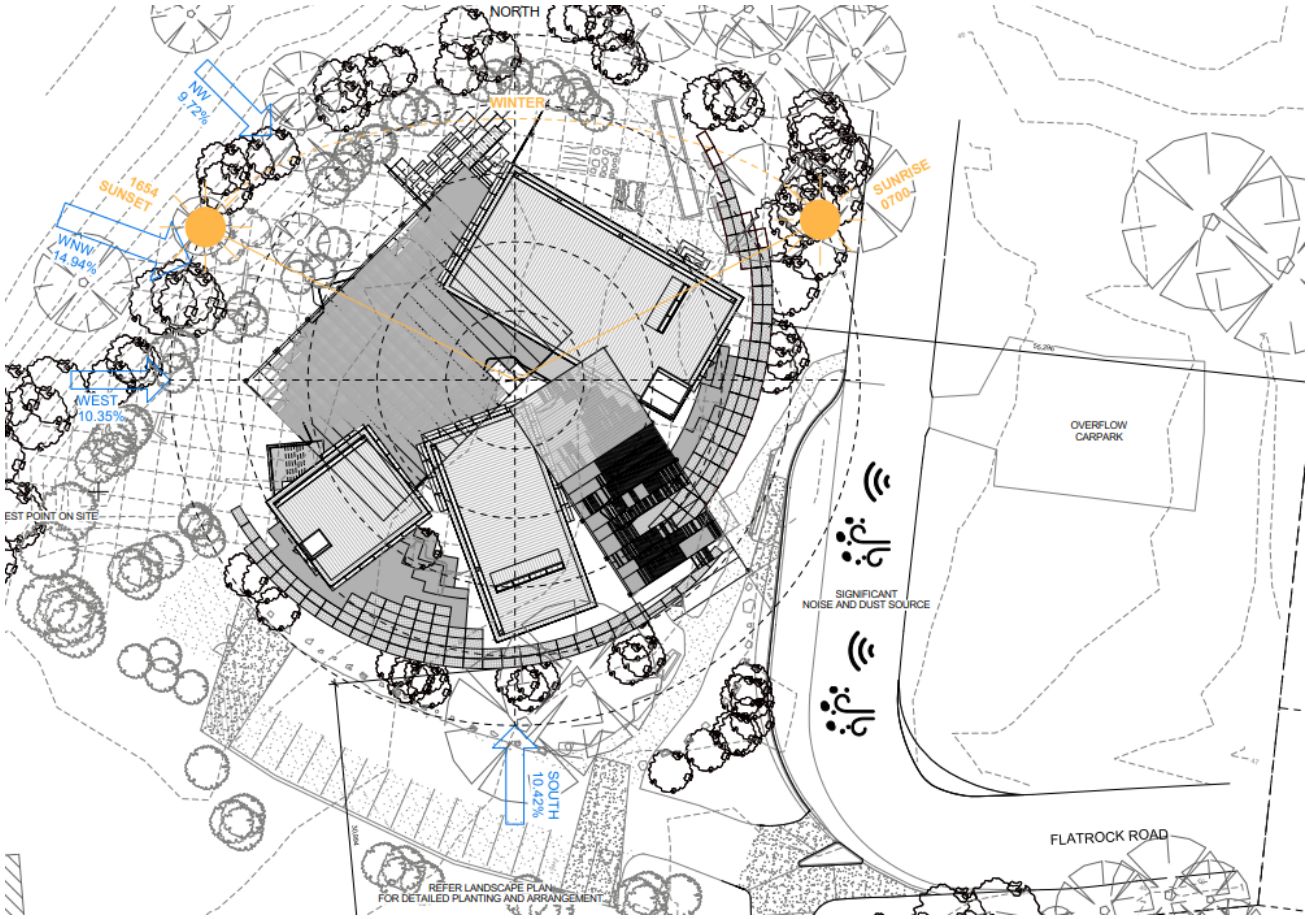

Figure 2: Extract of the Site Analysis Plan prepared by *Terroir.*

2 PROPERTY DETAILS

2.1 DESCRIPTION OF PROPERTY

The subject site has a legal description of Lot 1 DP 1018193, Flatrock Road, Mundamia. The subject site is located approximately 5.7km west of Nowra town centre. Mundamia is a small New South Wales Rural Location within the local government area of Shoalhaven, it is located approximately 129kms from the capital Sydney. Figure 3 shows the general site location with respect to surrounding towns and major road networks.

The subject site is an irregular shaped parcel of land with a total area of approximately 13.06ha and is located at the end of Flatrock Road. Flatrock Road is accessed from Yalwal Road to the south. The site is generally cleared of all vegetation and topographically variable.

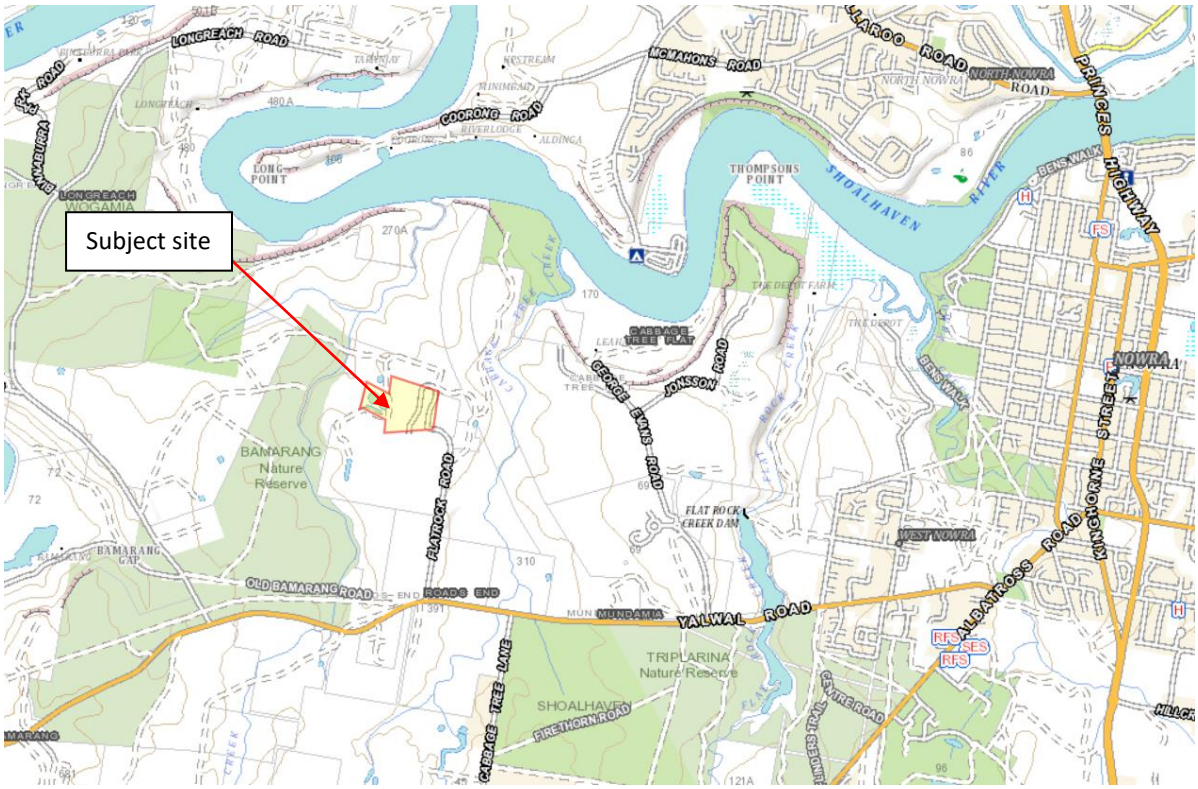

Figure 3: Location of subject site, outlined in red.

Figure 4: Aerial photo showing the approximate site boundaries outlined in blue.

2.2 CLASS OF VEGETATION

The vegetation types have been classified using the formations and sub-formations provided in Figure A1.2 of the bushfire guideline. Vegetation descriptions are as per Keith D, 2004 in Keith (2004) "Ocean Shores to Desert Dunes" published by DECC (except heathlands which is provided two sub-formations rather than one based largely on vegetation height) the main categories are as follows:

- Forests (wet sclerophyll forests and dry sclerophyll forests);
- Woodlands;
- Forested wetlands;
- Tall heaths;
- Freshwater wetlands;
- Short heaths;
- Alpine complex;
- Semi-arid woodlands;
- Arid shrublands;
- Rainforests; and
- Grasslands.

Fuel loads are based on recent information provided by:

- The University of Wollongong's (UoW) Fuels Modelling Project;
- The University of Melbourne (UoM) which reference the fuel classifications found in Keith (2004); and
- CSIRO Ecosystems Sciences and Bushfire Dynamics and Applications.

Where a mix of vegetation types exist, the type providing the greatest bushfire hazard has been used. Vegetation that is to be cleared as part of the development has not been included in this assessment. It should also be noted that remnant vegetation (a parcel of vegetation < 1 ha or fire run of < 50m) and Riparian vegetation are considered a low hazard and APZ setbacks and building construction standards for these will be the same as required for rainforest vegetation.

The following are not required to be considered a bushfire threat for the purposes of PBP, as detailed below:

- Single areas of vegetation less than 1 hectare in area and greater than 100 metres separation from other areas of Category 1 or 2 vegetation.
- Multiple areas of vegetation less than 0.25 hectares in area and not within 20m of the site, or each other or of other areas of vegetation being classified vegetation.
- Strips of vegetation less than 20 metres in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20m of the site or 2 each other, or other areas of vegetation being Category 1, 2 or 3 vegetation.
- Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load, including grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses such as playing areas and fairways, maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens and other non-curing crops, cultivated gardens, arboretums, commercial nurseries, nature strips and windbreaks.

  Note: 1. Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bush fire attack (recognizable as short cropped grass for example, to a nominal height of 100 mm). 2. A windbreak is considered a single row of planted trees located on a boundary and used as a screen or to reduce the effect of wind on the leeward side of the trees.

- Existing areas of managed gardens and lawns within curtilage of buildings. Non-vegetated areas, including waterways, roads, footpaths, buildings, and rocky outcrops.

The site is cleared of vegetation and comprise part of the existing waste management and resource facility. The characteristics of the surrounding vegetation communities were obtained using, Compilation Map: Biometric Vegetation Types & Endangered Ecological Communities of the Shoalhaven, Eurobodalla & Bega Valley Local Government Areas, A Living Map, (2013) NSW Office of Environment and Heritage, V2.0. Vegetation in this area has been classified as a community of Sydney Coastal Dry Sclerophyll Forest.

According to Keith (2004) the Sydney Coastal Dry Sclerophyll Forest vegetation posing a threat to the proposed development would be classified as Forest.

Figure 5: Bushfire Mitigation Plan (Attachment 2).

2.3 ASSESSMENT OF SLOPE

The slope in all directions over a distance of 100m from the existing property boundary or building footprint has been assessed in terms of the following classes:

(i) all upslope vegetation (considered 0°)
(ii) >0 to 5° downslope vegetation
(iii) >5 to 10° downslope vegetation
(iv) >10 to 15° downslope vegetation
(v) >15 to 18° downslope vegetation.

During the assessment of the slope, if it was found that there were a number of different slope classes present over the 100m in any one direction, the slope of the area, which will most significantly influence the fire behavior, has been adopted.

The effective bushfire slopes most influencing bushfire behaviour to the southeast is level to upslope.

2.4 SIGNIFICANT ENVIRONMENTAL FEATURES

The proposed development site contains no known significant environmental features.

2.5 THREATENED SPECIES

There are no known threatened species on the subject land at the time of writing this report.

2.6 ABORIGINAL RELICS

There are no known aboriginal relics located on the subject land at the time of writing this report.

2.7 ZONING

The site is subject to the provisions of Shoalhaven City Council LEP 2014, under which it is zoned **SP2 Infrastructure**. Figure 6 shows the zoning map of the subject site and surrounding lands. The proposed development is permissible within the zone.

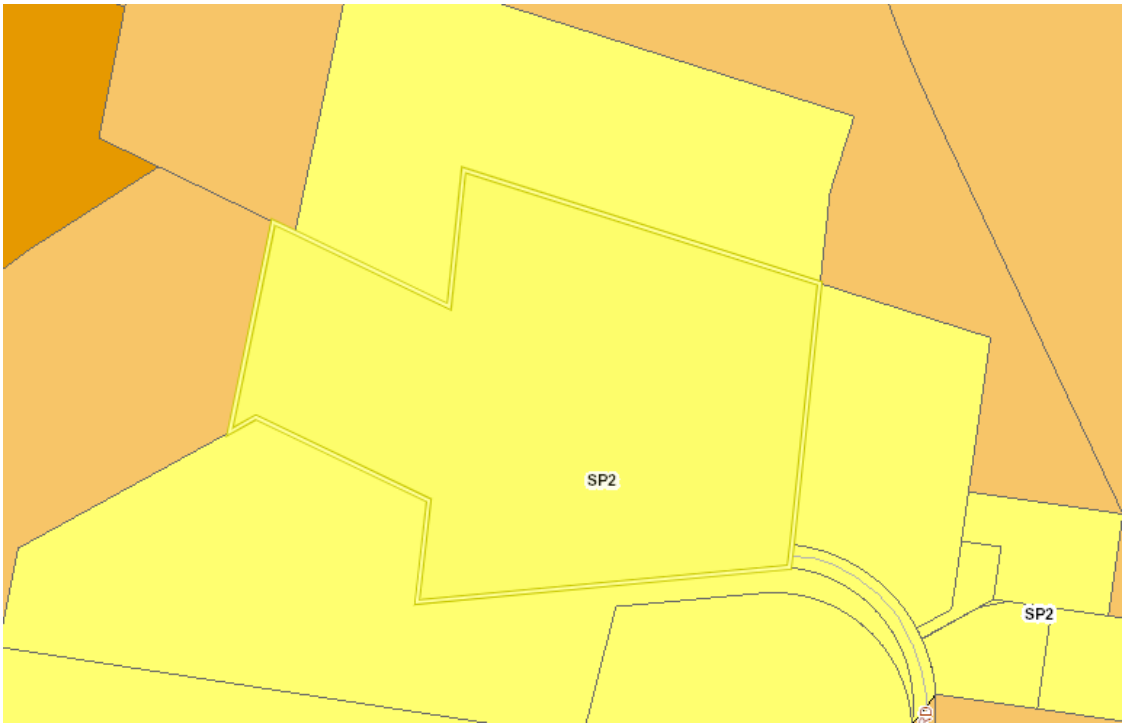

Figure 6: Zoning map of approximate site boundaries outlined in yellow.

3 PROPERTIES ADEQUACY FOR BUSHFIRE PROTECTION

3.1 ASSESSMENT METHODOLOGY

A site inspection was conducted to determine the direction and scale of any potential bush fire event based on an analysis of slope, aspect, vegetation type and density, current fuel loading and evidence of past fire history.

The information contained in the appendices of the PBP 2019 has been used to categorise vegetation type and slope class in the locality, as discussed in Sections 2.2 and 2.3 of this report. Section A1.6 of the PBP 2019 was used to determine the appropriate fire area and corresponding FDI rating. Following on from this, Table A1.12.1 of PBP 2019 was used to determine APZs for each respective vegetation class and the bushfire exposure level (construction requirements) for the proposed development.

3.2 SPECIFICATIONS FOR ASSET PROTECTION ZONE

The aim of APZs is to ensure that there is a progressive reduction in flammable material towards any building. In relation to APZs for infill development the performance criteria are to provide a defendable space onsite and to provide and maintain asset protection zones for the life of the development as to prevent the spread of a fire towards the building. The intent of the measures is to provide sufficient space and maintain reduced fuel loads, so as to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with the building. The performance criteria and acceptable solutions for asset protection zones for infill development in accordance with PBP 2019 are provided in Table 1.

Table 1: Provides the performance criteria and acceptable solutions for APZ in accordance with PBP 2019.

Performance Criteria	Acceptable Solutions	Compliance
The intent may be achieved where:		
Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m².	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	APZ are contained within subject site.
APZs are managed and maintained to prevent the spread of a fire towards the building.	APZs are managed in accordance with the requirements of Appendix 4.	The APZs on the subject site should have no problem being maintained in accordance with the requirements of Standards for Asset Protection Zones (RFS, 2005).
The APZ is provided in perpetuity. APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimized.	APZs are wholly within the boundaries of the development site. The APZ is located on lands with a slope less than 18 degrees.	APZ's are contained within the subject site. The subject site does not contain slopes greater than 18 degrees.

Table 2 provides a breakdown of the vegetation type, slope class and the required APZ for the proposed development. The APZs have been calculated for the Illawarra/Shoalhaven region using a FFDI of 100. The distance for the asset protection zone/separation distance has been measured in accordance with Table A1.12.1 PBP 2019 (Determination of BAL, FFDI 100 – Residential Development) which is between each of the vegetation stands identified (from the edge of the foliage cover) and the building. The separation distances have been measured onsite using a Nikon Forestry Pro Range Finder and Clinometer.

Table 1: Breakdown of the vegetation type, slope class and the required APZ in accordance with Appendix 1 and Table A1.12.5 of PBP 2019.

Direction	*Dominate Vegetation Type*	*Effective Bushfire Slope*	*APZ Provided (m)*	*APZ Recommended (m)*	*BAL*	*Comments*
Resource Recovery Learning Centre (RRLC)						
Southeast	Forest	Upslope	64m	**34m**	**BAL 12.5**	APZs already established.
All Other Directions	Managed Land	-	>100m	-	**BAL Low**	Managed land
NOTE: The NCC does not provide for any bush fire specific performance requirements for Class 9b buildings that are not considered SFPP. As such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions and thus **the building has no specific bushfire construction requirements.** However it is recognised that the proposed development has potential to be used as an assembly building for occupants on-site. Therefore, to provide a better bushfire outcome, it is recommended that the proposed development shall be designed and constructed to comply with Section 3 and Section 5 (**BAL 12.5)** Australian Standard AS3959-2018 'Construction of buildings in bush fire-prone areas' and the relevant sections of sections 7.4 and 7.5 of 'Planning for Bush Fire Protection 2019'						

3.3 ASSESSING THE BUSHFIRE RISK

The main factors directly affecting the behavior of fire are:

- Wind (strength and direction);
- Fuel Moisture and content (how dry it is, relative humidity);
- Type quantity and arrangement of fuel (vegetation density); and
- Slope (fire spreads quicker upslope due to preheating).

The prevailing weather conditions associated with the bushfire season in the Shoalhaven (Mundamia) region are strong north-westerly winds, low relative humidity, and high temperatures. With the combination of the current vegetation (after the land is developed) and slope, the overall bushfire risk, based on radiant heat exposure, associated with the proposed development is **Low**, with the foremost bushfire risk coming from southeast of the development site.

The following combination of mitigation measures are recommended to provide an appropriate level of safety for occupants and a level consistent with that required by PBP 2019:

- A minimum 34m Asset Protection Zone (APZ) shall be maintained around the proposed development. The APZ shall be managed as an Inner Protection Area – IPA (Figure 7) for the life of the development and comply with section 3.2 and Appendix 5 of Planning for Bush Fire Protection 2019 and the NSW Rural Fire Service's document 'Standards for asset protection zones', as outlined below:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

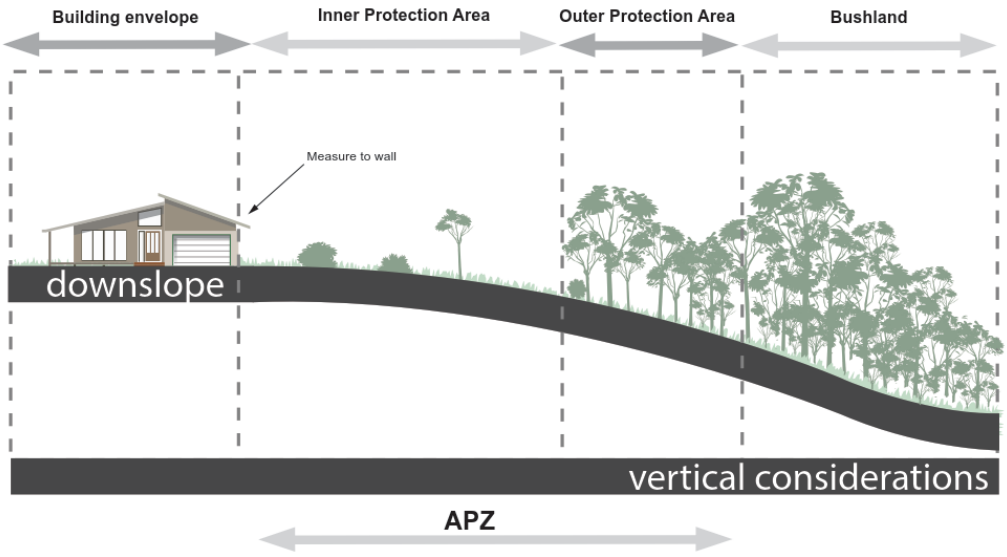

Figure 7: Diagrammatic representation of an Asset Protection Zone.

3.4 CONSTRUCTION STANDARDS

The construction standards and associated performance criteria for infill development require that the proposed building can withstand bushfire attack in the form of wind, smoke, embers, radiant heat and flame contact. Section 3.3 of PBP 2019 requires that the construction standards be determined in accordance with AS3959 or NASH Standards.

AS3959-2018 states that 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 bushfire attack. An elevation is deemed to be not exposed to the source of bushfire attack if all of the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the building. The construction requirements for a shielded elevation shall be not less than that required for BAL—12.5, except where the exposed elevations have been determined as BAL—LOW.

Recommendations

The NCC does not provide for any bush fire specific performance requirements for Class 9 building identified as not being SFPP. As such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions and thus **the building has no specific bushfire construction requirements.**

Whilst bush fire construction is not captured in the NCC for Class 9b (not considered SFPP and having a public assembly less than 500m^2) buildings, it is recognised that the proposed development has potential to be used as an assembly building for occupants on-site. Therefore, to provide a better bushfire outcome, it is recommended that the proposed resource recovery learning centre shall be designed and constructed to comply with Section 3 and Section 5 (**BAL 12.5)** Australian Standard AS3959-2018 'Construction of buildings in bush fire-prone areas' and the relevant sections of sections 7.4 and 7.5 of 'Planning for Bush Fire Protection 2019'.

The specific construction requirements for **BAL 12.5** are provided in Australian Standard AS3959-2018 'Construction of buildings in bush fire-prone areas' (**Attachment 3**). In addition to the construction requirements in AS3959-2018, section 7.5 of 'Planning for Bush Fire Protection 2019' sets out additional construction requirements for development within NSW.

3.5 SITING AND ADEQUACY OF WATER ELECTRICITY AND GAS SUPPLIES

The performance criteria and acceptable solutions for water, electricity, and gas for SFPP development are provided in PBP 2019. The intent of the measures are to provide adequate water services for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

Table 2: Provides the performance criteria and acceptable solutions for water, electricity, and gas for SFPP development in accordance with PBP 2019.

Performance Criteria	Acceptable Solutions	Compliance
Water Resource An adequate water supply for firefighting purposes is installed and maintained.	- reticulated water is to be provided to the development, where available; or - a 10,000 litres minimum static water supply for firefighting purposes is provided for each occupied building where no reticulated water is available.	Reticulated water is available to the site, and internal hydrants are currently installed within the subject site.
Water supplies are located at water supplies are located at regular intervals. The water supply is accessible and reliable for firefighting operations.	- fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005; - hydrants are not located within any road carriageway; and - reticulated water supply to SFPPs uses a ring main system for areas with perimeter roads.	Internal hydrants are currently within the subject site as part of the existing use as a Waste Resource Facility.

Performance Criteria	Acceptable Solutions	Compliance
flows and pressure are appropriate.	- fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	
The integrity of the water supply is maintained.	- all above-ground water service pipes external to the building are metal, including and up to any taps.	Capable of complying.
Electricity Services Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	• where practicable, electrical transmission lines are underground. • where overhead electrical transmission lines are proposed: - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.	The area is serviced by existing electrical transmission lines. The augmentation of that service should have no problem satisfying the acceptable solution for electricity.
Gas services Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings	• reticulated or bottled gas is installed and maintained in accordance with AS 1596:2014 and the requirements of relevant authorities. Metal piping is to be used. • all fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side. • Connections to and from gas cylinders are metal. • polymer-sheathed flexible gas supply lines are not used. • above-ground gas service pipes are metal, including and up to any outlets.	Any future gas bottles shall be installed and maintained in accordance with AS 1596. Gas cylinders are to be positioned in accordance with the acceptable solution outlined in this table. From the site inspection there is no reason why the installation of gas cylinders for future buildings associated with the proposal cannot comply with the acceptable solutions outlined in this table.

3.6 ADEQUACY OF ACCESS AND EGRESS FROM SITE FOR EMERGENCY REPONSES

In relation to access requirements for infill development the performance criteria are for safe, operational access to be provided (and maintained) for emergency services personnel in suppressing a bushfire while residents are seeking to relocate, in advance of a bushfire. The acceptable solution for access is to satisfy the intent and performance criteria for access roads in section 5.3.2 of PBP 2019.

In relation to this development the performance criteria and acceptable solutions for Property Access Roads in section 5.3.2 of PBP 2019 are the relevant requirements. An assessment of the proposed development against these requirements is provided in Table 4.

Table 3: Provides the performance criteria and acceptable solutions for Property Access Roads for residential and rural development in accordance with section 5.3.2 of PBP 2019.

Performance Criteria	Acceptable Solutions	Compliance
Firefighting vehicles are provided with safe, all-weather access to structures	Property access roads are two-wheel drive, all weather roads.	Property access road is a two-wheel drive all weather road.
The capacity of access roads is adequate for firefighting vehicles	The capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.	The proposed property access does not transverse any areas subject to periodic inundation.
There is appropriate access to water supply	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning. There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	No reticulated water available on site. Suitable access to a static water supply shall be provided.
Firefighting vehicles can access the development and exit the property safely.	At least one alternative property access road is provided for individual buildings or groups of buildings that are located more than 200 metres from a public through road. *There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed building and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.* In circumstances where this cannot occur, the following requirements apply: - Minimum 4m carriageway width; - In forest, woodland and heath situations, rural property roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m, at the passing bay; - A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; - Property access must provide a suitable turning area in accordance with Appendix 3; - Curves have a minimum inner radius of 6m and are minimal in number to allow	Access shall be upgraded where required to comply with the following: - Minimum 4m carriageway width; - In forest, woodland and heath situations, rural property roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m, at the passing bay; - A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; - Property access must provide a suitable turning area in accordance with Appendix 3; - Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; - The minimum distance between inner and outer curves is 6m; - The crossfall is not more than 10 degrees; - Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads. The existing access road generally complies with the access requirements of PBP 2019.

Performance Criteria	Acceptable Solutions	Compliance
	for rapid access and egress; - The minimum distance between inner and outer curves is 6m; - The crossfall is not more than 10 degrees; - Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and a development comprising more than three dwellings has formalised access by dedication of a road and not by right of way. • *Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.*	

3.7 ADEQUACY OF BUSHFIRE MAINTENANCE PLANS FOR EMERGENCY

Shoalhaven Rural Fire District (92 Albatross Rd, PO Box 372 Nowra) currently administers bushfire maintenance plans and fire emergency procedures in this particular area.

Legislation requires occupants of land to immediately extinguish fires or notify fire-fighting authorities, on becoming aware of fire during a fire danger period. The most appropriate course of action is to telephone "000" and report the fire.

Considering the nature of the subject development and potential occupancy, should a bushfire emergency impact upon this area, the implementation of the existing South Eastern Regional Emergency Management Plan (EMPLAN) would not be specific enough for emergency procedures associated with a bushfire event. It is our opinion a fire emergency plan and a bushfire maintenance plan should be in place to ensure the safety of all occupants. Therefore, in the author's opinion a site-specific Bush Fire Emergency Management Plan is required.

An emergency/evacuation plan should be prepared prior to occupation. The Bush Fire Emergency Management Plan should be consistent with the RFS Guidelines for Emergency/Evacuation.

The Bush Fire Emergency Evacuation Management Plan (BFEMP) is to provide a systematic procedure in the event of a bushfire emergency event that can be followed by employees, visitors and be easily understood by emergency services that may attend. The BFEMP is to contain procedures to determine whether or not to evacuate or shelter-in-place and gives the occupants instruction prior to and in the event of evacuation. The BFEMP is to address the following five (5) stages of evacuation:

- **Decision to evacuate** - Analyse event intelligence and make an assessment on the necessity to evacuate residents.

- **Warning** - Notifications of event conditions and appropriate actions required are conveyed to the residents.
- **Withdrawal** - The physical movement of at risk residents to safer locations.
- **Shelter** - The provision of refuge to evacuees in a safer location.
- **Return** - Assessment of the facility and managed return of evacuees.

The Bush Fire Emergency Evacuation Management Plan should recognise and incorporate the following:

- Where an FDI is predicted to be greater than 50 (Severe), early evacuations should be considered.
- Signage simply outlining the basic concept of the Fire Emergency and Evacuation Procedures Plan for the caravan park should be displayed at the main entrance point(s) to the development.
- The most important action for on-site refuge during a bushfire event is the timely extinguishment of any small fire that may ignite a building or its immediate environment.
- The following Personal Protective Equipment should be utilised during a bushfire event:
  - Sturdy leather footwear;
  - Long pants and long sleeved shirt or jumper (pure wool or cotton offers the best protection from sparks or embers);
  - Broad brimmed hat;
  - Goggles for eye protection;
  - Heavy duty gloves;
  - Handkerchiefs or cloth nappies to tie over nose and mouth;
  - Wet towels to drape over neck; and
  - Bottled drinking water.

3.8 LANDSCAPING

The performance criteria is for landscaping to be designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind driven embers to cause ignitions. The general principles of landscaping for bushfire protection aim to:

- Prevent flame impingement on the building;
- Provide a defendable space for property protection;
- Reduce fire spread;
- Deflect and filter embers;
- Provide shelter from radiant heat; and
- Reduce wind speed".

It is recommended that any future landscaping be designed and maintained in accordance with the following practices:

- maintaining a clear area of low cut lawn or pavement adjacent to the house;
- keeping areas under fences, fence posts and gates and trees raked and cleared of fuel;
- utilising non-combustible fencing and retaining walls;
- breaking up the canopy of trees and shrubs with defined garden beds;
- organic mulch should not be used in bushfire prone areas and non-flammable material should be used as ground cover, e.g. Scoria, pebbles, recycled crushed bricks.

- planting trees and shrubs such that:
  - the branches will not overhang the roof; and
  - the tree canopy is not continuous.

4. CONCLUSION AND RECOMMENDATIONS

This Bushfire Assessment Report has been prepared for *Terroir,* on behalf of their client, to accompany a development application for the construction of Resource Recovery Learning Centre (RRLC) at Flatrock Road, Mundamia.

The subject property is legally described as Lot 1 DP 1018193. The subject site is an irregular shaped parcel of land with a total area of approximately 13.06ha and is located at the end of Flatrock Road. Flatrock Road is accessed from Yalwal Road to the south. The site is generally cleared of all vegetation and topographically variable.

The development is for a learning centre this will be a resource recovery learning centre located in the existing Shoalhaven City Council Waste Facility at West Nowra (Mundamia), the learning centre will comprise three detached single storey buildings set around a suspended deck to be used as an outdoor learning area. The proposed floor level of the buildings and outdoor learning area are generally indicated to be at or above existing surface levels. Around the eastern and southern wides of the buildings some gabion feature walls are proposed. South of the learning centre, a new carpark is proposed to service the learning centre with disabled parking, bus drop off and pathways and associated landscaping.

Although Public Assembly Buildings are not considered as SFPP under the RF Reg, they still require referral under the EP&A Act s.4.14 to the NSW RFS. For buildings used for public assembly with a floor area greater than 500m², bush fire construction requirements must be taken into account. However, since the proposed resource recovery learning Centre has a publicly available floor space area less than 500m², the Resource Recovery Learning Centre does not need to consider bush fire construction requirements. Nevertheless, compliance with AS3959 and the NASH Standard must still be considered to meet the aims and objectives of PBP.

The site is cleared of vegetation and comprise part of the existing waste management and resource facility. The characteristics of the surrounding vegetation communities has been classified as a community of Sydney Coastal Dry Sclerophyll Forest. According to Keith (2004) the Sydney Coastal Dry Sclerophyll Forest vegetation posing a threat to the proposed development would be classified as Forest. With the combination of the current vegetation (after the land is developed) and slope, the overall bushfire risk, based on radiant heat exposure, associated with the proposed development is **Low**, with the foremost bushfire risk coming from southeast of the development site.

The following combination of mitigation measures are recommended to provide an appropriate level of safety for occupants of the building and a level consistent with that required by PBP 2019:

Asset Protection Zone

1. A minimum 34m Asset Protection Zone (APZ) shall be maintained around the proposed development. The APZ shall be managed as an Inner Protection Area – IPA (Figure 7) for the life of the development and comply with section 3.2 and Appendix 5 of Planning for Bush Fire Protection 2019 and the NSW Rural Fire Service's document 'Standards for asset protection zones'.

Landscaping

2. Any future landscaping shall be designed and maintained in accordance with Table 6.8a of Planning for Bushfire Protection 2019 as outlined below:
   a. maintaining a clear area of low cut lawn or pavement adjacent to the house;
   b. keeping areas under fences, fence posts and gates and trees raked and cleared of fuel;
   c. utilising non-combustible fencing and retaining walls;
   d. breaking up the canopy of trees and shrubs with defined garden beds;
   e. organic mulch should not be used in bushfire prone areas and non-flammable material should be used as ground cover, e.g. Scoria, pebbles, recycled crushed bricks.
   f. planting trees and shrubs such that:
      - the branches will not overhang the roof; and
      - the tree canopy is not continuous.

Construction Standards

The NCC does not provide for any bush fire specific performance requirements for Class 9 building identified as not being SFPP. As such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions and thus ***the building has no specific bushfire construction requirements.*** *However, it is recognised that the proposed development has the potential to be used as an assembly building for occupants on-site. Therefore, to provide a better bushfire outcome, the following construction standard is recommended:*

3. The Resource Recovery Learning Centre (RRLC) shall be designed and constructed to comply with Section 3 and Section 5 (BAL 12.5) Australian Standard AS3959-2018 'Construction of buildings in bush fire-prone areas' and the relevant sections of sections 7.4 and 7.5 of 'Planning for Bush Fire Protection 2019' OR the NASH Standard (1.7.14 updated) 'National Standard Steel Framed Construction in Bushfire Areas-2014' as appropriate.

4. Fences and gates shall be constructed to comply with Section 7.6 of Planning for Bushfire Protection 2019.

5. The provision of electricity and gas shall comply with section 6.8c of 'Planning for Bush Fire Protection 2019'.

Access

6. Access shall be upgraded where and if required to comply with the following:
   - Minimum 4m carriageway width;
   - A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;
   - Property access must provide a suitable turning area in accordance with Appendix 3;

- Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;
- The minimum distance between inner and outer curves is 6m;
- The crossfall is not more than 10 degrees; and
- Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.

Emergency Management

7. An emergency/evacuation plan should be prepared prior to occupation. The Bush Fire Emergency Management Plan should be consistent with the RFS Guidelines for Emergency/Evacuation.

If the proposed development is constructed and maintained in accordance with the recommendations outlined in this report it will comply with performance requirements provided in *Planning for Bushfire Protection* (2019) and AS3959-2018 and will provide adequate provision for firefighting strategies. Compliance with the overall performance provided in *Planning for Bushfire Protection* (2019) and the deem to satisfy provisions provided in AS3959-2018 is provided Table 5.

Table 4: Compliance with the performance requirements of provided in Planning for Bushfire Protection (2019) and the deem to satisfy provisions provided in AS3959-2018.

Bushfire Protection Measure	Compliance
Asset Protection Zone	Refer to Sections 3.2, and 3.3
The siting and adequacy of water supplies for fire fighting	YES - Refer to Sections 3.5.
Capacity of public roads to handle increased volumes of traffic in the event of a bushfire emergency	Not applicable
Whether or not public roads in the vicinity that link with the fire trail network have two-way access	Not applicable.
Adequacy of emergency response access and egress	YES - Refer to Section 3.6.
Adequacy of bushfire maintenance plans and fire emergency procedures	YES - Refer to Sections 3.7.
Building construction standards	Not applicable.
Adequacy of sprinkler systems and other fire protection measures to be incorporated into the development	No sprinkler systems proposed.

This Bushfire Assessment Report should remain current for a period of twelve months (September 2024), at which time it should be subject to review to take into account changing land use and vegetation patterns. Any major bushfire event that affects the subject site should also trigger a review in order to determine the effectiveness of protection measures and annual hazard reduction activities.

The findings contained within this report are the result of discrete/specific methodologies used in accordance with recognised practices. To the best of our knowledge they represent a reasonable interpretation of the general conditions of the site. Having stated this, it is important to note that although designing a building to have an improved level of fire resistance will increase the likelihood of survival in a bushfire, their survival and that of the occupants cannot be guaranteed

and therefore the decision whether to *stay* or *go* should be based on an understanding that the adoption of solutions outlined in this report will not guarantee safety.

ATTACHMENT 1

SITE PLANS

Resource Recovery Learning Centre

Shoalhaven City Council

DA DRAWING LIST

NO.	TITLE	REVISION
DA-00-01	COVER SHEET	01
DA-00-02	EXISTING SITE PLAN	01
DA-00-03	SITE ANALYSIS PLAN	01
DA-00-04	DEMOLITION PLAN	01
DA-00-05	SHADOW DIAGRAMS	01
DA-00-06	MATERIALS BOARD	01
DA-20-01	3D IMAGES	01
DA-21-01	GROUND FLOOR PLAN	01
DA-21-02	ROOF PLAN	01
DA-22-01	BUILDING ELEVATIONS	01
DA-22-02	BUILDING ELEVATIONS	01
DA-23-01	SITE SECTIONS	01
DA-23-02	BUILDING SECTIONS	01

00-06_MATERIAL LEGEND

CODE	DESCRIPTION
CB-01	Concrete Block
CF-01	Concrete Floor
CPT-01	Carpet Tile
CS-01	Canopy Shading
EF-01	External Façade
GW-01	Gabion Wall
RF-01	Metal Sheeting
RF-02	Polycarbonate Sheeting
SG-01	Steel Grating
TC-01	Timber Columns (Recycled)
TF-01	Timber Flooring (Recycled)

GENERAL NOTES

DO NOT SCALE FROM THIS DRAWING

CONFIRM ALL DIMENSIONS AND SETOUTS ON SITE PRIOR TO MANUFACTURE & INSTALLATION

ALL WORK IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS

TO BE READ IN CONJUNCTION WITH ENGINEERS DOCUMENTS.

KEY PLAN

LEGEND

Rev	Date	Description
01	07/06/23	Development Application

Sydney Level 2, 79 Myrtle St
Chippendale 2008
Nominated Architect: Gerard Reinmuth 6629
T 02 9698 2198
F 02 9698 2353

Hobart 181 Elizabeth St
Hobart 7000
Nom. Architect TAS: Scott Balmforth CC1041T
Registered Architect VIC: Scott Balmforth 16263
T 03 6234 6372
F 03 6231 4939

TERROIR

Project:
Shoalhaven City Council
Resource Recovery Learning Centre
120 Flatrock Road, Mundamia NSW

Drawing Description:
COVER SHEET

Drawn by: AN Checked by: GR Scale: @A1

PROJECT NO:	DWG NO:	REV NO:
22204	DA-00-01	01

Drawing Status: DEVELOPMENT APPLICATION

NORTH

NW
9.72%

WINTER

1654
SUNSET

SUNRISE
0700

WNW
14.94%

WEST
10.35%

LOWEST POINT ON SITE

SITE BOUNDARY

BUILDING SETBACK

55,296

OVERFLOW
CARPARK

SIGNIFICANT
NOISE AND DUST SOURCE

SOUTH
10.42%

30.994

REFER LANDSCAPE PLAN
FOR DETAILED PLANTING AND ARRANGEMENT

FLATROCK ROAD

SITE BOUNDARY

BUILDING SETBACK

GENERAL NOTES

DO NOT SCALE FROM THIS DRAWING

CONFIRM ALL DIMENSIONS AND SETOUTS ON SITE PRIOR TO MANUFACTURE & INSTALLATION

ALL WORK IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS

TO BE READ IN CONJUNCTION WITH ENGINEERS DOCUMENTS.

KEY PLAN

LEGEND

0 m 4 m 8 m 12 m 16 m

Rev	Date	Description
01	07/06/23	Development Application

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Nom. Architect TAS: Scott Balmforth CC1041T
Registered Architect VIC: Scott Balmforth 16263
T 03 6234 6372
F 03 6231 4939

TERROIR

Project:
Shoalhaven City Council
Resource Recovery Learning Centre
120 Flatrock Road, Mundamia NSW

Drawing Description:
SITE ANALYSIS PLAN

Drawn by: AN Checked by: JL Scale: 1 : 200@A1

PROJECT NO:	DWG NO:	REV NO:
22204	DA-00-03	01

Drawing Status: DEVELOPMENT APPLICATION

Date Plotted: 30/06/2023 4:26:39 PM File Path: C:\Users\Nguyen\Documents\22204_RRLC_nguyen2VRCR.rvt

GENERAL NOTES

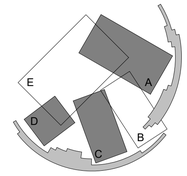
DO NOT SCALE FROM THIS DRAWING

CONFIRM ALL DIMENSIONS AND SETOUTS ON SITE PRIOR TO MANUFACTURE & INSTALLATION

ALL WORK IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS

TO BE READ IN CONJUNCTION WITH ENGINEERS DOCUMENTS.

KEY PLAN



LEGEND

0 m 4 m 8 m 12 m 16 m

SITE BOUNDARY

TREES (DEAD) TO BE REMOVED
REFER TO ARBORIST REPORT
FOR FURTHER DETAIL

TREES TO BE REMOVED
REFER TO ARBORIST REPORT
FOR FURTHER DETAIL

BUILDINGS TO BE RELOCATED

SITE BOUNDARY

OVERFLOW CARPARK

FLATROCK ROAD

REFER LANDSCAPE PLAN
FOR DETAILED PLANTING AND ARRANGEMENT

SITE BOUNDARY

Rev	Date	Description
01	07/06/23	Development Application

Sydney Level 2, 79 Myrtle St
Chippendale 2008
Nominated Architect: Gerard Reinmuth 6629
T 02 9698 2198
F 02 9698 2353

Hobart 181 Elizabeth St
Hobart 7000
Nom. Architect TAS: Scott Balmforth CC1041T
Registered Architect VIC: Scott Balmforth 16263
T 03 6234 6372
F 03 6231 4939

TERROIR

Project:
Shoalhaven City Council
Resource Recovery Learning Centre
120 Flatrock Road, Mundamia NSW

Drawing Description:
DEMOLITION PLAN

Drawn by: AN Checked by: JL Scale: 1:200 @ A1

PROJECT NO:	DWG NO:	REV NO:
22204	DA-00-04	01

Drawing Status: DEVELOPMENT APPLICATION

Date Plotted: 30/06/2023 4:27:52 PM File Path: C:\Users\Nguyen\Documents\22204_RRLC_nguyen2VRCR.rvt

GENERAL NOTES

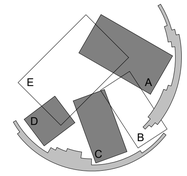
DO NOT SCALE FROM THIS DRAWING

CONFIRM ALL DIMENSIONS AND SETOUTS ON SITE PRIOR TO MANUFACTURE & INSTALLATION

ALL WORK IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS

TO BE READ IN CONJUNCTION WITH ENGINEERS DOCUMENTS.

KEY PLAN



LEGEND

0 m 2 m 4 m 6 m 8 m

00-06_MATERIAL LEGEND	
CODE	DESCRIPTION
CB-01	Concrete Block
CF-01	Concrete Floor
CPT-01	Carpet Tile
CS-01	Canopy Shading
EF-01	External Façade
GW-01	Gabion Wall
RF-01	Metal Sheeting
RF-02	Polycarbonate Sheeting
SG-01	Steel Grating
TC-01	Timber Columns (Recycled)
TF-01	Timber Flooring (Recycled)

Rev	Date	Description
01	07/06/23	Development Application

Sydney Level 2, 79 Myrtle St
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Hobart 181 Elizabeth St
Hobart 7000
Nom. Architect TAS: Scott Balmforth CC1041T
Registered Architect VIC: Scott Balmforth 16263
T 03 6234 6372
F 03 6231 4939

TERROIR

Project:

Shoalhaven City Council
Resource Recovery Learning Centre
120 Flatrock Road, Mundamia NSW

Drawing Description:

ROOF PLAN

Drawn by: AN Checked by: JL Scale: 1:100 @ A1

PROJECT NO:	DWG NO:	REV NO:
22204	DA-21-02	01

Drawing Status: DEVELOPMENT APPLICATION

ATTACHMENT 2

BUSHFIRE MITIGATION PLAN

SET consultants

Bushfire Mitigation Plan

Lot 1 DP1018193,
Flatrock Road,
Mundamia

Map Key

Lot
100m Buffer
140m Buffer
1m_contours
Development Footprint
Sydney Coastal DSF
Slope Analysis

0 25 50 m

DATE:6/12/2022

ATTACHMENT 3

CONSTRUCTION REQUIREMENTS

SECTION 3 GENERAL CONSTRUCTION REQUIREMENTS

3.1 GENERAL

This Section specifies general requirements for the construction of buildings for all Bushfire Attack Levels (BALs).

The BALs and the corresponding Sections for specific construction requirements are listed in Table 3.1.

TABLE 3.1

BUSHFIRE ATTACK LEVELS AND CORRESPONDING SECTIONS FOR SPECIFIC CONSTRUCTION REQUIREMENTS

Bushfire Attack Level (BAL)	Classified vegetation within 100 m of the site and heat flux exposure thresholds	Description of predicted bushfire attack and levels of exposure	Construction Section
BAL—LOW	See Clause 2.2.3.2	There is insufficient risk to warrant specific construction requirements	4
BAL—12.5	≤12.5 kW/m^2	Ember attack	3 and 5
BAL—19	>12.5 kW/m^2 ≤19 kW/m^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 and 6
BAL—29	>19 kW/m^2 ≤29 kW/m^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 and 7
BAL—40	>29 kW/m^2 ≤40 kW/m^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux with the increased likelihood of direct contact with flames	3 and 8
BAL—FZ	>40 kW/m^2	Direct exposure to flames from fire front in addition to heat flux and ember attack	3 and 9

3.2 CONSTRUCTION REQUIREMENTS FOR SPECIFIC STRUCTURES

3.2.1 Attached structures and structures sharing a common roof space

Where any part of a garage, carport, veranda, cabana, studio, storage area or similar roofed structure is attached to, or shares a common roof space with, a building required to conform with this Standard, the entire garage, carport, veranda or similar roofed structure shall conform with the construction requirements of this Standard, as applicable to the subject building.

Alternatively, the structure shall be separated from the subject building by a wall that extends to the underside of a non-combustible roof covering, and that conforms with one of the following:

(a) The wall shall have an FRL of not less than 60/60/60 for loadbearing walls and –/60/60 for non-loadbearing walls when tested from the attached structure side and shall have openings protected as follows:

A2

(i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*—by construction with an FRL of not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

(b) The wall shall be of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and shall have openings protected as follows:

A2 (i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*—by construction with an FRL of not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.2.2 Garages and carports beneath the subject building

Where a garage or carport is beneath a building required to comply with this Standard, it shall conform with the construction requirements of this Standard, as applicable to the subject building.

Alternatively, any construction separating the garage or carport (including walls and flooring systems) from the remainder of the building shall conform with one of the following:

(a) The separating construction shall have an FRL of not less than 60/60/60 for loadbearing construction and –/60/60 for non-loadbearing construction when tested from the garage or carport side and shall have openings protected in accordance with the following:

A2 (i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*—by construction with an FRL of not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

(b) Where part or all of the separating construction is a wall, the wall need not conform with Item (a) above, provided the wall is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and the wall has openings protected in accordance with the following:

A2 (i) *Doorways*—by self-closing fire doors with an FRL of –/60/30 that conforms with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*—by construction with an FRL not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.2.3 Adjacent structures on the subject allotment

Where any garage, carport, or similar roofed structure on the subject allotment is not attached to a building required to conform with this Standard, that structure shall conform with the construction requirements of this Standard.

Alternatively, the adjacent structure shall be separated from the subject building by one of the following:

(a) A distance of not less than 6 m from the building required to conform with this Standard. This distance is measured as any of the horizontal straight lines from the adjacent structure to the subject building.

or

(b) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and has an FRL of not less than 60/60/60 for loadbearing walls and –/60/60 for non-loadbearing walls when tested from the outside. Any openings in the wall shall be protected in accordance with the following:

A2

(i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*—by construction with an FRL of not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

(c) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness. Any openings in the wall shall be protected in accordance with the following:

A2

(i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*—by construction with an FRL of not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.3 EXTERNAL MOULDINGS

Unless otherwise required in Clause 3.6.1 and Sections 5 to 9, combustible external mouldings, jointing strips, trims and sealants may be used for decorative purposes or to cover joints between sheeting material.

3.4 HIGHER LEVELS OF CONSTRUCTION

The construction requirements specified for a particular BAL shall be acceptable for a lower level.

NOTE: For example, if the site has been assessed at BAL—12.5, BAL—12.5 construction is required; however any element or combination of elements contained in BAL—19, BAL—29, BAL—40 and BAL—FZ levels of construction may be used to satisfy this Standard.

3.5 REDUCTION IN CONSTRUCTION REQUIREMENTS DUE TO SHIELDING

Where an elevation is not exposed to the source of bushfire attack, then the construction requirements for that elevation can reduce to the next lower BAL. However it shall not reduce to below BAL—12.5.

An elevation is deemed to be not exposed to the source of bushfire attack if all of the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the same building (see Figure 3.1). However it shall not reduce to below BAL 12.5.

The shielding of an elevation shall apply to all the elements of the wall, including openings, but shall not apply to subfloors or roofs.

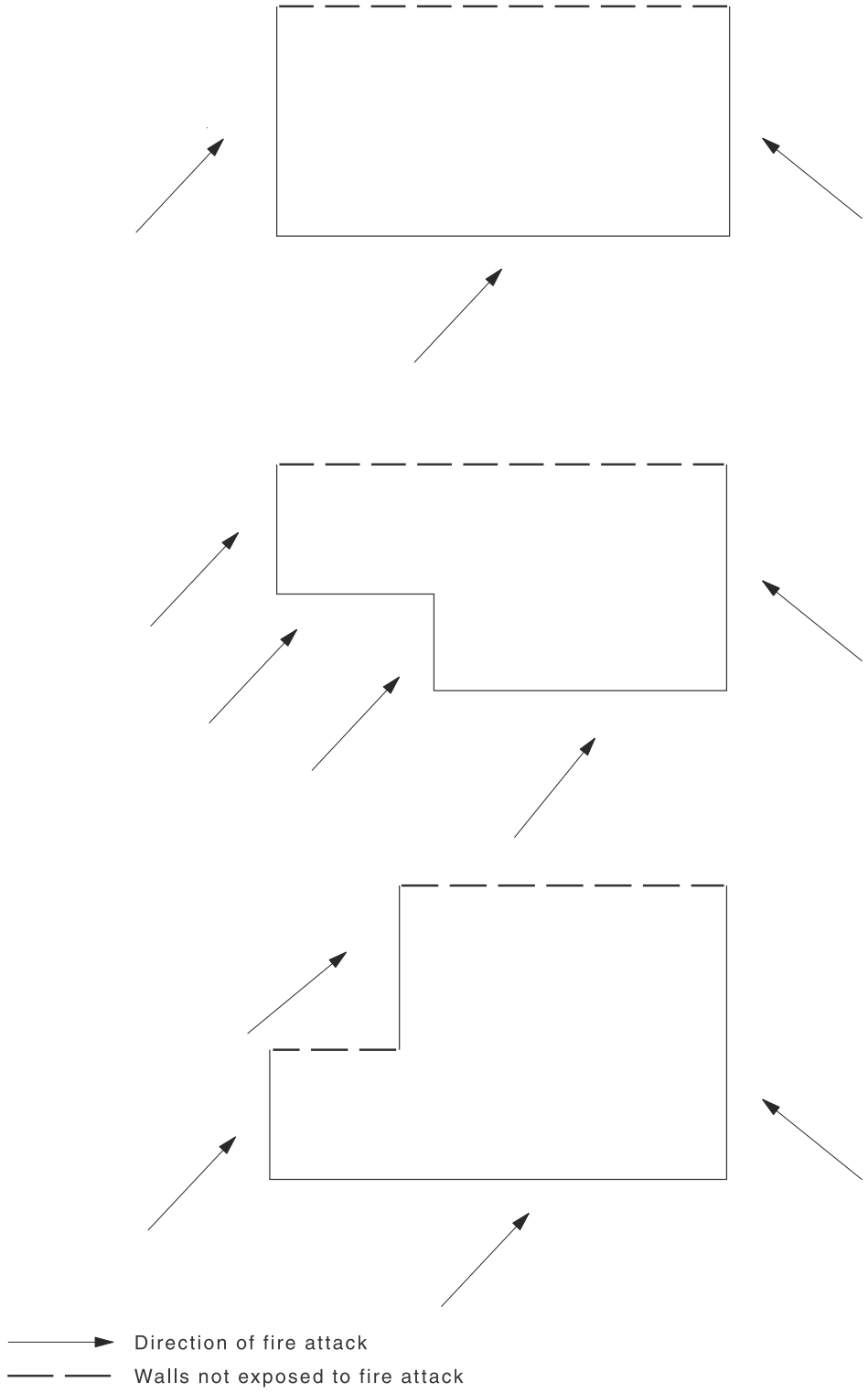

FIGURE 3.1 EXAMPLES OF WALLS SUBJECT TO SHIELDING

A2 | ## 3.6 VENTS, WEEPHOLES, GAPS AND SCREENING MATERIAL

3.6.1 Vents, weepholes, joints and the like

All gaps including vents, weepholes and the like shall be screened, except for weepholes to the sills of windows and doors.

All joints shall be suitably backed with a breathable sarking or mesh, except as permitted by Clause 3.3.

The maximum allowable aperture size of any mesh or perforated material used as a screen shall be 2 mm.

C3.6.1 *Weepholes in sills of windows and doors and those gaps between doors and door jambs, heads or sills (thresholds) are exempt from screening because they do not provide a direct passage for embers to the interior of the building or building cavity.*

3.6.2 Gaps to door and window openings

Where screens are fitted to door openings for ember protection, they shall have a maximum aperture of 2.0 mm and be tight fitting to the frame in the closed position.

Gaps between doors including jambs, heads or sills (thresholds) shall be protected using draught seals and excluders or the like (see Figure 3.2).

Windows conformant with AS 2047 will satisfy the requirements for gap protection. Screens fitted to window openings shall have a maximum aperture of 2.0 mm and these shall be tight fitting to the frames.

A2 | ***C3.6.2*** *There is no requirement to screen the openable parts of doors for ember protection at the lower BALs, however in many circumstances it may be desirable to screen the opening for insect protection. In such circumstances, where the insect screen is fitted internally, such screens may be considered as a door furnishing and the use of non-metallic mesh permissible, provided the screening system is fitted internally and wholly protected by the closed door.*

A2

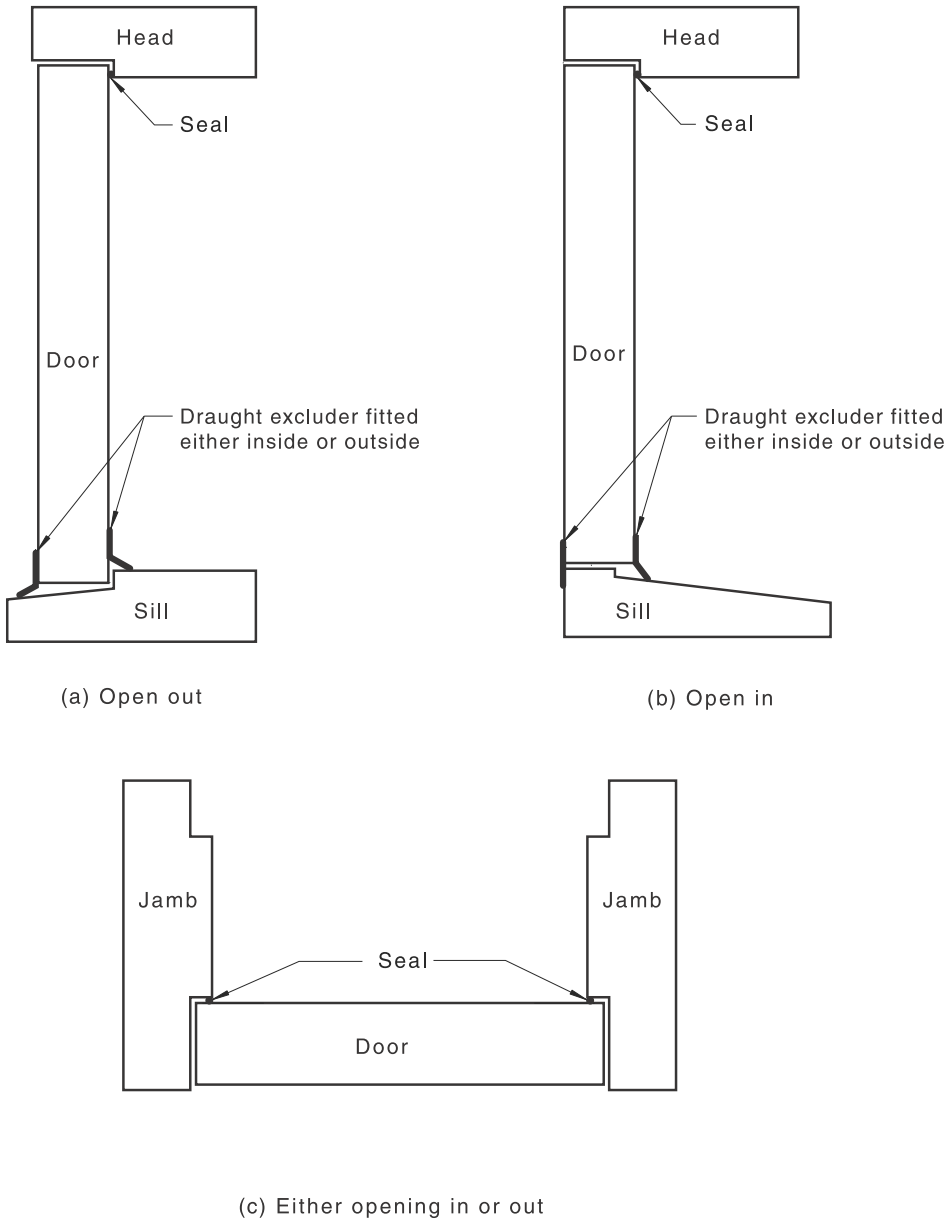

FIGURE 3.2 GAPS BETWEEN DOORS AND THE DOOR JAMBS, HEADS OR SILLS (THRESHOLDS)

3.7 BUSHFIRE SHUTTERS

Bushfire shutters shall—

(a) protect the entire window assembly including framing, glazing, sash and sill;

(b) protect the entire door assembly including framing, glazing, sill and hardware;

A2 (c) consist of material specified in Clauses 5.5.1, 6.5.1, 7.5.1, 8.5.1 and 9.5.1 for the relevant BAL;

(d) be fixed to the building and be non-removable;

(e) be capable of being closed manually from either inside or outside or motorised shutter systems, where they are not reliant on mains power to close;

NOTE: If power-assisted shutter systems are used then that system is powered with continuous back-up energy such as a battery system.

(f) when in the closed position, have no gap greater than 2 mm between the shutter and the wall, frame or sill; and

(g) where perforated, have uniformly distributed perforations with a maximum aperture of 2 mm and a perforated area no greater than 20% of the shutter.

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

A2

3.8 TESTING OF MATERIAL, ELEMENTS OF CONSTRUCTION AND SYSTEMS TO THE AS 1530.8 SERIES

A2

Unless otherwise specified, elements of construction and systems satisfy this Standard when tested in accordance with the AS 1530.8 series for the relevant BAL and Crib Class in Table 3.2.

A2

Elements of construction or systems tested in accordance with AS 1530.8.1—2007 with Crib Classes A, B and C prior to the issue of this Standard are acceptable.

TABLE 3.2

A2

TESTING OF MATERIAL, ELEMENTS OF CONSTRUCTION AND SYSTEMS

Acceptable test criteria	Relevant allowable BAL	Crib class
AS 1530.8.1	BAL—12.5 to BAL—40	AA
AS 1530.8.2	BAL—FZ	Not applicable

Where any element of construction or system satisfies the test criteria in the AS 1530.8 series without screening for ember protection, the requirements of this Standard for screening of openable parts of windows shall still apply.

Where a window protected with a shutter satisfies the test criteria of the AS 1530.8 series, the additional requirements of this Standard for screening of openable parts of windows do not apply.

NOTE: The ember protection function of tested shutter has been verified by the testing.

3.9 GLAZING

Glazing requirements shall be in accordance with Sections 5 to 9 of this Standard.

NOTES:

1 Where double-glazed assemblies are used, the glazing requirements provided in this Standard apply to the external face of the glazed assembly only.

2 Refer to AS 1288 for an explanation of the terminologies used to describe various types of glass in this Standard.

3.10 SARKING

A2 Where sarking is required in Sections 5 to 9, the flammability index shall be not greater than 5 when tested in accordance with AS 1530.2.

C3.10 *Sarking material is a principle component used to control condensation and is used for energy efficiency purposes under the NCC. It may be vapour permeable or impermeable dependant on its location within the structure. Seek independent advice regarding selection of sarking prior to installation.*

3.11 TIMBER LOG WALLS

Where the thickness of a timber log wall is specified in Sections 5, 6 and 7, two criteria are nominated, as follows:

(a) The nominal overall thickness is the overall thickness of the wall.

(b) The minimum thickness is the thickness of the wall at the interface of two logs in the wall.

For most log profiles, the thickness of the log at the interface with an adjacent log is less than the overall thickness of the wall.

SECTION 5 CONSTRUCTION REQUIREMENTS FOR BAL—12.5

5.1 GENERAL

A building assessed in Section 2 as being BAL—12.5 shall conform with Section 3 and Clauses 5.2 to 5.8.

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

NOTE: BAL—12.5 is primarily concerned with protection from ember attack and radiant heat up to and including 12.5 kW/m^2 where the site is less than 100 m from the source of bushfire attack.

5.2 SUB-FLOOR SUPPORTS

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

(a) a wall that conforms with Clause 5.4; 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).

A2 Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles shall be constructed of —

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) a timber species as specified in Appendix E Paragraph E1; or

(iv) a combination of Items (i), (ii) and (iii).

NOTE: This requirement applies to the subject building only and not to verandas, decks, steps, ramps and landings (see Clause 5.7).

A2 Combustible material should not be stored in the subfloor space as these may be ignited by embers and cause an additional impact to the building.

‘**Text deleted**’

5.3 FLOORS

5.3.1 General

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

5.3.2 Elevated floors

5.3.2.1 *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 conforms with Clause 5.4; or

(b) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or

A2 (c) a combination of Items (a) and (b).

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5.3.2.2 *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:

A2 (a) Material that conform 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).

(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);

or

A2 (b) A system that conforms with AS 1530.8.1.

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

5.4 WALLS

5.4.1 General

The exposed components of an external wall that are less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle of less than 18 degrees to the horizontal and extending more than 110 mm
A2 in width from the wall (see Figure D3, Appendix D) shall be as follows:

(a) Non-combustible material including the following provided the minimum thickness is 90 mm:

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

(ii) Precast or in situ walls of concrete or aerated concrete.

(iii) Earth wall including mud brick; or

(b) Timber logs of a species with a density of 680 kg/m^3 or greater at a 12% moisture content; of a minimum nominal overall thickness of 90 mm and a minimum thickness of 70 mm (see Clause 3.11); and gauge planed; or

(c) Cladding that is fixed externally to a timber-framed or a steel-framed wall and is—

(i) non-combustible material; or

(ii) fibre-cement a minimum of 6 mm in thickness; or

(iii) bushfire-resisting timber (see Appendix F); or

(iv) a timber species as specified in Paragraph E1, Appendix E; or

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A2 (v) steel sheeting; or

(vi) a combination of any of Items (i), (ii), (iii) (iv) or (v); or

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

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

5.4.2 Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed.

5.4.3 Vents and weepholes

Except for exclusions provided in Clause 3.6, vents and weepholes in external walls shall be screened with a mesh made of corrosion-resistant steel, bronze or aluminium.

5.5 EXTERNAL GLAZED ELEMENTS, ASSEMBLIES AND DOORS

5.5.1 Bushfire shutters

Where fitted, bushfire shutters shall conform with Clause 3.7 and be made from—

(a) non-combustible material; or

(b) a timber species as specified in Paragraph E1, Appendix E; or

(c) bushfire-resisting timber (see Appendix F); or

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

5.5.2 Screens for windows and doors

Where fitted, screens for windows and doors shall have a mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium.

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

(a) metal; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species as specified in Paragraph E2, Appendix E.

5.5.3 Windows and sidelights

Window assemblies shall:

A2 (a) be completely protected by a bushfire shutter that conforms with Clause 3.7 and Clause 5.5.1; or

(b) be completely protected externally by screens that conform with Clause 3.6 and Clause 5.5.2; or

C5.5.3(A) *For Clause 5.5.3(b), the screening needs to be applied to cover the entire assembly, that is including framing, glazing, sash, sill and hardware.*

or

A2 (c) conform with the following:

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(i) *Frame material* For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D),window frames and window joinery shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F); or

(B) A timber species as specified in Paragraph E2, Appendix E; or

(C) Metal; or

(D) Metal-reinforced uPVC. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel.

There are no specific restrictions on frame material for all other windows.

(ii) *Hardware* There are no specific restrictions on hardware for windows.

(iii) *Glazing* Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), this glazing shall be Grade A safety glass a minimum of 4 mm in thickness or glass blocks with no restriction on glazing methods.

NOTE: Where double-glazed assemblies are used above, the requirements apply to the external pane of the glazed assembly only. For all other glazing, annealed glass may be used in accordance with AS 1288.

A2 (iv) *Seals and weather strips* There are no specific requirements for seals and weather strips at this BAL.

(v) *Screens* The openable portions of windows shall be screened internally or externally with screens that conform with Clause 3.6 and Clause 5.5.2.

A2 ***C5.5.3(B)*** *For Clause 5.5.3(c), screening to openable portions of all windows is required in all BALs to prevent the entry of embers to the building when the window is open.*

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

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall—

(a) be completely protected by bushfire shutters that conform with Clause 3.7 and Clause 5.5.1;

or

(b) be completely protected externally by screens that conform with Clause 3.6 and Clause 5.5.2;

or

(c) conform with the following:

A2 (i) *Door panel material* Material shall be—

(A) non-combustible; or

(B) solid timber, laminated timber or reconstituted timber, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

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(C) hollow core, solid timber, laminated timber or reconstituted timber with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(D) hollow core, solid timber, laminated timber or reconstituted timber protected externally by a screen that conforms with Clause 5.5.2; or

(E) for fully framed glazed door panels, the framing shall be made from metal or bushfire resisting timber (see Appendix F) or a timber species as specified in Paragraph E2, Appendix E or uPVC.

A2 (ii) *Door frame material* Door frame material shall be—

(A) bushfire resisting timber (see Appendix F); or

(B) a timber species as specified in Paragraph E2 of Appendix E; or

(C) metal; or

(D) metal-reinforced uPVC. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel.

A2 (iii) *Hardware* There are no specific requirements for hardware at this BAL.

(iv) *Glazing* Where doors incorporate glazing, the glazing shall be Grade A safety glass a minimum of 4 mm in thickness, or glass blocks with no restriction on glazing methods.

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

A2 (v) *Seals and weather strips* Weather strips, draught excluders or draught seals shall be installed.

(vi) *Screens* There is no requirement to screen the openable part of the door at this BAL.

(vii) Doors shall be tight-fitting to the door frame and to an abutting door, if applicable.

5.5.5 Doors—Sliding doors

Sliding doors shall—

(a) be completely protected by a bushfire shutter that conforms with Clause 3.7 and Clause 5.5.1;

or

(b) be completely protected externally by screens that conform with Clause 3.6 and Clause 5.5.2; or

(c) conform with the following:

(i) *Frame material* The material for door frames, including fully framed glazed doors, shall be—

(A) bushfire-resisting timber (see Appendix F); or

(B) a timber species as specified in Paragraph E2, Appendix E; or

(C) metal; or

(D) metal-reinforced uPVC and the reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel.

A2 (ii) *Hardware* There are no specific requirements for hardware at this BAL.

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A2 (iii) *Glazing* Where doors incorporate glazing, the glazing shall be Grade A safety glass a minimum of 4 mm in thickness.

A2 (iv) *Seals and weather strips* There are no specific requirements for seals and weather strips at this BAL.

A2 (v) *Screens* There is no requirement to screen the openable part of the sliding door at this BAL.

(vi) *Sliding panels* Sliding panels shall be tight-fitting in the frames.

5.5.6 Doors—Vehicle access doors (garage doors)

The following applies to vehicle access doors:

(a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet a minimum of 6 mm in thickness; or

(iv) a timber species as specified in Paragraph E1, Appendix E; or

(v) a combination of any of Items (i), (ii), (iii) or (iv).

(b) All vehicle access doors shall be protected with suitable weather strips, draught excluders, draught seals or brushes. Door assemblies fitted with guide tracks do not need edge gap protection.

NOTES:

1 Refer to AS/NZS 4505 for door types.

2 Gaps of door edges or building elements should be protected as per Section 3.

C5.5.6(b) *These guide tracks do not provide a direct passage for embers into the building.*

(c) Vehicle access doors with ventilation slots shall be protected in accordance with Clause 3.6.

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

5.6.1 General

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

(a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.

(b) The roof/wall and roof/roof junction shall be sealed or otherwise protected in accordance with Clause 3.6.

A2 (c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet that conforms with Clause 3.6 and, made of corrosion-resistant steel, bronze or aluminium.

(d) Only evaporative coolers manufactured in accordance with AS/NZS 60335.2.98 shall be used. Evaporative coolers with an internal damper to prevent the entry of embers into the roof space need not be screened externally.

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5.6.2 Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall—

(a) be located on top of the roof framing, except that the roof battens may be fixed above the sarking;

(b) cover the entire roof area including ridges and hips; and

(c) extend into gutters and valleys.

5.6.3 Sheet roofs

Sheet roofs shall—

(a) be fully sarked in accordance with Clause 5.6.2, except that foil-backed insulation blankets may be installed over the battens; or

(b) have any gaps sealed at the fascia or wall line, hips and ridges by—

(i) a mesh or perforated sheet that conforms with Clause 3.6 and that is made of corrosion-resistant steel, bronze or aluminium; or

(ii) mineral wool; or

(iii) other non-combustible material; or

(iv) a combination of any of Items (i), (ii) or (iii).

C5.6.3 *Sarking is used as a secondary form of ember protection for the roof space to account for minor gaps that may develop in sheet roofing.*

5.6.4 Veranda, carport and awning roof

The following applies to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 5.6.1 to 5.6.6.

(b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] that conforms with Clause 5.4 shall have a non-combustible roof covering, except where the roof covering is a translucent or transparent material. A2

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

5.6.5 Roof penetrations

The following applies to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors or the like, shall be sealed. The material used to seal the penetration shall be non-combustible.

(b) Openings in vented roof lights, roof ventilators or vent pipes shall conform with Clause 3.6 and be made of corrosion-resistant steel, bronze or aluminium.

This requirement does not apply to a room sealed gas appliance.

NOTE: A gas appliance designed such that air for combustion does not enter from, or combustion products enter into, the room in which the appliance is located.

In the case of gas appliance flues, ember guards shall not be fitted.

NOTE: AS/NZS 5601 contains requirements for gas appliance flue systems and cowls. Advice can be obtained from manufacturers and State and Territory gas technical regulators.

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A2 (c) All overhead glazing shall be Grade A safety glass that conforms with AS 1288.

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A A2 safety glass diffuser, that conforms with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass of minimum 4 mm in thickness shall be used in the outer pane of the IGU.

(e) Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a A2 flammability index not greater than 5.

(f) Evaporative cooling units shall be fitted with non-combustible butterfly closers as close as practicable to the roof level or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(g) Vent pipes made from PVC are permitted.

(h) Eaves lighting shall be adequately sealed and not compromise the performance of the element.

5.6.6 Eaves linings, fascias and gables

The following applies to eaves linings, fascias and gables:

(a) Gables shall conform with Clause 5.4.

A2 (b) Eaves penetrations shall be protected as for roof penetrations as specified in Clause 5.6.5.

(c) Eaves ventilation openings shall be fitted with ember guards in accordance with Clause 3.6 and made of corrosion-resistant steel, bronze or aluminium.

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

‘**Text deleted**’

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

5.6.7 Gutters and downpipes

This Standard does not provide material requirements for—

(a) gutters, with the exception of box gutters; and

(b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

5.7 VERANDAS, DECKS, STEPS AND LANDINGS

5.7.1 General

Decking may be spaced.

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

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A2 ***C5.7.1*** *Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0 – 5 mm during service. It should be noted that research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacing of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.*

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

A2 **5.7.2.1** *Material to enclose a subfloor space*

This Standard does not provide construction requirements for the material used to enclose a subfloor space except where those material are less than 400 mm from the ground.

Where the material used to enclose a subfloor space are less than 400 mm from the ground, they shall conform with Clause 5.4.

5.7.2.2 *Supports*

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

5.7.2.3 *Framing*

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

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

This Standard does not provide construction requirements for decking, stair treads and the trafficable surfaces of ramps and landings that are more than 300 mm from a glazed element.

Decking, stair treads and the trafficable surfaces of ramps and landings less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species as specified in Paragraph E1, Appendix E; or

(d) uPVC; or

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

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

5.7.3.1 *Supports*

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

5.7.3.2 *Framing*

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

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

This Standard does not provide construction requirements for decking, stair treads and the trafficable surfaces of ramps and landings that are more than 300 mm from a glazed element.

Decking, stair treads and the trafficable surfaces of ramps and landings less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species as specified in Paragraph E1, Appendix E; or

A2 (d) a combination of any of Items (a), (b) or (c).

5.7.4 Balustrades, handrails or other barriers

This Standard does not provide construction requirements for balustrades, handrails and other barriers.

5.7.5 Veranda posts

Veranda posts—

(a) shall be timber mounted on galvanized mounted shoes or stirrups with a clearance of not less than 75 mm above the adjacent finished ground level; or

(b) less than 400 mm (measured vertically) from the surface of the deck or ground (see Figure D2, Appendix D) shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) a timber species as specified in Paragraph E1, Appendix E; or

(iv) a combination of any of Items (a) or (b).

5.8 WATER AND GAS SUPPLY PIPES

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

External gas pipes and fittings above ground shall be of steel or copper construction having a minimum wall thickness in accordance with gas regulations or 0.9 mm whichever is the greater. The metal pipe shall extend a minimum of 400 mm within the building and 100 mm below ground.

NOTE: Refer to State and Territory gas regulations, AS/NZS 5601.1 and AS/NZS 4645.1.

C5.8 *Concern is raised for the protection of bottled gas installations. Location, shielding and venting of the gas bottles needs to be considered.*

7.5 Additional construction requirements

To ensure the performance criteria for construction standards given in section 7.4 can be met, PBP adopts additional measures over and above AS 3959 and NASH Standard as follows:

- construction measures for ember protection at BAL‑12.5 and BAL‑19 provided by AS 3959;
- construction measures for development in BAL‑FZ; and
- requirements over and above the performance criteria contained within AS 1530.8.1 and AS 1530.8.2 apply in regards to flaming.

7.5.1 Ember protection

Based on the findings from the 2009 Victorian Bush Fires Royal Commission, PBP aims to maintain the safety levels previously provided by AS 3959:1999 in relation to ember protection at lower Bush Fire Attack Levels.In particular, the areas addressed are in relation to:

- sarking;
- subfloor screening;
- floors;
- verandas, decks, steps, ramps and landings;
- timber support posts and beams; and
- fascias and bargeboards.

7.5.2 NSW State Variations under G5.2(a) (i) and 3.10.5.0(c)(i) of the NCC

Certain provisions of AS 3959 are varied in NSW based on the findings of the Victorian Bush Fires Royal Commission and bush fire industry research.

The following variations to AS 3959 apply in NSW for the purposes of NSW G5.2(a)(i) of Volume One and NSW 3.10.5.0(c)(i) of Volume Two of the NCC;

- clause 3.10 of AS 3959 is deleted and any sarking used for BAL‑12.5, BAL‑19, BAL‑29 or BAL ‑40 shall:
    - be non‑combustible; or
    - comply with AS/NZS 4200.1, be installed on the outside of the frame and have a flammability index of not more than 5 as determined by AS 1530.2; and
- clause 5.2 and 6.2 of AS 3959 is replaced by clause 7.2 of AS 3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL; and
- clause 5.7 and 6.7 of AS 3959 is replaced by clause 7.7 of AS 3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL; and
- fascias and bargeboards, in BAL-40, shall comply with:
    - clause 8.4.1(b) of AS 3959; or
    - clause 8.6.6 of AS 3959.

7.5.3 Construction in the flame zone

The flame zone is the area that has significant potential for sustained flame contact during a bush fire. The flame zone is determined by the calculated distance at which the radiant heat of the design fire exceeds 40kW/m².

The NCC references AS 3959 and the NASH Standard. The NSW variation to the NCC excludes both AS 3959 and the NASH Standard as a Deemed to Satisfy solution for buildings that are required to be constructed to BAL‑FZ as defined in AS 3959.

Although Chapter 9 of AS 3959 and the NASH Standard has not been adopted, they should still be used as a basis for a performance based solution demonstrating compliance with the performance requirements of the NCC and PBP for construction in the flame zone.

All flame zone developments should be sited and designed to minimise the risk of bush fire attack. Buildings should be designed and sited in accordance with appropriate siting and design principles to ensure the safest protection from bush fire impacts.

7.5.4 Flaming

Materials that allow flaming can be problematic and are not supported by the NSW RFS for the following reasons:

- flaming materials increase the exposure of other elements of construction and the adjoining structure to flame contact after a bush fire front has passed; and
- flaming materials will potentially increase the exposure of occupants of the building to radiant heat, direct flame contact, smoke after a bush fire front has passed.

This increase in exposure can contribute to the risk of loss of life and compromise the ability of residents to defend their property and egress from the building once the bush fire front has passed.

In addition, it can reduce the ability of occupants to make safe and effective decisions about their safety. Where there is potential for materials of construction to ignite as a result of bush fire attack, the proposed building solution generally fails the construction performance criteria for residential infill development.

For development which may be subject to flame contact (BAL-40 and BAL-FZ), systems tested in accordance with AS 1530.8.1 and AS 1530.8.2 respectively will be considered, except that there is to be no flaming of the specimen except for:

- window frames that have passed the criteria of AS 1530.8.1 and AS 1530.8.2, may be approved provided their flaming is not considered to compromise the safety of other elements of the building; and
- use of other minor elements which allow flaming may be considered provided they do not compromise the integrity of the fire safety of the building (examples include address numbers, house names, decorative artwork, etc).

Flaming of other more significant elements of the building (such as aesthetic wall cladding) is considered to pose an unacceptable risk and will not be supported.

7.6 Fences and gates

Fences and gates in bush fire prone areas may play a significant role in the vulnerability of structures during bush fires. In this regard, all fences in bush fire prone areas should be made of either hardwood or non-combustible material. However, in circumstances where the fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.