BEMC
Bushfire
Environmental
Management
Consultancy

BUSH FIRE ASSESSMENT REPORT

Development of Class 5-8 Buildings
Highway Service Centre
16330 Newell Highway, Gillenbah, NSW, 2700
Lot 1 / DP 200087

Reference #:241954

FPA AUSTRALIA
BRONZE MEMBER
Fire Protection Association Australia

BPAD
Bushfire Planning & Design
Accredited Practitioner
Level 3

Bush Fire Certificate

Certificate issued unders4.14(1)(b) of the *Environmental Planning & Assessment Act, 1979*

This Certificate has been issued by a person accredited by Fire Protection Association Australia (FPA Australia) under the Bush Fire Planning and Design (BPAD) Accreditation Scheme and who is recognised by the NSW Rural Fire Service as a qualified consultant in bushfire risk assessment within the meaning of section 4.14(1)(b) of the *Environmental Planning and Assessment Act 1979* (NSW).

Property Details and Description of Works

Address Details	**Unit no**	**Street no** 16330	**Street name** Newell Highway		**Lot/Sec/DP** Lot 1 / DP 200087
	Suburb Gillenbah		**State** NSW		**Postcode** 2700
Local Government Area	Narrandera				
BCA class of the building	Class 6				
Description of the proposal	Highway Service Centre				
Development Application Reference					

Bush Fire Assessment Report

A detailed Bush Fire Assessment Report is attached, which includes the relevant submission requirements set out in *Appendix* 2 of *Planning for Bush Fire Protection 20*19 together with recommendations as to how the relevant specifications and requirements are to be achieved.	**YES** ☒ **NO** ☐
Report Reference No#	241954
Report Date	29/09/2024

BPAD Certification

Duncan Scott-Lawson **Bushfire and Environmental Management Consultancy Pty Ltd** **ABN: 606 409 656 44**	I hereby certify, in accordance with Section 4.14(1)(b) of the *Environmental Planning and Assessment Act 1979* that: • I am a person recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment; and • the development conforms to the relevant specifications and requirements of Planning for Bush Fire Protection 2019 in accordance with section 4.14(1)(b) of the *Environmental Planning and Assessment Act 1979* (NSW).	
BPAD Accreditation Number **# 47789** BPAD Bushfire Planning & Design Accredited Practitioner Level 3	**Signature** 	**Date** 29/09/2024

Disclaimer

Please note that every effort has been made to ensure that information provided in this report is accurate. It should be noted that the information is for the client for the specific purpose for which it is supplied, that is to support a DA application. This report is strictly limited to the purpose including the facts and matters stated within it and is not to be used, directly or indirectly, for any other application, purpose, use or matter.

Due consideration has been given to site conditions and to appropriate legislation and documentation available at the time of preparation of the report. As these elements are liable to change over time, the report should be considered current at the time of preparation only. Should further information become available regarding the conditions at the site, BEMC reserves the right to review the report in the context of the additional information. BEMC has made no allowance to update this report and has not considered events occurring after the time its assessment was conducted.

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Title	Bush Fire Assessment Report			
Description	Highway Service Centre 16330 Newell Highway, Gillenbah, NSW, 2700 - Lot 1 / DP 200087			
Created By	Duncan Scott-Lawson 0408 667 137 duncan@emconsultancy.com.au			
Prepared For	Richmond + Ross Harshad Varsani C/o harshadv@richmondross.com.au 0431 699 042			
Version Number	**Modified By**	**Modifications Made**	**Date Modified**	**Status**
1	SJ	Draft	17/09/2024	Draft
2	DSL	Final	30/09/2024	Completed

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Abbreviations and Acronyms

APZ	Asset Protection Zone
AS/NZS 1221:1997	Australian Standard – Fire hose reels
AS1596-2014	Australian Standard – The storage and handling of LP Gas
AS2419-2021	Australian Standard – Fire hydrant installations
AS2441:2005	Australian Standard – Fire hose reels installation
AS3745:2010	Australian Standard – Planning for emergencies in facilities
BAL	Bush fire Attack Level
BCA	Building Code of Australia
BFAR	Bush Fire Assessment Report
BFSS	Bush Fire Strategic Study
BPA	Bush fire Prone Area (Also Bush fire Prone Land)
BPL Map	Bush fire Prone Land Map
BPMs	Bush fire Protection Measures
BV	Biodiversity Values
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
FFDI	Forest Fire Danger Index
GFDI	Grass Fire Danger Index
ha	Hectare
HOC	Heat Of Combustion
IPA	Inner Protection Area
kJ/kg	Kilo Joules per Kilo gram
LGA	Local Government Area
LAT	Large Air Tanker
OPA	Outer Protection Area
PBP	Planning for Bush fire Protection
RF Act	*Rural Fires Act 1997*
RF Regs	*Rural Fires Regulations 2013*
RHG	Restricted Head Growth
SEED	Sharing and Enabling Environmental Data in NSW
SFR	Short Fire Run

1 EXECUTIVE SUMMARY AND RECOMMENDATIONS

BEMC Pty Ltd was engaged by Richmond + Ross to complete a Bush Fire Assessment on the proposed Class 6 development at 16330 Newell Highway, Gillenbah, NSW, 2700 - Lot 1 / DP 200087 **(Figure 1, page 6).** The proposed development includes a new Highway Service Centre.

BEMC has used Method 1 assessment pathway from PBP 2019 to undertake this assessment and to prepare the Bush Fire Assessment Report (BFAR).

Based upon the assessment, perusal of the site plan prepared by Richmond + Ross **(Appendix 1, page 25)**, and a site visit, it is recommended that development consent be granted subject to the following conditions to comply with PBP 2019:

Recommendation 1 - Asset Protection Zones
At the commencement of building works and in perpetuity the property around the proposed development shall be maintained as an inner protection area (IPA) as outlined within Appendix 4 of Planning for Bush Fire Protection 2019 and the NSW RFS document Standards for asset protection zones to a distance of:

- 10 metres from the northern roof line of the proposed outdoor shelter (or to the property boundary, which ever if furthest),
- 30 metres on the eastern elevation from the lounge,
- 30 metres on the western elevation from the lounge,
- 10 metres from the southern roof of the proposed refuelling canopy (or to the property boundary, which ever if furthest).

Recommendation 2 - Landscaping
A Landscaping plan is required to illustrate:

- Compliance with APZ standards within Appendix 4 of PBP 2019,
- If fencing, retaining wall, garden/path edging is within 6m of a building or in areas of BAL-29 or greater shall illustrate constructed of non-combustible materials,
- A minimum 1.5-metre-wide area (or to the property boundary where the setbacks are less than 1 metre), suitable for pedestrian traffic, must be provided around the immediate curtilage of the building,
- No yard storage within the APZ,
- No planting within 6m of the outdoor shelter, lounge or refuelling canopies.

Recommendation 3 - Construction Standards
The proposed outdoor seating shelter and refuelling canopies to be constructed from non-combustible materials.

The construction of the proposed lounge with section 3 and section 7 (BAL 29) Australian Standard AS3959-2018 Construction of buildings in bush fire-prone areas or NASH Standard National Standard Steel Framed Construction in Bushfire Areas – 2021 as appropriate and section 7.5 of Planning for Bush Fire Protection 2019.

Recommendation 4 - Electricity services
Were possible electricity should be placed underground.

If overhead power supply is provided, the const authority shall determine vegetation management is in accordance with Energy Australia 'Vegetation Safety Clearances' (NS179, April 2002).

Recommendation 5 - Emergency Management

The Bush Fire Emergency Management and Operation Plan shall:

- Be consistent with the NSW RFS document: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*.
- Be consistent with *Australian Standard AS 3745:2010 Planning for emergencies in facilities*.
- NSW RFS Schools Program Guide.
- Be provided to the Local Emergency Management Committee for its information prior to occupation of the development.
- Plan for early evacuation and pre-emptive closures.
- Demonstrate the required bushfire protection measures the annual checks to ensure these measures are maintained.

Finally, the implementation of the adopted measures and recommendations forwarded within this report comply with Planning for Bush fire Protection (2019) and will contribute to the amelioration of the potential impact of any bush fire upon the development, but they do not and cannot guarantee that the area will not be affected by bush fire at some time.

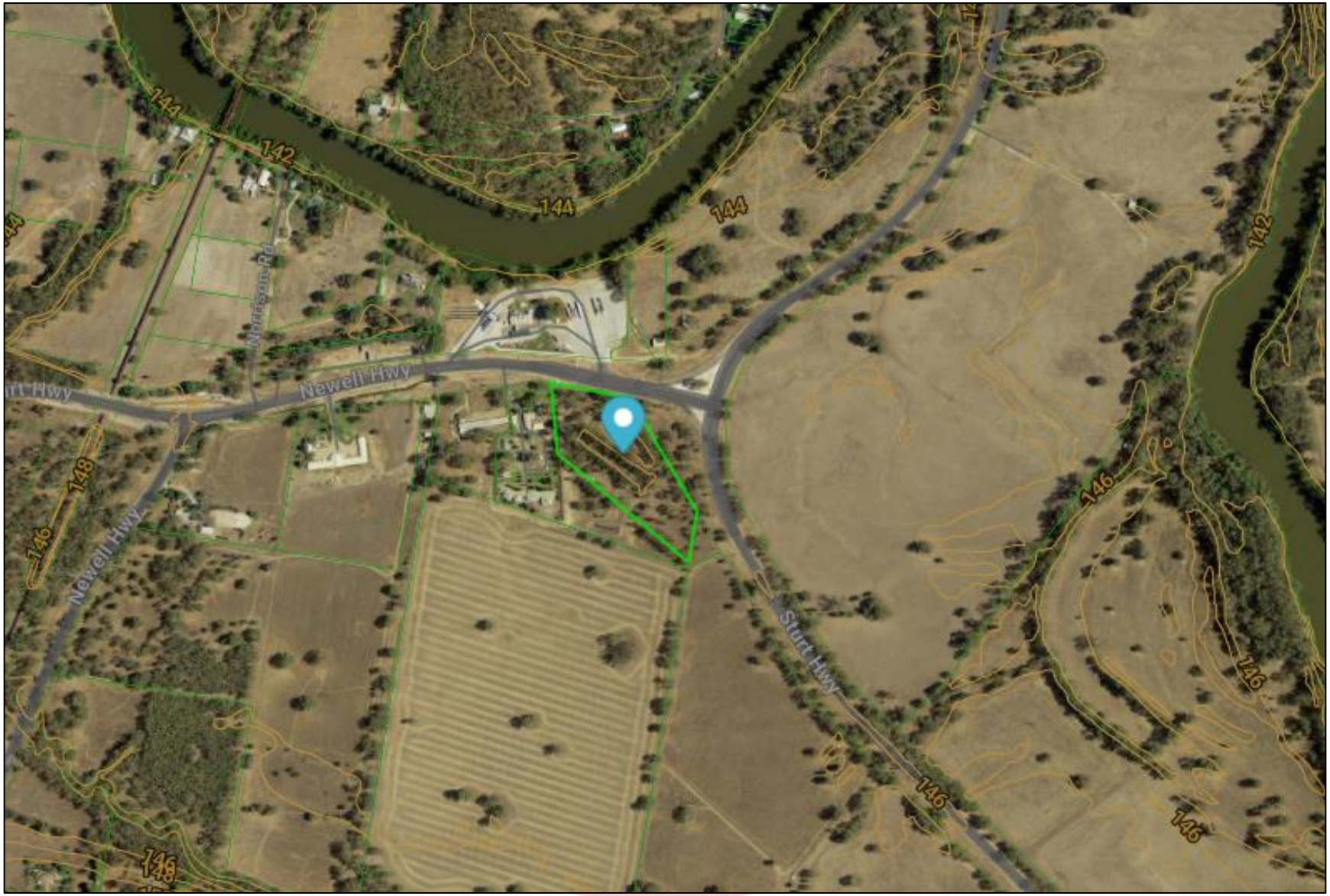

Figure 1 Property location of 16330 Newell Highway, Gillenbah, NSW, 2700 - Lot 1 / DP 200087 (Mecone Mosaic, 2024)


Figure 2 Bushfire Assessment
Separation
Category 1 Access
Asset Protection Zone
Proposed Development
140m Assessment area
Refuelling canopies
Lot Boundary
Grasslands
Grassy woodlands
Cadastral
SixMap Imagery
0
25
50 m
BEMC
30m APZ
Outdoor shelter
Rest lounge
Refuelling canopies

2 INTRODUCTION

BEMC Pty Ltd was engaged by Richmond + Ross to complete a bush fire assessment to accompany a Development Application for the Class 6 development at 16330 Newell Highway, Gillenbah, NSW, 2700 - Lot 1 / DP 200087, hereafter referred to as the 'site' (**Figure 1, page 6**).

The identification of bush fire prone lands (BPL Map) in NSW is required under section 10.3 of the Environment Planning and Assessment Act 1979 (EP&A Act). Section 4.14 of the EP&A Act requires developments to comply with NSW Rural Fire Service, Planning for Bush fire Protection (PBP 2019) if any part of a development site is affected by a bush fire hazard as indicated within the BPL Map.

This development falls within the Bush Fire Vegetation Buffer zone on the Mid Coast Council bush fire prone land map which triggers development assessment provisions under 4.14 of the EP&A Act and compliance with PBP 2019. The consent authority may consult with the RFS under section 4.15 of the EP&A Act for development in bush fire prone lands.

The bush fire requirements of non-occupied developments need to align with the unique features of the development type. 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.

It is important to ensure that a defendable space is provided for the size and scale of the development. Proposed measures must operate in combination to minimise the impact of bush fire and ensure that access and services are adequate. Due to the hazardous nature of some development, the *Hazardous Industry Planning Advisory Papers (HIPAPs*) should also be considered for hazardous developments in Bush fire prone lands.

It is clear from the investigation and assessment of the property that the site is located within Bush fire Prone Land.

To determine the planning and construction requirements a site assessment has be performed in September 2024 to determine the appropriate bush fire threat level, design, planning and construction standards required to comply with PBP 2019.

The Site Plan for the property prepared by Richmond + Ross is provided in **Appendix 1, page 25.**

2.1 DESCRIPTION OF PROPOSED DEVELOPMENT

Table 1 *Description of Proposed development*

Boundaries	Existing buildings west and north, Newell Highway north, Stuart Highway ea Grasslands south and east.
Topography	Level
Type of development	Class 6 – Highway Service Centre
Roof construction	Metal
External wall construction	TBC
Landscaping plan provided	No
Bush fire Prone Land	Yes – Narrandera Council – FFDI – 80

The proposed development comprises of a new Highway Service Centre which includes signage, Fuel tanks, lounge, seating, truck canopies and parking bays.

The proposed location of the development is provided in **Figure 1, page 6** with further development details provided in **Appendix 1, page 25**.

2.2 Objectives of Assessment

This assessment has been undertaken to enable council to make determination of the proposed development in consideration of the requirements of s4.14 of the Environmental Planning and Assessment Act 1979, PBP 2019 and AS 3959-2018.

In order to comply the following conditions must be met:

- satisfy the aim and objectives of PBP outlined in Chapter 1 of PBP.
- Consider any issues listed for the specific purpose for the development set out in this chapter, and
- Propose an appropriate combination of BPMs.

This report assesses to requirements of the development to meet the six objectives listed in section 1.1 of PBP 2019, which provide for the protection of human life and minimize impacts on property.

- Afford buildings and their occupants protection from exposure to a bushfire.
- Provide for a defendable space to be located around buildings.
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings.
- Ensure appropriate operation access and egress for emergency services personnel and residents is available.
- Provide for ongoing management and maintenance of Bush fire Protection Measures (BPMs), and
- Ensure the utility services are adequate to meet the needs of firefighters.

2.3 National Construction Code

The National Construction Code (NCC) is the updated version of the Building Code of Australia (BCA). The KNSS Control building is a building Class 8 in accordance with the NCC.

NSW G5P1 Bushfire resistance of the NCC outlines the requirements for buildings in designated bushfire prone areas. Part G5 states that a building must be designed and constructed to:

- Reduce the risk of ignition from a design bushfire with an annual exceedance probability not more than 1:100 years, or 1:200 years for a Class 9 building.
- Take account of the assessed duration and intensity of the fire actions of the design bushfire.
- Prevent internal ignition of the building and its contents, and
- Maintain the structural integrity of the building for the duration of the design bushfire.

NSW G5P1 only applies in a designated bushfire prone area to:

- a Class 2 or 3 building; or
- a Class 4 part of a building; or
- a Class 9 building that is a special fire protection purpose; or
- a Class 10a building or deck immediately adjacent or connected to a building or part of a type listed in (a), (b) or (c).

2.4 Specific Objectives of Other Developments

Whilst bush fire 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.

3 BUSH FIRE RISK STRATEGIC STUDY

Planning for Bushfire Protection (2019) is based on the worst-case scenarios for each of the bush fire behaviour elements of fire weather, vegetation, slope and assumes not human intervention. All development shall be assessed on an individual basis as broad-brush approaches of documents such as PBP 2019 may not be applicable in every instance.

A Bush Fire Risk Strategic Study (BFRSS) was prepared to inform the context of the Bush Fire Assessment Report (BFAR). The level of information gathered and analysis within the BFRSS depends upon the nature and scale of the development. The BFRSS provides a broad-brush approach to determine landscape wildfire risk in considerations of vegetation continuity, distribution, and proximity to development; human intervention; access and evacuation. This enables an assessment the *actual* bushfire risk, determine if strict adherence to PBP 2019 is warranted, and if a proposed development is appropriate in the bush fire hazard context.

Table 2 *Bush fire risk strategic study*

ELEMENT	Low Threat		Moderate Threat		High Threat		Extreme Threat	
Adjoining Lands	The proposed development and changing land use will have positive impacts on the ability of adjoining landowners to implement Bush fire Protection Measures		The proposed development and changing land use do not impact on the ability of adjoining landowners to implement Bush fire Protection Measures	√	The proposed development and changing land use will impact on the ability of adjoining landowners to implement Bush fire Protection Measures		The proposed development will significantly impact on the wildfire risk profile of adjoining lands.	
Surrounding infrastructure	The proposed development does not significantly impact on community water, electricity, or gas services.		The proposed development is associated with community water, electricity, or gas services but will not have significant impact.	√	The proposed development impact on community water, electricity, or gas services.		The wildfire risk profile of significant infrastructure will increase due to this development.	
Emergency services	The proposed development does not significantly impact on the ability of emergency services to plan, prepare, respond, or recover prior, during or after a bush fire event.		The proposed development is located within 30-minute flight from a Large Air Tanker (LAT) airbase and within 30-minutes of multiple fire response units.	√	The proposed development is located more than 30-minute flight from a Large Air Tanker (LAT) airbase and only 1 or 2 fire response units within 30-minutes.		It is unlikely emergency services will respond to wildfire in this location during extreme and catastrophic events.	

ELEMENT	Low Threat		Moderate Threat		High Threat		Extreme Threat	
Access	Good, multiple route evacuation is possible and connects with the public road network in a direction away from the wildfire threat to shelter location.	√	More than one access or egress routes is provided from the property to a safer location which then can access the public road network with multiple access/egress routes o shelter location.		One access or egress routes is provided, which is <200m from the property to a safer location.		Only one access or egress route with no nearby safe location.	
Emergency egress	Seamless integration with existing settlement - no effect on evacuation.	√	Short bushland pinch points that may restrict access temporarily or carry fire across roads. Unlikely impact on evacuation.		Pinch points that are likely to restrict access along evacuation routes for short periods (15-30mins) and carry fire across roads.		Large areas of bushland or multiple pinch points along evacuation routes that could block evacuation routes for an extended time.	
Vegetation continuity	Forested vegetation beyond 140m form the site is scattered with low continuity due to built development.		Forested vegetation beyond 140m form the site is scattered and isolated, forming a dominate fast moving grassland or open woodland fire event.	√	Patches of forested vegetation associated riparian and isolated ridgelines beyond 140m from the site may result in localised forest fire event.		Continuous forested areas within mountainous terrain beyond 140m from the site will result in broadscale landscape emergency management operations.	
Vegetation connectiveness	Forested vegetation corridors beyond 140m are restricted and do not enable landscape fire to enter and move through the site by a continuous fire path.		Forested vegetation corridors beyond 140m from the site exist, although grasslands >100m provide separations between forested vegetation restricting the fire head progression of landscape fire.		Forested vegetation corridors beyond 140m from the site exist, although grasslands <100m provide separations between forested vegetation restricting the fire head progression of landscape fire.	√	Forested vegetation corridors beyond 140m from the site provide for passage of landscape fire to enter and move through the site.	
Vegetation Location	Wildfire within forests can only approach from one direction surrounded by a suburban, township or urban area managed in a minimum fuel condition.	√	Wildfire within forests can only approach from two directions and the site is within a suburban, township or urban area managed in a minimum fuel condition.		Wildfire within forests can approach from several directions although gaps within forested vegetation or are present.		Wildfire within forests can approach from several directions and have hours or days to grow and develop before impacting and/or site is surrounded by unmanaged vegetation.	
Separation	Hazard separation between forested hazard and buildings of greater than 100m.		Hazard separation between forested hazard and buildings of 50-100m		Hazard separation between forested hazard and buildings of 30-50m		Hazard separation between forested hazard and buildings of <30m	√

ELEMENT	Low Threat		Moderate Threat		High Threat		Extreme Threat	
Vegetation flammability	Within the dominated fire direction, the fire fuel is restricted to surface, partially managed and separated through land use practises.		Within the dominated fire direction, the fire fuel is highly aerated, with significant separations (>50m) between these patches with partially managed vegetation between.		Within the dominated fire direction, the fire fuel is highly aerated, with <50m between these patches with partially managed vegetation between	√	Within the dominated fire direction, the fire fuel is highly aerated, continuous continuity vertically and horizontally with flammable species.	
Wildfire Behaviour	Extreme Wildfire behaviour at the site is not possible given the broader landscape.		Extreme Wildfire behaviour at the site is unlikely given the broader landscape.	√	Extreme Wildfire behaviour at the site is likely given the broader landscape.		Extreme Wildfire behaviour at the site is very likely given the broader landscape.	
Overall Threat Rating:			Wildfire provides **MODERATE** threat to this proposal	√				

In this case, a **moderate** threat has been determined and strict compliance with PBP is not warranted due to:

- Good, multiple route evacuation is possible and connects with the public road network in a direction away from the wildfire threat to shelter location.
- Forested vegetation beyond 140m form the site is scattered and isolated, forming a dominate fast moving grassland or open woodland fire event.
- Extreme Wildfire behaviour at the site is unlikely given the broader landscape.

4 BUSHFIRE HAZARD ASSESSMENT

This section details the site assessment methodology. It provides detailed analysis of the bushfire threat and bushfire planning requirements in and around the proposed site.

4.1 ASSESSMENT METHODOLOGY

The assessment of the vegetation, slope and other bushfire characteristics within and surrounding the site has been carried out with the aid of the follows:

- Nearmap and sixmap aerial photograph Interpretation.
- Kogan 6*25 Laser distance finder.
- Photo Theodolite application supported by contour and terrain profiles.
- Sharing and Enabling NSW Environmental Data portal.
- Reference to regional vegetation community mapping, and
- Site assessment in September 2024.

4.2 FIRE DANGER INDEX

This assessment utilises Narrandera Council area with a FFDI 80.

4.3 BAL ASSESSMENT

A simplified Method 1 assessment in accordance with Appendix 1 of PBP 2019 has been completed. The output of this assessment is provided in **Table 3, below** and illustrated in **Figure 2, page 7.**

Table 3 *BAL Assessment (Method 1 PBP 2019)*

Elements	Method (unit)	Fire Run2
Vegetation	PBP 2019	Grassy Woodlands
Effective slope	Site visit – Theodolite (°)	Level
Fire Danger Index (FFDI)	Council Area	80
OUTPUTS (Table A1.12.6)		
BAL FZ		<8m
Separation to Achieve BAL40		<8 - <11m
Separation to Achieve BAL29		11 - < 16m
Separation to Achieve BAL19		16 - < 22m
Separation to Achieve BAL12.5		22 - < 100m

4.4 ASSET PROTECTION ZONE

An APZ is a buffer zone between a bush fire hazard and buildings. The APZ is managed to minimise fuel loads and reduce potential radiant heat levels, flame, localised smoke and ember attack. The appropriate APZ distance is based on vegetation type, slope and the nature of the development.

For this proposed development asset protection zones are required to a distance of:

- 10 metres from the northern roof line of the proposed outdoor shelter (or to the property boundary, which ever if furthest),
- 30 metres on the eastern elevation from the lounge,
- 30 metres on the western elevation from the lounge,
- 10 metres from the southern roof of the proposed refuelling canopy (or to the property boundary, which ever if furthest).

4.5 LANDSCAPING

A combination of hard (materials) and soft (design) landscaping will benefit the survivability of a building during a bushfire event. The type, quantity and condition of fuel has a very important effect on bushfire behaviour in proximity to a building.

A Landscaping plan is required to illustrate:

- Compliance with APZ standards within Appendix 4 of PBP 2019,
- If fencing, retaining wall, garden/path edging is within 6m of a building or in areas of BAL-29 or greater shall illustrate constructed of non-combustible materials,
- A minimum 1.5-metre-wide area (or to the property boundary where the setbacks are less than 1 metre), suitable for pedestrian traffic, must be provided around the immediate curtilage of the building,
- No yard storage within the APZ,
- No planting within 6m of the outdoor shelter, lounge or refuelling canopies.

4.6 ACCESS

Design of access roads shall enable safe access and egress for residents attempting to leave the area while emergency service personnel are arriving to undertake firefighting operations.

For this proposed development adequate width, turning n capacity with alternative access to the public road system is provided.

4.7 ELECTRICITY

Electricity should be located so as not to contribute to the risk of fire or impede the firefighting effort.

For this proposed development overhead powerline supply is provided. Providing underground power supply throughout the lot will support meeting the aims and objectives of PBP and mitigating bush fire risk bush fire risk.

4.8 GAS

Gas should be located so as not to contribute to the risk of fire or impede the firefighting effort.

For this proposed development gas bottles are not proposed.

4.9 WATER

An adequate supply of water is essential for firefighting purposes.

For this proposed development a external attach hydrants will be required and can be utilised for firefighting purposes.

4.10 Construction Standards

The NCC does not provide for any bush fire specific performance requirements for these particular classes of buildings. As such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions, however compliance with AS 3959 and the NASH Standard must be considered when meeting the aims and objectives of PBP.

Due to the elevated risk and isolation, the following bushfire protection measures are recommended:

- The proposed outdoor seating shelter and refuelling canopies to be constructed from non-combustible materials.
- The construction of the proposed lounge with section 3 and section 7 (BAL 29) Australian Standard AS3959-2018 Construction of buildings in bush fire-prone areas or NASH Standard National Standard Steel Framed Construction in Bushfire Areas – 2021 as appropriate and section 7.5 of Planning for Bush Fire Protection 2019.

4.11 Hazardous Industry

Some developments are considered by their very nature to be hazardous, as much for their ability to start bush fires as their susceptibility to bush fire impacts.

The proposed development is considered Hazardous Industry and a preliminary Fire Hazard Assessment has been completed to inform a Bushfire Hazard assessment provided in **Chapter 6, page 20** of this report.

4.12 FM Global Property Loss Prevention Data Sheets

FM Global Property Loss Prevention Data Sheets provide standards help you reduce the chance of property loss due to fire, weather conditions, and failure of electrical or mechanical equipment, which can be applied to bush fire risk mitigation.

Data Sheet 9-19, Wildland Fire has been reviewed with the following recommendations incorporated into this risk analysis:

- Strips of vegetation less than 20 m wide perpendicular to the exposed building wall and not within 20 m of the building or other vegetation is not considered a bushfire threat (such as perimeter screening vegetation).
- Apply construction schedules to protect built assets from direct flame, radiant heat and embers.
- Remove all combustible elements (vegetation, wooden fencing and landscaping) within 1.5m of the built asset.
- If the level of radiant heat is higher than 12.5 kW/m^2 for combustible wall construction (timber), or higher than 30 kW/m2 (rounded up from 27 kW/m2 in FM Global Property Loss Prevention Data Sheet 1-20 for this application only) for non-combustible exposed wall construction, then the wildland fire exposure exceeds the passive protection of the exposed building. If the wildland fire exposure exceeds the passive protection further works are required, such as increasing the reduced-fuel zone (APZ); upgrading the construction materials or providing and adequately designed exterior sprinkler systems.
- Avoid combustible yard storage.

Data Sheet 1-20, Protection Against Exterior Fire Exposure has been reviewed with the following recommendations incorporated into this risk analysis:

- The type, height and bulk of yard storage needs to be considered for the separations to buildings.
- Loaded trailers are considered yard storage.
- Provide > 10 m horizontally between combustible yard storage and building air intakes or exhaust vents.

- The location of hydrants needs to be considered in consecutively with yard storage plans.
- Locate dumpsters > 9m from building if opening (windows and doors) in exposed wall and wall has a < 1-hr fire rated.
- Provide a water supply capable of providing a minimum duration of 60 minutes to a specific application design within automatic-type sprinklers, water-spray nozzles, corrosion-resistant pipe and fittings and various other requirements.
-

Data Sheet *Understanding the Hazard: Wildland Fire Exposure (P0414)* has been reviewed with the following recommendations incorporated into this risk analysis:

- Keep gutter free of debris.
- Cover vents with wire mesh to keep burning embers out.
- Treat wooden exterior walls with fire retardant paint.
- Remove all combustible yard storage.
- Develop written contingency plans.
- Fully trained and equip emergency response team where required.
- Create clearance zones around buildings and structures.
- Protect windows and frames with shutters.
- Consider protecting ay combustible exteriors walls with sprinklers.
- Provide adequate and reliable water supply.

5 BUSHFIRE ASSESSMENT AND PERFORMANCE MEASURES

This section assesses Bushfire Performance Measures (BPMs) for the proposed development at 16330 Newell Highway, Gillenbah, NSW, 2700 - Lot 1 / DP 200087 in consideration of the aims and objectives and Chapter 8 of Planning for Bushfire protection 2019

Table 4 *Planning for bushfire protection compliance (PBP 2019)*
Section 8.3.1 – Buildings of Class 5 to 8 under NCC on bushfire prone lands

	PERFORMANCE CRITERIA	COMPLIANCE for 16330 Newell Highway, Gillenbah, NSW, 2700 - Lot 1 / DP 200087
Aims and Objectives of PBP	Afford buildings and their occupants protection from exposure to a bush fire	• Access, APZ and landscaping requirements applied. • Bushfire construction standards applied. • Emergency arrangements to be developed.
	Provide for a defendable space to be located around buildings	• Separation to the bush fire threat provided. • Operational plan to ensure the APZ and landscaping are maintained to be developed.
	Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings	• Access, APZ and landscaping requirements applied. • Bushfire construction standards applied. • Operational plan to ensure the APZ and landscaping are maintained to be developed.
	Ensure that appropriate operational access and egress for emergency service personnel and occupants is available	• Appropriate access is provided.
	Provide for ongoing management and maintenance of BPMs	• Operational plan to ensure the APZ and landscaping are maintained to be developed.
	Ensure that utility services are adequate to meet the needs of firefighters	• External attack hydrants will be provided that can be used for bush fire protection. • Vehicle access is provided around the buildings. • Fire fighter pedestrian access is provided around the buildings and structures.
Specific Objective off Class 5-8	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	• Appropriate access is provided.
	To provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development	• Appropriate access is provided. • Emergency arrangements to be developed.

	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	• External attack hydrants will be provided that can be used for bush fire protection. • Electricity to be provide underground. • Separations between bush fire threat and structures provided, supported by landscaping requirements. • No gas bottles proposed.
	Provide for the storage of hazardous materials away from the hazard wherever possible	• No yard storage within the APZ. • Operational plan to ensure the APZ and landscaping are maintained to be developed.

6 HAZARDOUS INDUSTRY

Some developments are considered by their very nature to be hazardous, as much for their ability to start bush fires as their susceptibility to bush fire impacts. New developments of this nature should be avoided on bush fire prone land. However, where hazardous industries are proposed, in preparation of a bushfire assessment, the Fire Safety Study prepared under the *DPIE Hazardous Industry Planning and Assessment Papers* (HIPAPs) should be considered.

This study provides details of all credible fire hazards and the associated fire prevention and mitigation measures for the development. The bush fire assessment must address the appropriate protection measures to be provided commensurate with the bush fire hazards and associated risks. Care should also be taken to ensure that such facilities do not impact on existing developments.

Table 5 *DPIE Hazardous Industry Planning and Assessment Papers*

HIPAP	Bush fire considerations
Industry Emergency Planning Guidelines	Evacuation and emergency management arrangements prior to and during bushfire events within the NSW RFS district shall be included in the facilities emergency management arrangements. This will include: • Bush fire decision triggers. • action require at each decision trigger. • responsibilities to implement the actions.
Fire Safety Study Guidelines	This bush fire assessment report forms one element in the safety assurance process. The application of the recommendations within this report will mitigate the risk of a bushfire impacting on the site to acceptable levels.
Risk Assessment	This bush fire assessment report forms one element in the risk assessment process. The application of the recommendations within this report will mitigate the risk of a bushfire impacting on the site to acceptable levels.
Risk Criteria for Land Use Planning	The land use and siting of this development is appropriate for bush fire protection requirements.
Hazard Audit Guidelines	Annual review of the bushfire protection measures recommended within this report shall be included in annual audit reviews. Specific attention shall be afforded to: • Ensuring any future installed/established landscaping features comply with bush fire requirements. • Asset Protection Zones are maintained to the required distances and fire fuel loads, removing the ability for vegetation creep over time. • Retrofitting of any buildings is completed the required bush fire construction level. • Review of bush fire emergency management arrangements
Guidelines for Hazard Analysis	This bush fire assessment report forms one element in the hazard analysis process. The application of the recommendations within this report will mitigate the risk of a bushfire impacting on the site to acceptable levels.
Construction Safety Studies	The Construction Safety Study identifies all hazards which are specific to demolition, construction and commissioning activities associated with proposed development. This analysis is outside the requirements of bush fire planning.
HAZOP Guidelines	The HAZOP process is used to identify potential hazards and operational problems in terms of plant design and human error.

	This analysis is outside the requirements of bush fire planning.
Safety Management System Guidelines	Evacuation and emergency management arrangements prior to and during bushfire events within the NSEW RFS district shall be included in the facilities Safety Management System (SMS)
Land Use Safety Planning	This bush fire assessment report forms one element in the land use safety planning process. The application of the recommendations within this report will mitigate the risk of a bushfire impacting on the site to acceptable levels.
Route Selection	These guidelines provide an overall integrated framework for the assessment of road transport routes for the transportation of hazardous materials. This analysis is outside the requirements of bush fire planning.
Hazards-Related Conditions of Consent	The application of the recommendations within this report will mitigate the risk of a bushfire impacting on the site to acceptable levels.

7 CONCLUSION AND RECOMMENDATIONS

In accordance with the provisions of PBP 2019, the recommendations outlined within this assessment will reduce the risk of damage and/or harm in the event of a bushfire event to acceptable levels. Compliance with the below recommendations can be achieved or practically implemented without substantial change to the proposed layout or construction methodology. It is recommendations that development consent be granted subject to the following conditions:

Asset Protection Zones

At the commencement of building works and in perpetuity the property around the proposed development shall be maintained as an inner protection area (IPA) as outlined within Appendix 4 of Planning for Bush Fire Protection 2019 and the NSW RFS document Standards for asset protection zones to a distance of:

- 10 metres from the northern roof line of the proposed outdoor shelter (or to the property boundary, which ever if furthest),
- 30 metres on the eastern elevation from the lounge,
- 30 metres on the western elevation from the lounge,
- 10 metres from the southern roof of the proposed refuelling canopy (or to the property boundary, which ever if furthest).

Landscaping

A Landscaping plan is required to illustrate:

- Compliance with APZ standards within Appendix 4 of PBP 2019,
- If fencing, retaining wall, garden/path edging is within 6m of a building or in areas of BAL-29 or greater shall illustrate constructed of non-combustible materials,
- A minimum 1.5-metre-wide area (or to the property boundary where the setbacks are less than 1 metre), suitable for pedestrian traffic, must be provided around the immediate curtilage of the building,
- No yard storage within the APZ,
- No planting within 6m of the outdoor shelter, lounge or refuelling canopies.

Construction Standards

The proposed outdoor seating shelter and refuelling canopies to be constructed from non-combustible materials.

The construction of the proposed lounge with section 3 and section 7 (BAL 29) Australian Standard AS3959-2018 Construction of buildings in bush fire-prone areas or NASH Standard National Standard Steel Framed Construction in Bushfire Areas – 2021 as appropriate and section 7.5 of Planning for Bush Fire Protection 2019.

Construction and site layout plans

It is recommended that a page within the construction and site layout plans is dedicated to Bushfire Construction standards together with the landscaping plan to ensure bushfire requirements are clearly understood and applied throughout the project and beyond.

Access

The proposed development meets these performance criteria through the acceptable solutions

Water Supply

External fire hydrants will be provided and can be used for bushfire water.

Electricity services

Were possible electricity should be placed underground.

If overhead power supply is provided, the const authority shall determine vegetation management is in accordance with Energy Australia 'Vegetation Safety Clearances' (NS179, April 2002).

Gas services
No gas services are proposed.

Emergency Management
The Bush Fire Emergency Management and Operation Plan shall:

- Be consistent with the NSW RFS document: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*.
- Be consistent with *Australian Standard AS 3745:2010 Planning for emergencies in facilities*.
- NSW RFS Schools Program Guide.
- Be provided to the Local Emergency Management Committee for its information prior to occupation of the development.
- Plan for early evacuation and pre-emptive closures.
- Demonstrate the required bushfire protection measures the annual checks to ensure these measures are maintained.

8 REFERENCES

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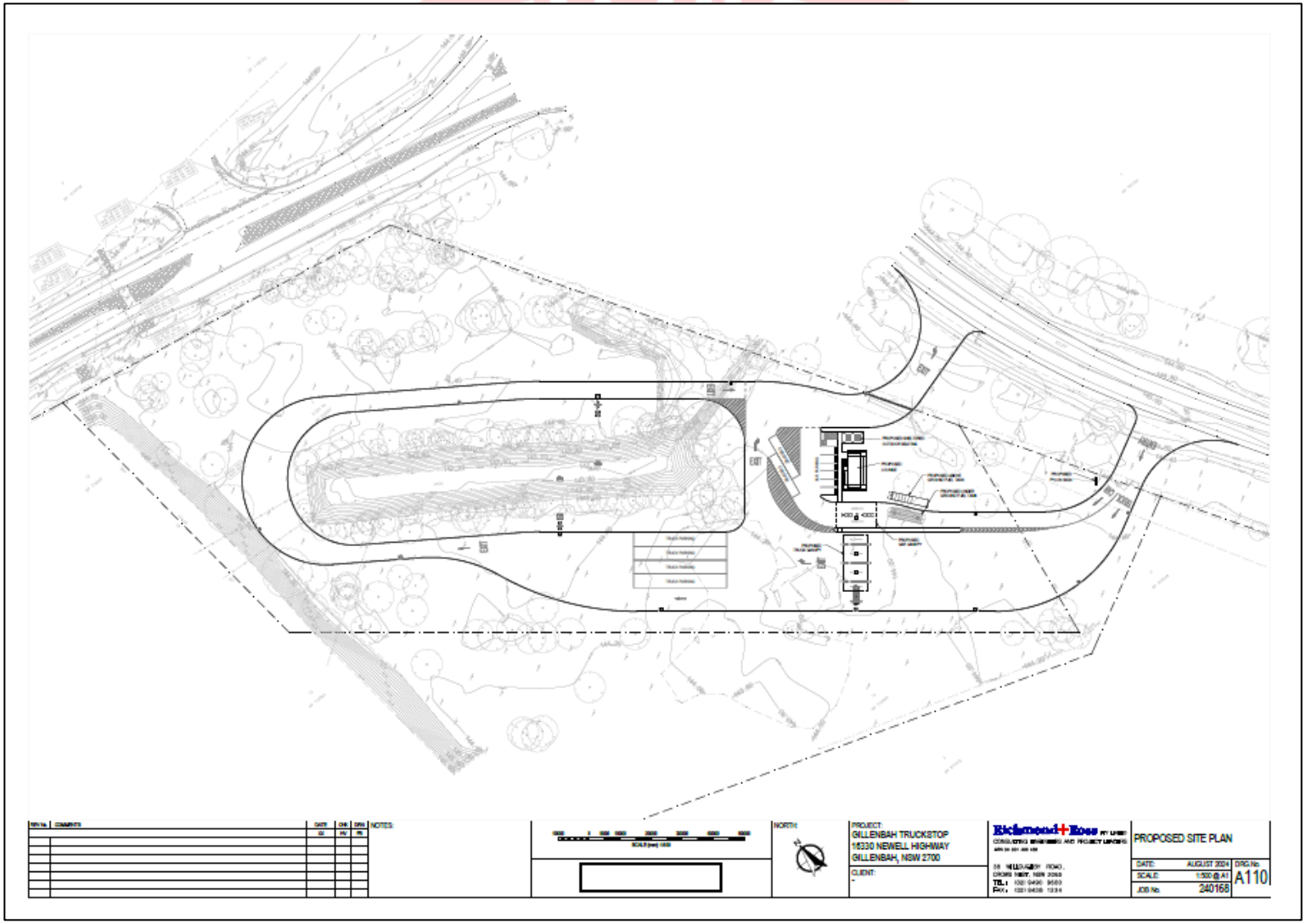
9 APPENDIX 1 SITE LAYOUT PLANS



10 APPENDIX 2 PLATES (PHOTOGRAPHS)

Plates 1 –6 depict the elements in and around the site that are considered within the bush fire hazard assessment. The classified vegetation, separations, effective and site slope are identified in **Table 3, page 14** and displayed in **Figure 2, page 7**.

Plate 1 *(P1) Access along Newell Highway*

Plate 2 *(P2) Entrance into property from Newell Highway*

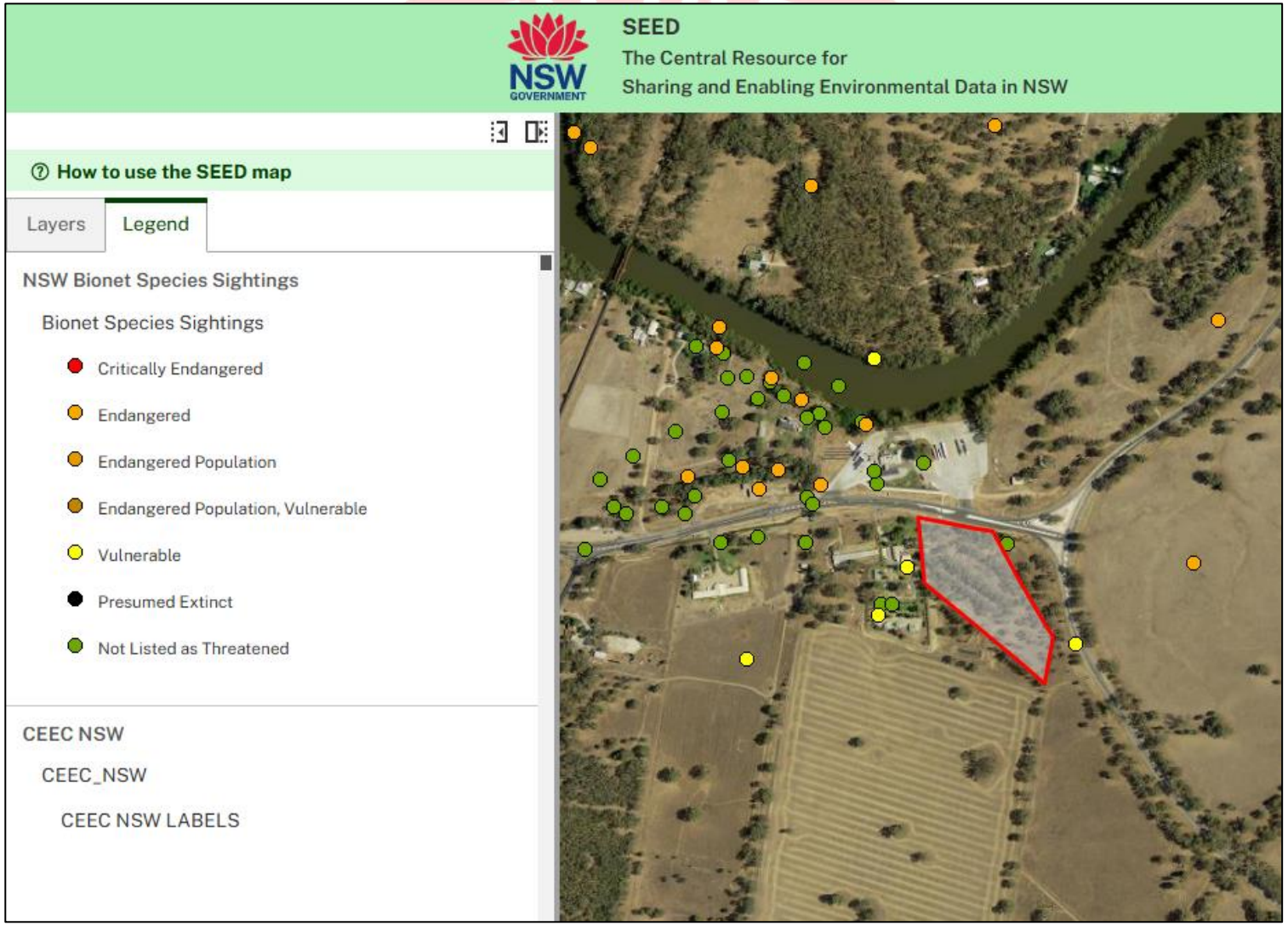
Plate 3 *(P3) Grassy woodlands within the lot to the north of the built development*

Plate 4 *(P4) Grassy woodlands within the lot to the north of the built development*

Plate 5 *(P5) Grassy woodlands within the lot to the east of the built development*

Plate 6 *(P6) Grassy woodlands within the lot to the east of the built development*

11 APPENDIX 3 NSW SHARING AND ENABLING ENVIRONMENTAL DATA



12 APPENDIX 4 BIODIVERSITY MAP

Biodiversity Values Map and Threshold Tool

The Biodiversity Values (BV) Map and Threshold Tool identifies land with high biodiversity value, particularly sensitive to impacts from development and clearing.

The map forms part of the Biodiversity Offsets Scheme threshold, which is one of the factors for determining whether the Biodiversity Offset Scheme (BOS) applies to a clearing or development proposal. You can use the Threshold Tool in the map viewer to generate a BV Threshold Report for your nominated area. The report will calculate results for your proposed development footprint and determine whether or not you will need to engage an accredited assessor to prepare a Biodiversity Development Assessment Report (BDAR) for your development.

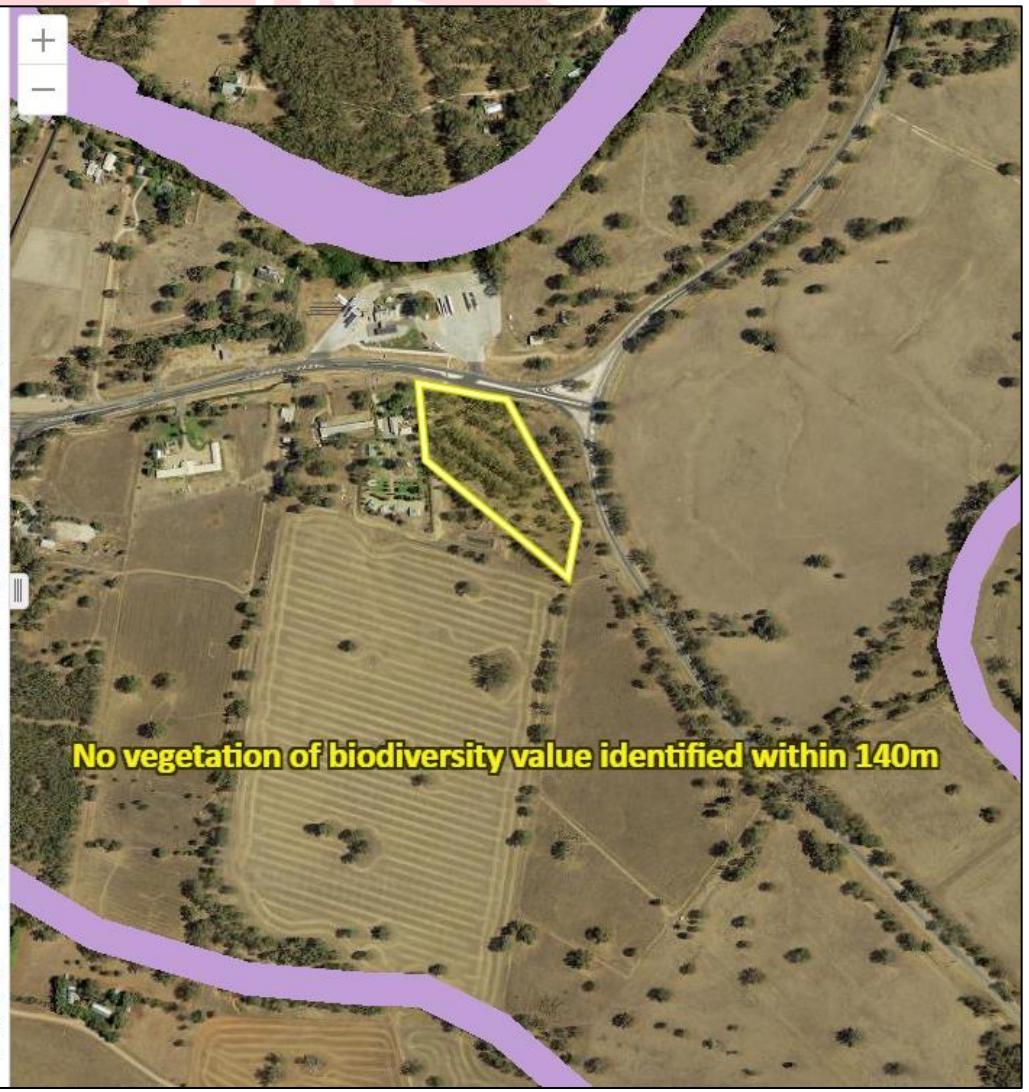
This report can be used as evidence for development applications submitted to councils, native vegetation clearing not requiring development consent in urban areas and areas zoned for environmental conservation under State Environmental Planning Policy (Biodiversity and Conservation) 2021 - Chapter 2 vegetation in non-rural areas.

What's new?

For more information about the latest updates to the Biodiversity Values Map and Threshold Tool go to the updates section on the Biodiversity Values Map webpage.

Map Review: Landholders can request a review of the BV Map where they consider there is an error in the mapping on their property. For more information about the map review process and an application form for a review go to the Biodiversity Values Map Review webpage.

If you need help using this map tool see our Biodiversity Values Map and Threshold Tool User Guide. or contact the Map Review Team at map.review@environment.nsw.gov.au or on 1800 001 490.



13 APPENDIX 5 BUSH FIRE PROTECTION MEASURES

The following information on building survivability and the application of Bushfire Protection Measures should be considered continually for the life of the development. These measures facilitate meeting the aims and objectives of PBP 2019 and mitigating bushfire risk and are provided to inform the client.

Why do buildings burn during bush fires?

Research has been undertaken to over the last decades to analysis and determine the elements that determine the survivability of a building during a bush fire event. As the research is validated, these elements are incorporated into planning documentation that guides construction in bush fire prone areas, such as Australian Standard 3959 and NSW RFS Planning for Bushfire Protection.

Research has illustrated that there are three ways a bush fire impacts a building:

1. Direct flame contact,
2. Radiant heat from the bush fire, and
3. Embers generated by the bush fire.

Most people expect direct flame contact to be the biggest risk to homes in a bush fire, but this is not the case. Over 80% of house loss during bush fires occurs because of ember attack; the burning firebrands of bark, leaves and twigs with winds drive away from the main fire front. They find weaknesses in houses such as gaps, cracks to combustible construction materials and can quickly lead to ignition of the building.

Significantly, vegetation that is established adjacent to the building and within the Asset Protection Zone following the construction of the building, which provides fuel for burning embers to ignite and increase the ignitability of the building. It is critical that the Asset Protection Zone are maintained throughout the life of the property, so that wildfire is not encouraged closer to the building.

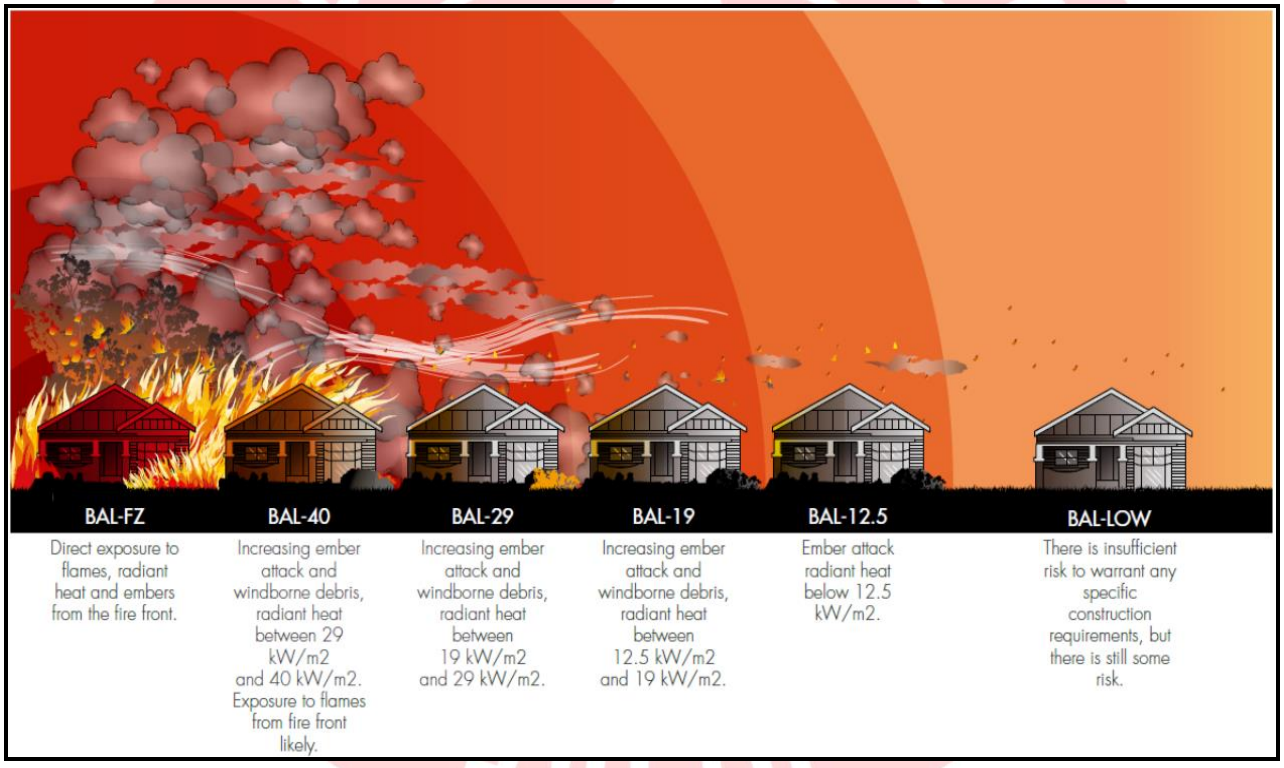
The research has illustrated the separation between the bushfire threat and building; and the construction standards of the building are the principal elements to building survivability. It is critical that:

1. Any future alterations and additions to the building are undertaken with materials that comply with the relevant BAL of the building.
2. The separations between the building and bush fire threat (known as the Asset Protection Zones (APZ)) are maintained to low flammability. This means restricted gardens and combustible elements, such as timber landscaping and furnishings. It is critical to maintain '*fire hygiene'* around the building.

Australia Standard 3959 Construction of buildings in Bush fire prone areas and Bush fire Attack Level (BAL)

Bush fire Attack Level (BAL) ratings refer to the fire intensity your house is likely to be subjected to in a bush fire, expressed in terms of radiant heat. The BAL assessment forms the construction component of the bush fire assessment process. The other component is the Bush fire planning, which includes Asset Protection Zones (APZ), separation to provide defendable spaces, access, water, electricity, gas, landscaping and emergency management.

Furthermore, the measures contained in the *Australian Standard 3959 Construction of buildings in Bushfire Prone Areas* for each BAL construction level are not for fire resistance. The building will burn. The construction standards are aimed at slowing the ignition and fire spread of the building to provide adequate time to enable occupants to shelter within the building as the bushfire front passes. The degree of vegetation management within the APZ, the unpredictable nature of behaviour of fire, and extreme weather conditions make building adjacent to vegetation very dangerous.



Relationship between fire behaviour and BAL (WA Guidelines for Planning in Bush fire Prone Areas, 2017)

Design and Siting

The design and siting of a building can be of critical importance during bush fire attack event. The appropriate design and siting can reduce the impact of bush fire attack mechanisms of direct flame, radiant heat, ember attack, smoke, and wind. Key principles to consider when designing and siting a new development include the following:

- Avoid building on ridges, saddles and build on level ground wherever possible.
- Utilise cut-in benches, rather than elevating the building when building on sloping land.
- Avoid raised floors and protect the sub-floor areas by enclosing or screening.

- Provide an appropriate shelter room that is located on the lowest or non-bush fire hazard side of the building, near building exits and provides the occupant views of the outside environment.
- Reduce bulk of building, limit re-entrant corners, and incorporate simplified roof that are able to self-clean of debris.
- No gutters on second or consecutive storeys of building and avoid box gutters.
- If gutters are installed, incorporate gutter guards with a flammability index more than 5 when tested to AS1530.2, or aluminium, bronze, or stainless steel with maximum aperture of 5mm.
- Limit glazing elements on the sides of the building exposed to the bush fire threat and use shutters to protect glazing elements.
- Carparking provided in a location that does not interfere with escape routes.
- Position development so any gas supplies and overhead electricity are positioned not to impede egress to and from the site.
- Class 10a buildings (such as shed, carport, and garages) should be a minimum of 6m away from any other building. Consider the storage of hazardous materials (petrol, kerosene, alcohol, LPG, natural gas, acetylene, vehicle, machinery etc.) within Class 10a buildings when siting in proximity to Class 1a occupied building and escape routes.
- Provide unobstructed access around the entire building supported by a minimum 1m wide concreted path to the external wall.

Asset Protection Zones

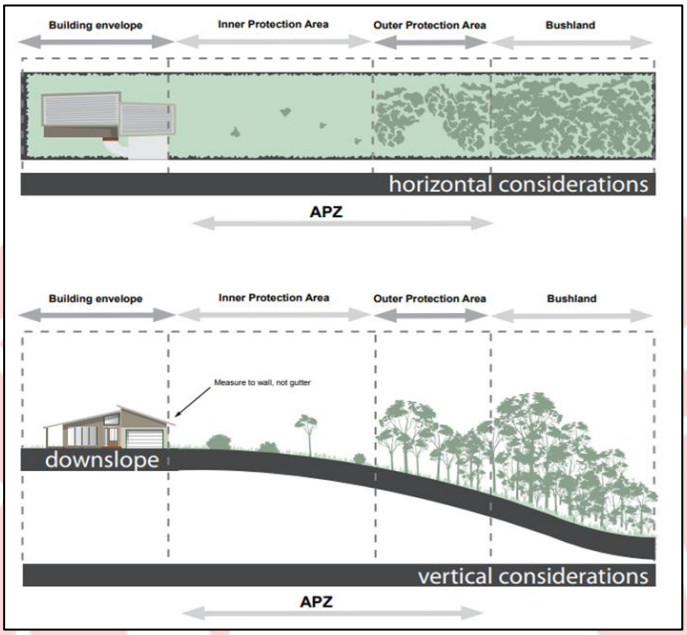
An APZ is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property. The required width of the APZ varies with slope and the type of hazard. An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance to the below standards should be undertaken on an annual basis, in advance of the fire season, as a minimum.

For a complete guide to APZs and landscaping, download the NSW RFS document Standards for Asset Protection Zones at www.rfs.nsw.gov.au/resources/publications .

An APZ can consist of both an Inner Protection Area (IPA) and an Outer Protection Area (OPA) as indicated below. An APZ can include the following:

Footpaths	Driveways
Lawns	Unattached non-combustible garages as long as suitably separated
Discontinuous gardens	Open space / parkland
Swimming pools	Car parking

Isolated areas of shrub and timbered vegetation are generally not a bush fire hazard as they are not large enough to produce fire of an intensity that will threaten dwellings. These areas include narrow strips of vegetation along road corridors.



Components of an APZ (Figure A4.1 - PBP 2019)

Any areas that are designated Asset Protection Zones, should be delineated by rural fencing, signposted or bollards (whatever is practical in the circumstances) to ensure vegetation creep does not occur and further landowners and ground management are aware that the area is to be maintained for Bush fire protection purposes. Examples are provided below:

Inner Protection Area (IPA)

The IPA extends from the edge of the OPA to the development. The IPA is the area closest to the asset and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and be a defendable space. The intent of an IPA is to stop the transmission of flame and reduce the transmission of radiant heat by the elimination of available fire fuel. This area also allows

airborne embers to fall safely without igniting further outbreaks and provides a safer firefighting position and is operationally important for implementation of clear fire control lines.

In practical terms the IPA is typically the curtilage around the dwelling, consisting of a mown lawn and well-maintained gardens. When establishing and maintaining an IPA the following requirements apply:

- Vegetation within the IPA should be kept to a minimum level. Litter fuels (leaves and vegetation debris) within the IPA should be continually removed and kept below 1cm in height and be discontinuous. There is minimal fine fuel at ground level which could be set alight by a bushfire.
- Canopy cover should be less than 15% (at maturity). Trees (at maturity) should not touch or overhang the building and should be separated by 2 to 5m.
- Lower limbs of canopy trees should be removed up to a height of 2m above ground.
- Preference should be given to smooth barked and evergreen trees.
- Large discontinuities or gaps in the shrub vegetation shall be established to slow down or break the progress of fire towards buildings.
- Shrubs should not be located under trees and not form more than 10% ground cover
- Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- Grasses should be kept mown (as a guide grass should be kept to no more than 100mm in height), and
- Woodpiles, wooden sheds, combustible material storage areas, large areas / quantities of garden mulch, stacked flammable building materials etc. are not permitted in the IPA.

Outer Protection Area (OPA)

An OPA is located between the IPA and the unmanaged vegetation. Vegetation within the OPA can be managed to a more moderate level. The reduction of fuel in this area substantially decreases the intensity of an approaching fire and restricts the pathways to crown fuels, reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

In practical terms the OPA is an area where there is maintenance of the understorey and some

separation in the canopy. When establishing and maintaining an OPA the following requirements apply:

- Tree canopy cover should be less than 30%, canopies should be separated by 2 to 5m
- Shrubs should not form a continuous canopy and form no more than 20% of ground cover
- Grasses should be kept to no more than 100mm in height with leaf and other debris should be mown, slashed or mulched.

Furthermore, the edge of the APZ should be clearly delineated to ensure vegetation creep does not occur over time, reducing the separation between the bushfire hazard and building.

Gardens and vegetation within the APZ

All vegetation will burn under the right conditions.

In choosing plants for landscaping consideration should be given to plants that possess properties, which help to protect buildings. If the plants themselves can be prevented from ignition, they can improve the defence of buildings by:

- Filtering out wind-driven burning debris and embers.
- Acting as a barrier against radiation and flame, and
- Reducing wind forces.

Consequently, landscaping with vegetation of the site should consider the following:

- Meet the specifications of an Inner Protection Area (IPA) detailed in PBP 2019.
- Priority given to retaining or planting species which have a low flammability and high moisture content.
- Priority given to retaining or planting species which do not drop much litter in the bushfire season, and which do not drop litter that persists as ground fuel in the bush fire season, and
- Create discontinuous or gaps in the vegetation to slow down or break the progress of fire towards the dwellings.
- Avoid gardens within 10m of the exterior building envelop.
- Trees and shrubs within 40m are not continuous, but instead arranged as discrete patches separated by a ground layer with low fuel hazard, such as mown grass.
- Position courtyards, gardens, and grassed areas in locations that facilitate the protection of the building.
- Install pebble/rock garden beds avoiding the use of mulch and wood chip.

Consideration should be given to vegetation fuel loads present on site. Careful thought must be given to the type and physical location of any proposed site landscaping.

Inappropriately selected and positioned vegetation has the potential to 'replace' any previously removed fuel load.

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a suitable balance between visual and safety concerns be considered. The below list of well know ground fire-retardant plants is intended as a guide only, check with your local council for information more specific to your area.

Lomandra longifolia	*Dampiera*
Lomandra hystrix	*Scaevola aemula*
Anigozanthos hybrids	*Succulents (most)*
Agapanthus orientalis	*Carpobrotus (Pigface)*
Liriope muscari	*Cotyledon*
Carpobrotus glaucescens	*Ajuga australis*
Casuarina glauca	*Myroporum*
Ajuga	*Nepeta* (catmint)
Brachyscome	*Mesembryanthemum*

Strategically positioned elevated vegetation (fire-retardant tree and shrub species) can act as 'windbreaks' and 'ember filter', reducing wind velocities and suppressing the density of embers attacking a building. It is critical that this vegetation is:

- On flat ground place >30m from the building (ideally 40m forming the outer perimeter of the IPA).
- >20m separation from the hazardous vegetation.
- Located on the side of the bush fire hazard.
- No gardens of shrubs under the trees.
- Shrub patches no greater than $10m^2$.

The below list of well know fire-retardant trees and shrubs is intended as a guide only, check with your local council for information more specific to your area:

Melia azederach (Cape Lilac)	*Citrus trees*
Brachychiton aecerifolius (Flame tree)	*Loquot*
Magnolia grandiflora	*Arbutus Quercus (only the deciduous oak)*
Pyrus (most ornamental pears)	*Feijoa*
Magnolia Little Gem	*Gleditzia*
Ulmus chinensis (Chinese Elm)	*Ficus (all including edible)*
Acacia howitii	*Aloe (all)*
Cercis (Judus Tree)	*Correa*
Acmena smithii (Lilypily)	*Acacia iteaphyla*
Prunus (all including ornamental)	*Scaevola crassifolia*
Cupaniopsis anacardiopsis (Tuckeroo)	*Viburnum tinus*
Malus (apple trees)	*Atriplex (saltbush)*
Eleocarpus	*Escallonia*
Mullbery	*Maireana (Cottonbush)*
Eremophila (Emu bush)	*Leucophyta brownii*
Melaleuca nodosa	*Plectranthus*
Syzygium (lilypilly)	*Santolina*
Photinia	*Coprosma*
Rhagodia (saltbush)	*Strelitzia*
Acacia Cyclops	*Senna (Silver Cassia)*

Recent post-fire research from the 2019/20 bushfire season suggests greenness factor (the extent to which plants are actively growing) had an impact on building survivability to a bushfire, indicating that maintained green grasses and landscape watering features are beneficial during a bushfire.

It is essential that any vegetation and landscaped areas and surrounds are subject to ongoing fuel management and reduction to ensure that fine fuels do not build up.

Landscaping features within the APZ

A combination of hard (materials) and soft (design) landscaping will benefit the survivability of a building during a bushfire event. The type, quantity and condition of fuel has a very important effect on bushfire behaviour in proximity to a building. Poorly located vegetation that burns readily may expose a house to increased levels of radiant heat and flame contact.

- Non-flammable features such as tennis courts, swimming pools, dams, patios, driveways or paths should be incorporated into the proposal, especially on the northern and western sides of the proposed building.
- Remove other flammable objects from around the house. These include sheds, caravans, outdoor furniture, barbeques, gas bottles, wood piles and organic mulch.
- Avoid flammable mulches within the APZ. Alternatives include gravel, scoria, pebbles, shells or recycled crushed bricks.
- Use non-combustible, moveable containers and pots that can be relocated in the summer.
- Restrict the use of door mats and place firewood stacks >10m from building.
- Restrict the use of timber and use materials such as brick, earth, stone, concrete and galvanised iron
- Metal screens can help to shield your house from radiant heat, direct flame contact and ember attack.
- An intensive area of planting centred on a contoured garden mound provide an effective screening.
- Fencing in BAL 29 or within 6m of a building should be of non-combustible materials.
- Establish a path immediately around the external wall of the building. Do not place garden beds adjacent to the external fabric of the building and under windows.
- Clumping shrubs and trees so they do not form a continuous canopy and are separated by areas of low fuel (maintained green grass lawn).

Further information can be found here - Landscaping for bushfires

Access Requirements

In the event of a serious bushfire threat to the proposed development, it will be essential to ensure that adequate ingress/ egress and the provision of defendable space are afforded in the development/building design.

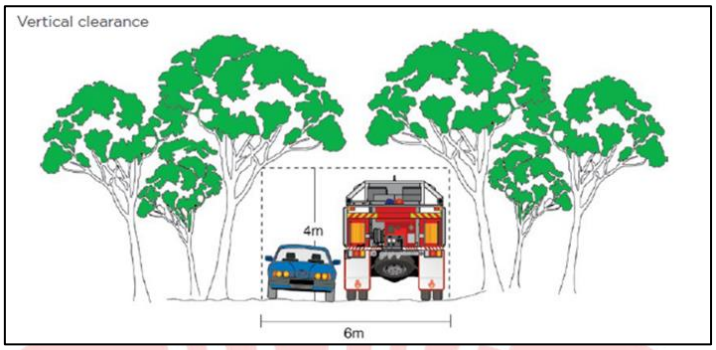
Local Area Traffic Management (LATM)

The objective of LATM is to attain an acceptable level of speed, volume, and composition of traffic within a local area and reduce the number of road accidents. This is achieved by modifying the street environment through the installation of various traffic control devices. LATM devices by their nature are designed to restrict and or impede the movement of traffic, especially large vehicles, which conflicts with the intent for access required by the NSW RFS and may significantly increase response times for emergency services.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

Vertical clearance

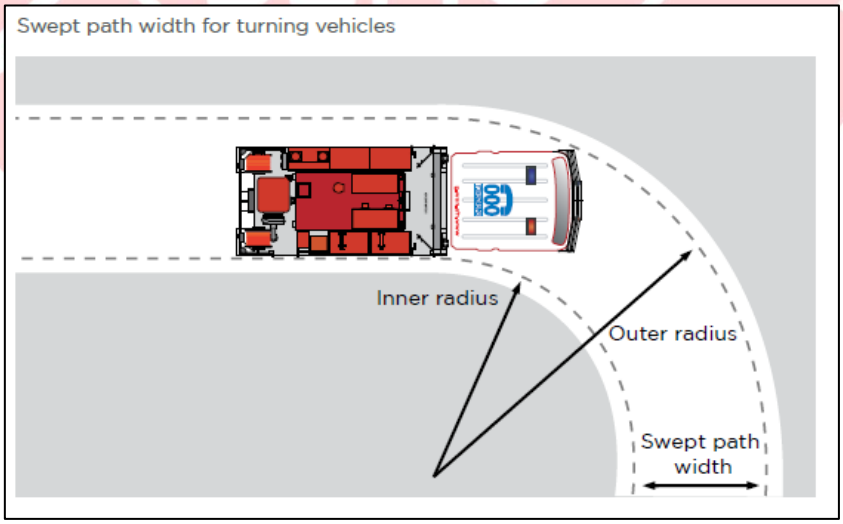
An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways/doorways, and overhanging structures (e.g., ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads and fire trails.

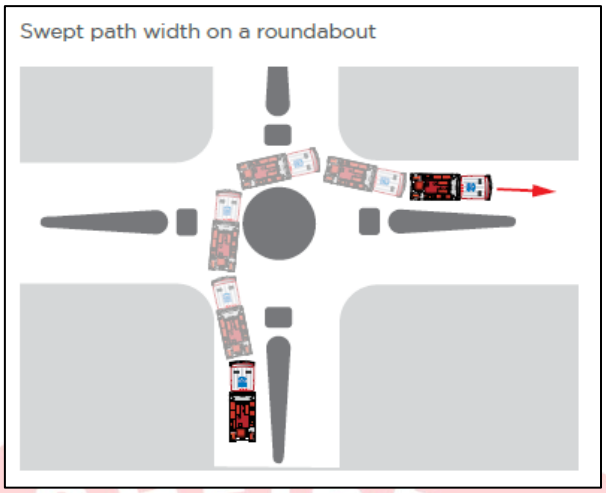


Vehicle Turning Requirements

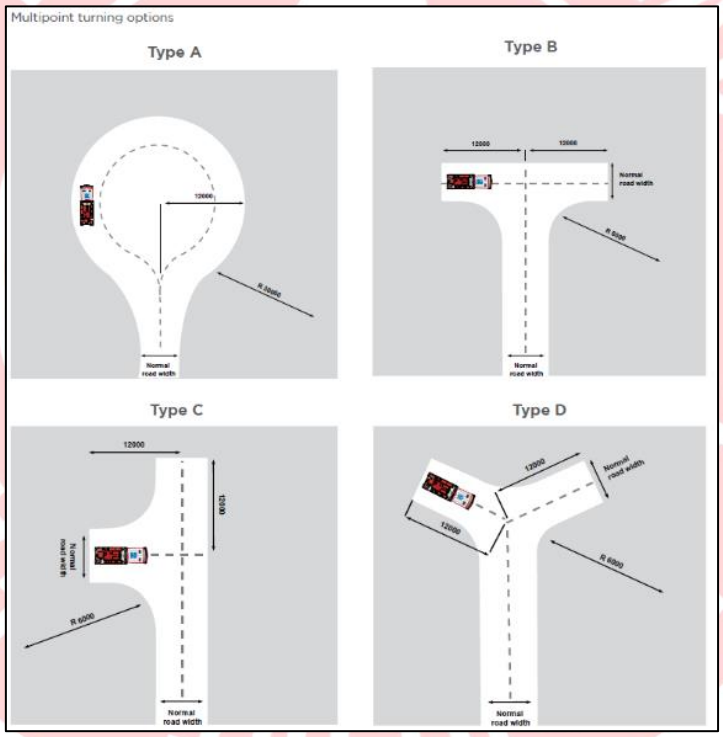
Fire crews must have rapid access and egress for vehicles, therefore curved carriageways should be constructed using the minimum swept path. The below diagrams from PBP2019 provide indication of the requirements to be achieved.

Minimum curve radius (inside edge (m))	Swept path (m) wide
<40	4.0
40 -69	3.0
70 - 100	2.7
>100	2.5





Where a turning head is proposed the NSW RFS requires that dead ends having a length greater than 20 metres should be provided with a turning head area which avoids multipoint turns.



Passing Bays

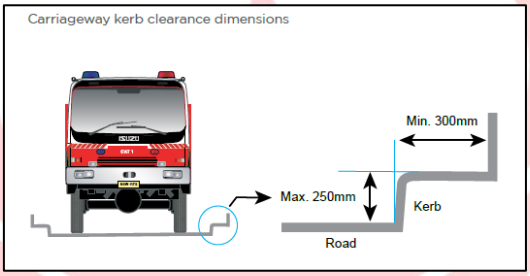
The construction of passing bays, where required, shall be 20m in length, provide a minimum trafficable width at the passing point of 6m.

Parking

Parking can create a pinch point within the road reserve. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants should be located clear of any parking areas to ensure that access is always available.

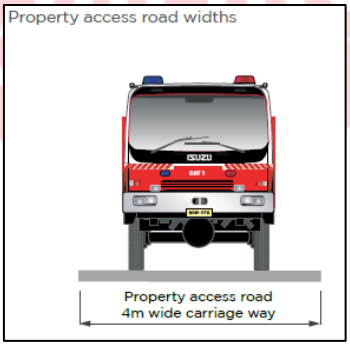
Kerb Dimensions

All kerbs constructed around access lanes should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.



Road Types

Property access is required to be 4m wide all-weather road. Can be sealed or unsealed.



Water Supply

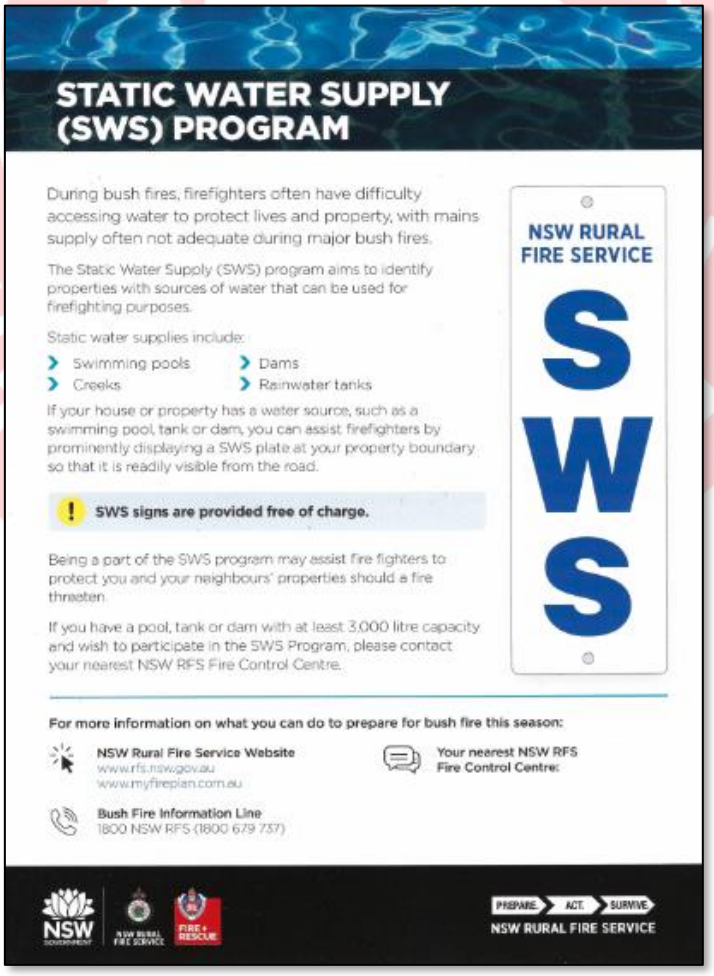
The intent of water measures is to provide adequate services of water for the protection of dwellings during and after the passage of a bush fire.

Where reticulated water supply is not provided, a static water supply for fire-fighting purposes should be above-ground, accessible, clearly marked and manufactured from concrete or metal. If raised, the tank stand should be made from non-combustible material. These static water supplies (tanks) should be positioned on the non-hazard side of the building and have 65mm Storz outlet with a ball valve fitted to the outlet within the IPA. If not appropriate, they should be appropriately shielded to protect the tank and fire fighters accessing the water. Category 1 fire appliances should be able to access within 4 m of static water supply with a hardened ground surface to support this access.

All exposed water pipes, values, taps and fittings should be metal and the supply line from tank to ball valve have the same bore size.

Where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump and are shielded against bush fire attack. Any hose and reel for firefighting connected to the pump shall be 19mm (internal diameter), and fire hose reels are constructed in accordance with AS/NZS 1221:1997 Fire hose reels and installed in accordance with AS 2441:2005 Installation of fire hose reels.

Where static water supply is provided the following signage should be installed at the front gate and at a location that is clearly visible (assume smoke) to approaching emergency services to guide them to the static water supply.



Electricity, Gas supplies and Hazardous materials

The intent of electricity, gas and hazardous material measures is to locate these utilities and materials so as not to contribute to the risk of fire to a building.

Electricity

Location of electricity services should limit the possibility of igniting the surrounding bush land or the fabric of buildings. Where practicable, electrical transmission lines are underground. If overhead, electrical transmission lines are installed with short pole spacing (30m), unless crossing gullies, gorges, or riparian areas, then 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.

For further information visit https://www.electricitysafety.com.au/

Gas

Any reticulated or bottled gas should be installed and maintained according to the requirements of the relevant authorities and AS/NZS 1596:2014. All fixed gas cylinders are kept clear of all flammable materials to 10m and shielded on the hazard side. All above-ground pipes and connections to and from gas cylinders are metal, and polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not permitted. Furthermore, if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion. Gas utilities should be positioned to not impede fire fighters accessing water supplies while undertaking suppression operations.

Hazardous Materials

Hazardous materials are any materials that can fuel the fire, such as leaf litter, grass, garden mulch and woodpiles. They can also be made up of solid combustibles or flammable liquids and gases such as petrol, kerosene, alcohol, LPG, natural gas, and acetylene. Vehicle, machinery, and other mechanical equipment that utilise fuels for operations can also be considered hazardous. The incorrect design and placement of carport and garages in residential developments could propagate fire towards the residential dwelling. Any liquids or fuels that are considered hazardous should be positioned away from the dominant bush fire threat. If located in a building/structure, it should be a minimum of 6m away from any other building. Vegetation surrounding these locations shall be maintained to IPA standards and the construction standards shall minimise the impact of ember attack to ignite the structure.

Construction Requirements

Groundwork and Sub-structure construction phase

During the ground phase potential ignition sources of the subject development may include hot works, incorrect disposal of cigarette butts and hot exhausts from vehicles, electrical failures, and sparks from metal contact.

Groundwork and Sub-structure construction phase fire management plan should be developed. Preparation of the site should include mitigating fire ignition sources. This should include vegetation management such as slashing and mowing long grasses in and around the development site, car parking

and access tracks. This is especially important during summer months where Rates of Spread of fire can significantly increase due to the prevailing weather condition.

Handheld fire extinguishers should be carried on each vehicle and on site for quick access and suppression of fires.

Where neither reticulated water nor an existing static water supply is available during the construction phase, a temporary 10,000 litre Static Water Supply within proximity of the development site shall be provided before the commencement of any construction works. This temporary supply will allow for the replenishment of attending fire services which will facilitate the rapid suppression of any potential ignitions. The temporary supply may be removed when the prescribed fire-fighting water supply is installed.

Ongoing Operations

Routine inspections of bush fire safety systems and equipment generally occur annually and are supported by a Bushfire Plan. Ideally these inspections should occur moving out of the colder months in preparation for the bushfire season. The most common types of inspections that are required are surface, near surface (grasses and debris) and elevated (shrub) fire fuel level accumulation in APZs, canopy separation reequipments in APZs, and maintaining building fire hygiene such as cleaning gutters and down pipes.

Developing and annually reviewing a bushfire plan, no matter how big or small the development, is critical to the ongoing maintenance of the Bushfire Protection Measures identified within this report.

Construction Standards

Australian Standard 3959 ''Construction of buildings in bushfire-prone areas‟ provides for six (6) levels of building construction these being BAL - Low, BAL - 12.5, BAL - 19, BAL - 29, BAL - 40 and BAL - FZ. The Australian Standard 3959 specifies construction standards for buildings within various Bushfire Attack Levels as determined by the Planning for Bushfire Protection – 2019 document.

Retrofitting

Any future alterations, extension to structures, even if they are complying, should consider the appropriate bushfire construction standards at that time. Homes built prior to August 2002 were not required to be built to meet bush fire construction standards. Constructions in Bush fire prone lands after August 2002 required bush fire construction standards, which have also changed over time.

The current construction standards are based on your Bush fire Attack Level (BAL). Evidence from large wildfire events over the last 20 years illustrate that house ignition is concentrated within 100m from the vegetation, although it can occur kilometres from the burning vegetation under worst case scenarios. Developments outside the bush fire prone area (100m from the vegetation) will benefit from increasing construction standards to withstand ember-attack to protect the building during a bush fire event.

When undertaking alterations and additions to a dwelling in Bush fire prone land only the new construction is required to conform with the current requirements, although this only partially protects your home.

Research has illustrated that ember-attack from the wildfire is the principal mechanism that ignites homes. The most vulnerable elements are timber decks, Eave fascia boards, gutters timber window frames and timber stairs. Furthermore, house-to-house fires occur following the ignition of a neighbouring

property. Appropriate amount of effort should be placed to ensure that vegetation and landscaping should be maintained to reduce the likelihood of ember attack igniting fire fuels near the house, and separation between neighbouring houses is achieved to reduce house-to-house fires. The use of non-combustible fencing and appropriately positioned windows can go a long way to reducing the risk of house-to-house fires.

While retrofitting identifies available construction protection methods as per *AS3959 – Construction of buildings in Bushfire Prone Area*, **it should be clearly understood that such building enhancements are complementary to good site preparation and vegetation management in the context of the bushfire survival plan**.

Routine maintenance is an important part of bushfire protection for your home, out-buildings and garden. For example, if a window/door metal shutter is fitted, it needs to work at the time of a bushfire threat just like your fire equipment needs to be ready to go.

Each retrofitting measure is a step towards making your home safer against the impact of embers and radiant heat in the event of a bushfire. If you want your home to be comparable to the construction requirements under AS 3959, then *ALL* the works associated with a particular BAL category will need to be undertaken.

Some of the basic retrofitting that can be undertaken:

- Enclose existing sub floors with suitable materials or construct the floor and structure with non-combustible materials
- Cover, seal, overlap, back or butt-joint all joints in the external surface material of walls to prevent gaps greater than 2mm.
- Seal vents, weepholes, breathers and openings with metal screens of aperture <2mm.
- Replace flammable external walls with non- combustible materials.
- Apply sarking-type material (flammability index >5) over the outer face of the building frame prior to re-fixing of any external cladding.
- Screen all windows and doors with metal screens of aperture <2mm and metal frames.
- Establish weather strips, draught excluders or draught seals around doors and panel lift garage doors.
- Garage roller doors could have guide tracks with a maximum gap area of 3mm and be fitted with a nylon brush in contact with the door.
- Above-ground, exposed water, gutter downpipes and gas supply pipes should be metal.
- incorporate gutter guards with a flammability index more than 5 when tested to AS1530.2, or aluminium, bronze, or stainless steel with maximum aperture of 5mm.
- Only use Bushfire resisting timber as specified in AS 3959 Appendix F.

Further information can be found at Guide-retrofit-your-home-for-better-bushfire-protection.

Electric Vehicles (EVs)

EVs are an ever-growing part of the transport environment with government aims of EV vehicles dominating throughout the 2030's. There are a variety of different technologies, battery types, and chemistries in vehicles, e-scooter and e-bikes creating complexity on the risk of '*thermal runaway*'.

Thermal runaway is an unstable chemical process that begins when heat generated within a battery exceeds the amount of heat that is dissipated to its surroundings, which can lead to the battery catch fire. EV batteries tend to put out toxic fumes resulting in suppression difficulties.

Although the chances of batteries catching fire is relatively small <0.1%, approximately 1/3rd of fires occur during charging. the location of residential parking of Plug-in Hybrid Electric Vehicles (PHEVs) vehicles should be considered when planning inconsideration of occupied buildings and extinguishment requirements.

Having a smoke/heat alarm, a F-500 (class A, B and F) Lithium-Ion Battery fire extinguisher in an open-air charging station (unenclosed building) that is location >6m from any building or flammable vegetation will significantly mitigate risk of a EV fire spreading.

Further information can be obtained at: https://www.evfiresafe.com/

Bushfire Emergency / Survival Plan

No matter how big or small the development is within a bush fire prone area, a bush fire plan is critical to preparing the property in the event of a bush fire. To ensure appropriate measures are taken, the worst-case scenario bush fire behaviour should be used to determine the course of action.

There is extreme noise, smoke, heat, and wind during the passing of a bush fire front under worst-case conditions. Vision, hearing, breathing, and communication are significantly affected during this period.

State bush fire authorities have established kits to help residential and small property owners to develop appropriate plans to plan and prepare for bush fire events. In NSW Bush fire survival Plans can be accessed from https://www.rfs.nsw.gov.au/plan-and-prepare/bush-fire-survival-plan.

The principal elements of the Bush fire survival Plans are:

- Know your risk.
- Know and understand the bush fire alert levels.
- Access to 'Fires Near Me' app.
- Knowledge of Local radio, local ABC/emergency broadcaster frequency, and TV.
- Prepare yourself, your home and your family.
- Leave early or prepare to stay.
    - If leaving, when to leave, where will you go, how will I get there, what will I take, who will you call, what is your back-up plan.
    - If you stay, do you have all the equipment you need, what are the signal to start defending the dwelling, what to do before, during and after the passing of the fire front, do all members of the household know what to do, check your equipment, develop action checklist, what is your back-up plan.
- Discuss all elements with your family and neighbours.

Furthermore, knowledge of escape routes (generally the public road system around your dwelling), refuges and location of any nearby Neighborhood Safer Places is critical knowledge prior to a bush fire event.

A bushfire emergency management and evacuation plans are prepared consistent with Australian Standard AS 3745:2010 Planning for emergencies in facilities. State agencies also have developed guidelines to facilitate the development of the documents and other Australian Standards are relevant for different development type. Bushfire emergency management and evacuation plans should be complemented with a Bushfire Management Plan (BMP).

A simple 4 step process can be undertaken to develop a basic bushfire emergency survival plan:

DISCUSS

STEP 1

DISCUSS WHAT TO DO IF A BUSH FIRE THREATENS YOUR HOME

Many households find that having a discussion over dinner works best as everybody is together and focussed.

Download the Step 1 discussion guide (PDF, 985.3 KB).

PREPARE

STEP 2

PREPARE YOUR HOME AND GET IT READY FOR BUSH FIRE SEASON

There are simple things you can do around your home to prepare it for a bush fire, like keeping the grass low and having a cleared area around your home.

Download the Step 2 checklist (PDF, 595.5 KB).

KNOW

STEP 3

KNOW THE BUSH FIRE ALERT LEVELS

If there is a fire in your area you will find its alert level on the NSW RFS website and in the 'Fires Near Me' app. You need to keep track of the alert level so you know what you should do.

Download Step 3 (PDF, 166.1 KB).

KEEP

STEP 4

KEEP ALL THE BUSH FIRE INFORMATION NUMBERS, WEBSITES AND THE SMARTPHONE APP

In a bush fire, it's important that you stay up to date on conditions in your area.

Download Step 4 (PDF, 219.1 KB).

Bushfire Management Plan

No matter how big or small the development is within a bushfire prone area, a bushfire plan is critical to preparing the property in the event of a bushfire. To ensure appropriate measures are taken, the worst-case scenario bushfire behaviour should be used to determine the course of action.

State bushfire authorities have established kits to help residential and small property owners to develop appropriate plans to plan and prepare for bushfire events. These can be accessed by contacting your local fire authority.

For larger development such as industrial, commercial and developments that accommodate vulnerable people, more comprehensive emergency management requirements and procedures should be developed.

At a minimum, the Bushfire Management Plan should illustrate the Bushfire Protection Measures (location and type of hazard (vegetation), defendable space, access, water, and construction standards) that will be implemented as part of the development to reduce the risk from bushfire to an acceptable level and should be clearly displayed within the property to ensure current occupants are aware of the bush fire risk.

Furthermore, the BMP can provide information that assists in wildfire suppression operations, such as:

- 24/7 emergency contact details including alternative telephone contact.
- Location of site infrastructure and assets.
- Fire-fighting water supply plan.
- Site access and neighbour/ internal road plan.
- Identification of built, natural and cultural assets in and around the site.
- Emergency escape routes, refuges, and location of any nearby Neighbourhood Safer Places.
- Location of Fire Management Zone, specifically Asset Protection Zones.
- Location of hazards (Physical, Chemical and Electrical) that will impact on fire-fighting operations and procedures to manage identified hazards during fire-fighting operations.
- Aviation assets (helipads and aviation water supplies) and risks (powerlines).
- Fire history in and around the site, and
- Schedule of on-ground works and review and updating schedule.

Construction in Flame Zones

Flame zone is defined as 'radiant heat received by the proposed building exceeds 40kW/m^2 or calculated by the point of potential flame contact, whichever occurs first'.

BAL FZ development applications should be referred to the NSW RFS. To satisfy the performance requirement the following applies:

1. Buildings subject to BAL FZ must comply with specific conditions of development consent for construction at this level.
2. The requirements above as modified by the development consent following consultation with the RFS under Section 4.14 of the Environmental Planning and Assessment Act 1979; or
3. The requirements of (a) as modified by development consent with a bush fire safety authority under Section100b of the Rural Fires Act 1997 for the purposes of integrated development

Although Section 9 of AS3959 2009 is excluded in NSW, it nonetheless should be used as a basis for assessment of compliance for construction in the flame zone.

For developments in the flame zone (as determined above), systems complying with AS3959 Section 9 will be considered, except that there is to be no flaming of the specimen unless:

1. The situation is infill development and specifically alterations and additions,
2. The outcome as the result of the alterations and additions is positive regarding bush fire safety (i.e., a better outcome is achieved),
3. The applicants are referred to the link that has the Bush Fire Survival Plan and engaged in the bush fire issues associated with their situation, and
4. The flaming is not considered to add to the existing overall bush fire risk of the development.

Materials that allow flaming can be problematic in flame zone and are not generally supported by the NSW RFS.

Construction elements of the building with 10m of the bushfire hazard are generally required to conform with AS1530.8.2.

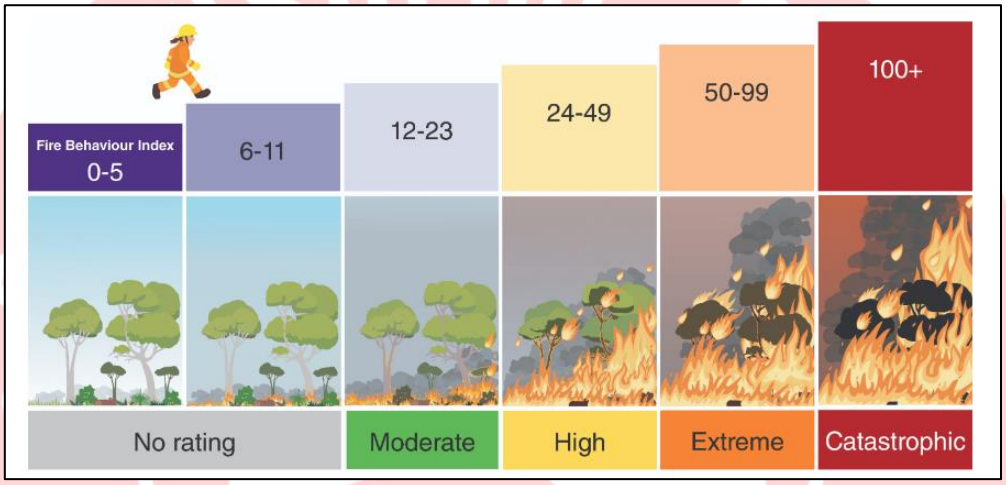
An integrated approach to the construction standards, design, and type of hazardous industry in Flame Zones will provide the best outcome to establish a development that will sustain bush fire attack.

Updated Australian Fire Danger Rating System

The principal objective of the new Australian Fire Danger Rating System (AFDRS) is to implement a more accurate and nationally consistent system that will enable improved decision-making by response agencies and industry and provoke the desired community response to messaging in order to improve public safety. More information at https://www.rfs.nsw.gov.au/news-and-media/newfdr and eLearning at https://www.afac.com.au/initiative/afdrs/afdrs-training .

The AFDRS uses the latest scientific understanding about weather, fuel and how fire behaves in different types of vegetation to improve the reliability of fire danger forecasts. This strengthens the ability of those working in emergency services to be better prepared, make improved decisions, and provide better advice to the community.

It is aimed at a simplified, action-oriented Fire Danger Rating System.



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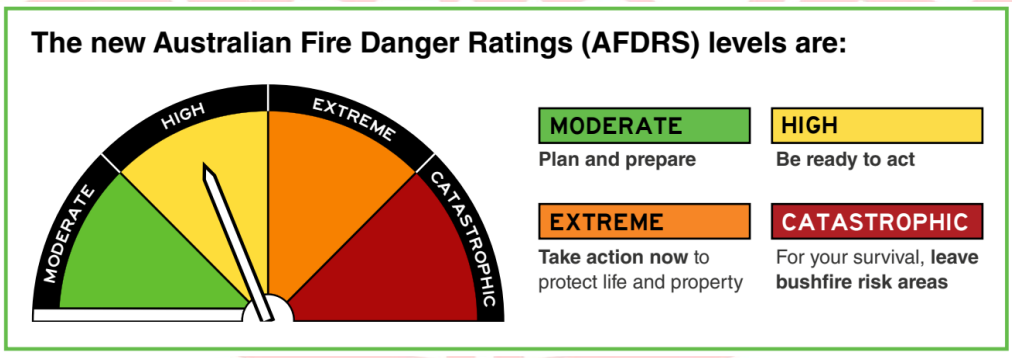

Accessed from AFAC: https://www.afac.com.au/initiative/afdrs/afdrs-faqs

MODERATE: *Plan and Prepare* - Have a plan and be ready to act if a fire starts.

HIGH: *Be ready to act* - Be alert for fires in your area and be ready to leave or be ready to defend.

EXTREME: *Take action* - Act before a fire starts.

CATASTROPHIC: *Leave high risk areas* - Protect your life, leave early.