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SPECIAL FIRE PROTECTION DEVELOPMENT BUSH FIRE ASSESSMENT REPORT

Eco Tourism - Cabins

28 Paradise Drive, Smiths Lake, NSW, 2428

Lot 22 / DP 806842

Reference #:252398

FPA AUSTRALIA BRONZE MEMBER Fire Protection Association Australia

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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Title	Bush Fire Assessment Report – Special Fire Protection Purpose			
Description	Special Fire Protection Purpose - Eco Tourism - Cabins 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842			
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Table 1 Abbreviations and Acronyms

APZ	Asset Protection Zone
ARKS	Areas of Regional Koala Significance
AS/NZS 1596:2014	Australian Standard – Storage and handling of LP Gas
AS/NZS 1221:1997	Australian Standard – Fire hose reels
AS2419:2021	Australian Standard – Fire hydrant installations
AS2441:2017	Australian Standard – Fire hose reels installation
AS3959:2018	AS3959:2018 Construction of buildings in bush fire prone land
BAL	Bush fire Attack Level
BCA	Building Code of Australia
BFAR	Bush Fire Assessment Report
BLA	Broader Landscape Assessment
BPAD	Bush Fire Planning and Design
BPL Map	Bush fire Prone Land Map
BPMs	Bush fire Protection Measures
BEMC	Bushfire Environmental Management Consultancy P/L
BFMC	Bush Fire Safety Authority
BV	Biodiversity Values
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
FFDI	Forest Fire Danger Index
FZ	Flame Zone
GFDI	Grass Fire Danger Index
ha	Hectare
HOC	Heat Of Combustion
IPA	Inner Protection Area
ISSC	Industry Safety Steering Committee
kJ/kg	Kilo Joules per Kilo gram
km/hr	Kilo metre per hour
LAT	Large Air Tanker
LiDAR	light detection and ranging
NASH	National Association of Steel-Framed Housing
NCC	National Construction Code
NSW	New South Wales
F&R	Fire and Rescue
OPA	Outer Protection Area
PBP 2019	Planning for Bush fire Protection 2019
RFS	Rural Fire Service
RHG	Restricted Head Growth
SEED	Sharing and Enabling Environmental Data in NSW
SFR	Short Fire Run
SFPP	Special Fire Protection Purpose
WM Act	*Water Management Act 2000*

1 EXECUTIVE SUMMARY

BEMC Pty Ltd was engaged by Kieran parry-Jones to complete a Bush Fire Assessment Report (BFAR) to on the proposed Special Fire Protection Purpose at 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842 **(Figure 1, page 8).** The proposed development includes an Eco-Tourism facility comprising of cabins.

BEMC has used Method 2 assessment pathway from AS3959:2018 to undertake this assessment and to prepare the Bush Fire Assessment Report (BFAR).

Based upon the assessment 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
The following recommendation are made in the absence of arborist or biodiversity reports to inform the bush fire analysis. Arborist and/or biodiversity report may be required to determine APZ compliance.

At the commencement of building works and in perpetuity the entire lot 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.

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

- Direct accessible egress path between the cabins and refuge building and to a safe place outside the refuge building.
- Landscape species are reflected in the landscaping plan to ensure tree canopy cover is less than 15% (IPA), and less than 30% (OPA) at maturity and trees do no touch or overhang buildings.
- Fencing and gates within BAL 29 areas or higher, and within 6m of the occupied dwelling shall be non-combustible.
- A minimum 1-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.
- Planting is limited in the immediate vicinity of the building.
- Planting does not provide a continuous canopy to the building (i.e., trees or shrubs are isolated or located in small clusters).
- Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies.
- Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown.
- Avoid planting of deciduous species that may increase fuel at surface/ ground level (i.e., leaf litter).
- Avoid climbing species to walls and pergolas.
- Locate combustible materials such as woodchips/mulch, flammable fuel stores away from the building.
- Locate combustible structures such as garden sheds, pergolas, and materials such as timber garden furniture away from the building, and
- Low flammability vegetation species are used.

Recommendation 3 - Construction Standards

The proposed refuge building, 2-storey brick garage and brick studio must comply with section 3 and section 5 (BAL 12.5) 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 - Access

Access to the property and development site is noted on **Figure 2, page 9**.

Private property access shall be provided to the refuge building that comply with the below requirements:

- Direct accessible egress path between the cabins and refuge building and to a safe place outside the refuge building.
- Private property access shall be two-wheel drive, all weather roads.
- The capacity of private property access of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.
- Category 1 fire appliance to within 4m of the static water supply.
- At least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200m from a public tough road.
- Minimum carriageway width of 4m.
- 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°.
- Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads.

Recommendation 5 - Electricity services

Maintain electricity underground.

Recommendation 6 - Gas services

Any reticulated or bottled gas shall be installed and maintained in accordance with the below requirements as outlined in Table 7.4a of PBP:

- Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used.
- All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side.
- Connections to and from gas cylinders are metal.
- Polymer-sheathed flexible gas supply lines are not used; and
- Above-ground gas service pipes are metal, including and up to any outlets.

Recommendation 7 - Bush Fire Management Plan - Emergency Management

Prior to the issue of an Occupation Certificate, a Bush Fire Management Plan prepared in accordance with the requirements of A2.6 of Planning for Bushfire Protection 2019 is to be submitted to and approved by the Council. The Bush Fire Management Plan this includes emergency management, and management and monitoring of bushfire protection measures shall:

- Be consistent with the NSW RFS document: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*.
- Be provided to the Local Emergency Management Committee for its information prior to occupation of the development.
- Plan for early evacuation.
- A Emergency Planning Committee is established to consult with staff in developing and implementing an Emergency Procedures Manual.
- Detailed plans of all emergency assembly areas including on-site and off-site arrangements as stated in AS 3745:2010 are clearly displayed, and an annually emergency evacuation is conducted.
- List and spatially illustrate the bushfire protection measures that are required to be established and maintained and provide an annual review/monitoring program prior to bushfire season to ensure bushfire protection measures are maintained for the life of the property.
- Consider the amount of travel likely to be generated during an emergency evacuation; the capacity of the broader road network to facilitate safe emergency evacuation; limitations/constraints inherent in the road system; and management of potential traffic conflicts (such as emergency vehicles versus evacuating members of the public).

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 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842 (Mecone Mosaic, 2025)*

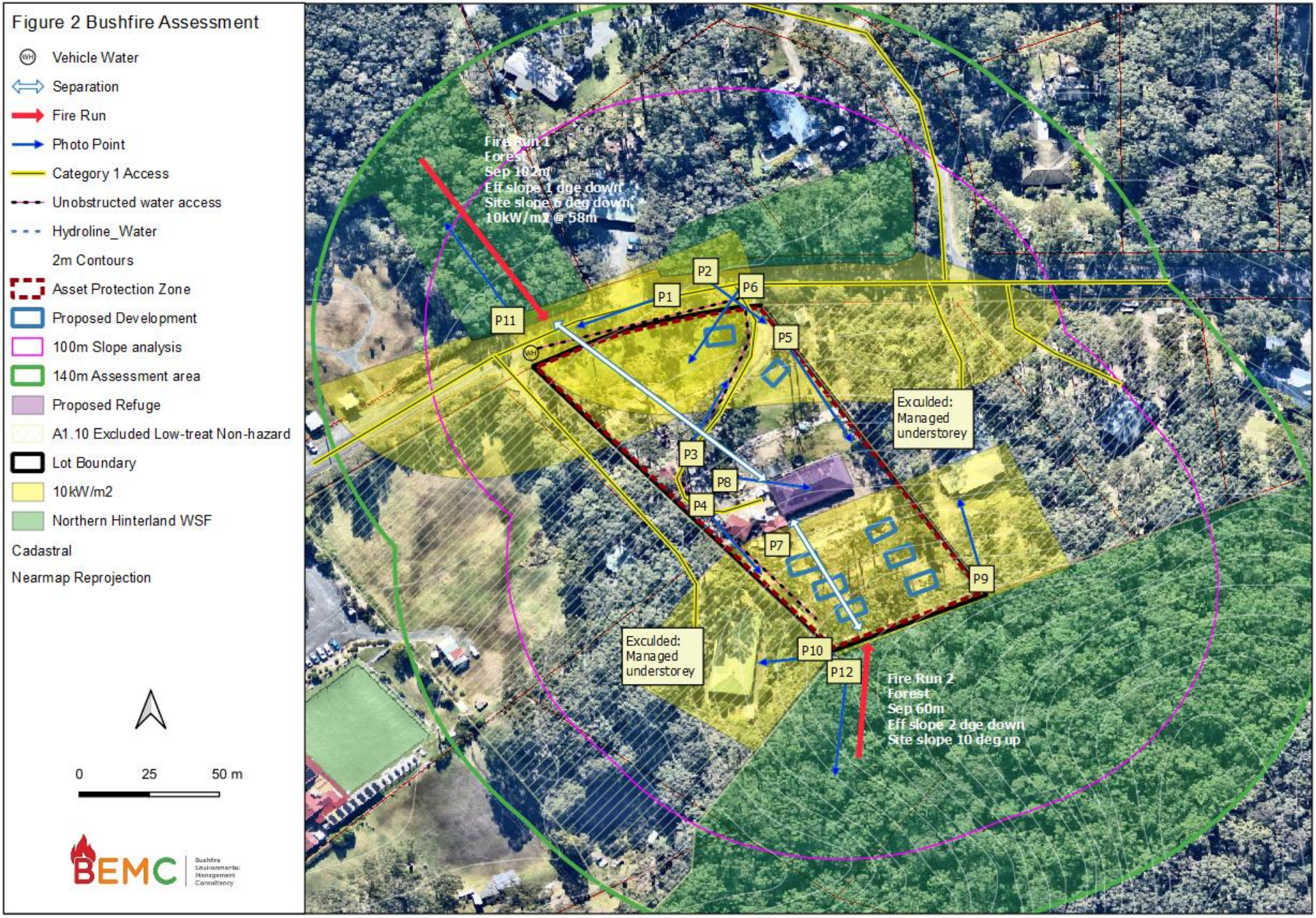


Figure 2 Bushfire Assessment
Vehicle Water
Separation
Fire Run
Photo Point
Category 1 Access
Unobstructed water access
Hydroline_Water
2m Contours
Asset Protection Zone
Proposed Development
100m Slope analysis
140m Assessment area
Proposed Refuge
A1.10 Excluded Low-treat Non-hazard
Lot Boundary
10kW/m2
Northern Hinterland WSF
Cadastral
Nearmap Reprojection
0
25
50 m
BEMC
Bushfire Environmental Management Consultancy
Fire Run 1
Forest
Sep 102m
Eff slope 1 dge down
Site slope 6 deg down
10kW/m2 @ 58m
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
P12
Excluded: Managed understorey
Excluded: Managed understorey
Fire Run 2
Forest
Sep 60m
Eff slope 2 dge down
Site slope 10 deg up

2 INTRODUCTION

BEMC Pty Ltd was engaged by Kieran parry-Jones to complete a Bush Fire Assessment Report (BFAR) to accompany a Development Application for the Special Fire Protection Purpose (SFPP) development located at 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842 (**Figure 1, page 8**).

It is clear from the investigation and assessment of the property that the site is located within bush fire prone land.

The identification of bush fire prone lands (BPL Map) in NSW is required under S. 10.3 of the Environment Planning and Assessment Act 1979 (EP&A Act)[1] [2] [3] . S. 4.14 of the EP&A Act requires developments to comply with NSW Rural Fire Service (RFS) Planning for Bushfire Protection (2019) (PBP 2019) [4] if any part of a development site is affected by a bush fire hazard as indicated within the BPL Map.

This development falls within bush fire affected land within the Mid-Coast Council BPL Map which triggers development assessment provisions under S. 4.14 of the EP&A Act and compliance with PBP 2019. The proposal constitutes "integrated development" under s 4.46 of the EPA Act because it triggers the requirement for a bushfire safety authority under s 100B of the Rural Fires Act 1997 (RF Act). A bushfire safety authority is required because the proposal is for the purpose of "eco-tourism" being a "special fire protection purpose" under s 100B(6) of the RF Act.

If the applicant determines that the project is integrated through the Development Application process, this document can support an application for *General Terms of Agreement* via a bushfire safety authority from NSW Rural Fire Service (RFS) as the report adheres to the requirements of S. 45 of the *Rural Fires Regulation* 2013[5] (RF Regs), Appendix 1, A 2.2 of PBP 2019.

The proposed development is considered tourism.

proposed development is listed in S. 100B (6)(d) *Rural Fires Act* (1997)[6] as a special fire protection purpose development.

The proposed development is not listed under s 47 of the *Rural Fires Regulations (2013)*[7] (RF Regs) as an additional Special Fire Protection Purpose (SFPP) development requiring a Bush Fire Safety Authority (BFSA).

The proposed development is not listed under S. 46 of the RF Regs excluded from requirements for BFSA.

If the applicant determines that the project is integrated through the Development Application process, this document can support an application for *General Terms of Agreement* via a BFSA from NSW RFS as the report adheres to the requirements of S. 45 of the RF Regs, Appendix 1, A2.1, A2.1.1 of PBP 2019.

[1] Environmental Planning & Assessment (1975) No 203 https://legislation.nsw.gov.au/
[2] Environmental Assessment Legislation Amendment Act (2002). Accessed online: https://www.legislation.nsw.gov.au/#/view/act/1979/203
[3] Environmental Planning & Assessment Amendment (Planning for Bush Fire Protection) Regulation 2007, accessed online: https://www.legislation.nsw.gov.au/regulations/2014-285.pdf
[4] NSW Rural Fire Service (2019). Planning for Bushfire Protection – A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners, NSW Rural Fire Service.
[5] Rural Fires Regulation (2013), accessed online: https://www.legislation.nsw.gov.au/#/view/regulation/2013/488
[6] Rural Fires Act (1997), Accessed online: https://www.legislation.nsw.gov.au/#/view/act/1997/65
[7] Rural Fires Regulation (2013), accessed online: https://www.legislation.nsw.gov.au/#/view/regulation/2013/488

2.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development includes an Eco-Tourism facility comprising of 10 cabins, with a total occupancy of 58 inclusive of cabin occupants at full capacity, residences and 1 staff.

The required objectives for Special Fire Protection Purpose Development have been considered in this assessment.

The proposed location of the development is provided in **Figure 1, page 9**.

2.2 OBJECTIVES OF ASSESSMENT

To assess the proposed development in consideration of s4.14 of the EP&A Act 1979, PBP 2019 and AS 3959:2018 to enable council to make a determination.

This report assesses whether the development meets the six objectives listed in section 1.1 of PBP 2019, which provide for the protection of human life and minimize impacts on property as follows:

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

2.3 SPECIFIC OBJECTIVES OF SPECIAL FIRE PROTECTION PURPOSE DEVELOPMENTS

The aims and objectives listed in section 1.1 of PBP 2019 remain applicable to Special Fire Protection Purpose developments, however further consideration has been given to these types of developments to ensure Bush fire Protection Measures (BPMs) are fully incorporated at the design stage of the development. The specific objectives of Special Fire Protection Purpose developments outlined in section 6.2 of PBP 2019 are:

- Minimise levels of radiant heat, localised smoke and ember attack through increased APZ, building design and siting.
- Provide an appropriate operational environment for emergency service personnel during firefighting and emergency management.
- Ensure the capacity of existing infrastructure (such as roads and utilities) can accommodate the increase in demand during emergencies as a result of the development, and
- Ensure emergency evacuation procedures and management which provides for the special characteristics and needs of occupants.

2.4 METHOD 2 FIRE BEHAVIOUR CALCULATIONS

The design fire methodology outlined in Appendix B of AS3959:2018[8], Detailed BAL Assessment, provides the mathematical methodology and accepted inputs of the simplified BAL assessment from which Method 1 matrix was derived. Method 2 fire design modelling consists of accurately determining input into nested calculations within the modelling to provide increased accuracy in determining radiant heat flux and flame length.

[8] Councils of Standards Australia (2018), AS 3959:2018: Construction of Buildings in Bush fire-prone Areas. SAI Global

Furthermore, Method 2 can consider the impact of the Kataburn rate of spread, radiant heat shielding, and short fire runs which may have an impact on the radiant heat exposure of a proposed development.

Understanding the knowledge gaps for bush fire prediction is required to enable accurate interpretation of bush fire modelling and fire engineering calculations used through the Method 2 detailed assessment. The gaps in knowledge include:

- Duration of the initial fire growth phase.
- Fire spread on slopes, in complex terrain and extreme condition.
- Fire spread around the entire perimeter.
- Short-distance (wind-driven) spotting.
- Characteristics of flames in different fuel types.

When interpreting the results of the detailed method, each of these elements are considered when determining the effect of the outputs of the calculations.

2.5 PBP 2019, 2025 Addendum and NCC

The 2022 edition of the National Construction Code (NCC 2022)[9] contains amendments to its bush fire protection provisions. This includes a suite of new provisions for Class 9 Buildings in bush fire prone areas that accommodate certain types of vulnerable occupants. This Addendum aligns Planning for Bush Fire Protection 2019 (PBP 2019) with NCC 2022.

The proposal is not class 9 buildings and not affected by PBP addendum or the NCC.

[9] Australian Building Codes Board (2010), Building Code of Australia, Class 1 and Class 10 Buildings, Housing Provisions Volume 2.

3 BROADER LANDSCAPE ASSESSMENT

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 no 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.

The Broader Landscape Assessment (BLA) examines the area external to the requirements of the planning proposal, extending for approximately two kilometres. The assessment includes an understanding of the bushfire hazards (vegetation extent), the broader road network, proximity to townsites, emergency response capacities, urban areas and suitable destinations within a context of increasing fire behaviour and exposure within the life of the development. It provides a means of quantifying the characteristics and the potential for a landscape scale bushfire when considering the suitability and risk to the development. The BLA utilises a point-based assessment process to quantify the landscape risk. This enables the identification of the ***actual*** bushfire risk and determines 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	0 points	1 point	3 points	5 points	SCORE
		LAND-USE			
Will the proposed development impact on adjoining lands	Positive impacts on the ability of adjoining landowners to implement Bush fire Protection Measures.	Reduce the requirements of adjoining landowners to implement Bush fire Protection Measures	Adjoining landowners will be required to increase Bush fire Protection Measures	Significantly inhibit adjoining landowners to implement Bush fire Protection Measures.	0
Will the proposed development impact on utilities or add hazards	Positive impacts on utilities or add hazards.	Minor impact on utilities or add hazards although considered within planning constraints.	Major impact on utilities or add hazards.	The wildfire risk profile of significant infrastructure will increase due to this development.	0
Community profile	High social-economic connected community	Rural disconnected community	Low social-economic connected community	Vulnerable development	1
Catastrophic landscape Wildfire Behaviour	Not possible given the broader landscape.	Unlikely given the broader landscape.	Likely given the broader landscape.	Very likely given the broader landscape.	3

ELEMENT	0 points	1 point	3 points	5 points	SCORE
EMERGENCY RESPONCE					
Proximity to potential built refuge	Within 5km	5-10km	10-50km	>50km	3
Impact on the ability of emergency services to respond, within fire growth period	Within 5-minutes of a fire stations (RFS or F&R)	Within 45-minutes of >5 fire stations (RFS or F&R)	Within 45mins-minutes of >5 fire stations (RFS or F&R)	<5 fire stations (RFS or F&R) within 45 hr	3
Proposed development within aviation response areas	Located within 15 minutes flight from a Large Air Tanker (LAT) airbase	located within 15-30 minutes flight from a Large Air Tanker (LAT) airbase	located more than 30-minute flight from a Large Air Tanker (LAT) airbase	It is unlikely aviation services deployed to this location.	1
WATER					
Water availability	Stand-along, visual dedicated firefighting water provided	Relies on water system <70m of furthest elevation of building	Relies on water system >70m of furthest elevation of building	Relies on natural water supplies (dams, creeks etc.)	1
ACCESS					
Local road pattern is suitable during a bushfire	Multiple evacuation routes are possible and connect with the public road network in a direction away from the wildfire threat to refuge location.	More than one egress routes are provided from the property to a safer location.	One egress route is provided, which is <200m from the property to a safer location.	Only one access or egress route with no nearby safe location.	1
Relationship between hazard and vehicle access	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.	3
FUEL HAZARD					
Vegetation continuity	Forested vegetation beyond 140m from the site is scattered with low	Forested vegetation beyond 140m from the site is scattered and isolated,	Patches of forested vegetation associated riparian and isolated	Continuous forested areas within mountainous terrain beyond 140m from the site	3

ELEMENT	0 points	1 point	3 points	5 points	SCORE
	continuity due to urban development.	forming a dominate fast moving grassland or open woodland fire event.	ridgelines beyond 140m from the site may result in localised forest fire event.	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 separation >100m between forested vegetation restricting the fire head growth	Forested vegetation corridors beyond 140m from the site exist, although separations <100m existing providing some impact on fire head growth.	Forested vegetation corridors beyond 140m from the site provide for passage of landscape fire to enter and move through the site.	3
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 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 are present.	Wildfire within forests can approach from several directions and have hours or days to grow and develop before impacting the site.	3
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	5
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.	3
				TOTAL	33

3.1 BROADER LANDSCAPE ASSESSMENT RECOMMENDATIONS

The BLA provides a quantifiable assessment of the landscape risk to guide the appropriate level of bushfire protection measures to mitigate bushfire risk to acceptable levels. Future changes in weather[10] [11] [12] have been considered within this assessment and the requirements for bushfire protection measures to be adequate for the life of the property.

The site has an accumulated score of **>30** is considered **HIGH** and **EXTREME** risk and strict compliance with method 1 of PBP 2029 is appropriate and applied. Any performance-based solutions shall require consultation with NSW RFS through a PRE-DA process.

Further analysis of site suitability in accordance with s4.15(c) of the EP&A Act should be considered by the consent authority.

Consider 4.15(1)(c) of the EP8&A act which provides a mandatory consideration of the 'suitability of the site for the development", and simply complying with PBP2019 may not be adequate for some sites. The BLA illustrates the site is suitable from a bushfire perspective.

[10] Clarke, H., Lucas, C., Smith, P., 2012. Changes in Australian fire weather between 1973 and 2010, International Journal of Climatology. DOI: 10.1002/joc.3480

[11] Douglas, G., 2017. Property Protection from Extreme Bushfire Events under the Influence of Climate Change. Doctor of Philosophy at the Western Sydney University, Sydney, Australia

[12] Lucas, C. 2010. On developing a historical fire weather data-set for Australia. Australian Meteorological and Oceanographic Journal. 60.1-14

4 BUSH FIRE HAZARD ASSESSMENT

This section details the site assessment methodology in Appendix 1 of PBP2019. It provides a detailed analysis of the vegetation, slope, exclusions, vegetation downgrades and shielding elements to provide the required Bush fire Protection Measures.

4.1 FOREST FIRE DANGER INDEX

This assessment utilises Mid-Coast Council area with a Forest Fire Danger Index (FFDI) of 80.

4.2 ASSESSMENT METHODOLOGY

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

- Nearmap, sixmap aerial photograph interpretation.
- Kogan 6*25 laser distance finder.
- Photo theodolite application supported by contour and LiDAR DEMs terrain profiles[13].
- Regional vegetation community mapping Sharing and Enabling NSW Environmental Data (SEED Portal)[14]
- Site visit in April 2025.

4.3 VEGETATION ASSESSMENT

In accordance with PBP 2019, an assessment of the vegetation over 140m in all directions from the building was undertaken. Consideration is provided to any clearing, re-vegetation or landscaping likely to occur to obtain the worst-case scenario and derived maximum fuel loads.

Vegetation that may be considered a bush fire hazard was identified and classification based on available fuel loads for sub-formations are provided through vegetation fuel monitoring project administered by the University of Wollongong, University of Melbourne and CSIRO Ecosystems Science and Bush fire Dynamics and Applications. The results of this research are commonly referred to as the '*NSW Comprehensive Fuel Loads*'[15].

An arborist and/or a biodiversity report has not been provided to inform the vegetation assessment.

Stream order watercourses within the 140m assessment area in accordance with the *Water Management Act 2000* (WM Act) have been identified. This vegetation is not proposed to be impacted on by bush fire protection measures.

No vegetation within the 140m Assessment has been identified within the Biodiversity Values (BV) Map[16] provided in **Appendix 3, page 48**.

The area is not identified within the Areas of Regional Koala Significance (ARKS).

SEED Portal (State Vegetation Type Mapping) and where available regional vegetation community mapping has been analysed to determine the vegetation in and around the development, which is illustrated in **Figure 3, page 18**.

[13] Elevation Foundation Spatial Data (ELVIS), ANZLIC licence committee on survey and mapping. Accessed online: https://elevation.fsdf.org.au/

[14] The Central Resource for Sharing and Enabling Environmental Data in NSW (SEED Portal) NSW Government State Vegetation Type Map (SVTM)-Current Release C1.1.M1.1 (December 2022) accessed online : https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map

[15] NSW Rural Fire Service (2019). Comprehensive vegetation Fuel Loads, Fact sheet V8, NSW Rural Fire Service. Sydney

[16] The Biodiversity Values Map and Threshold Tool https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

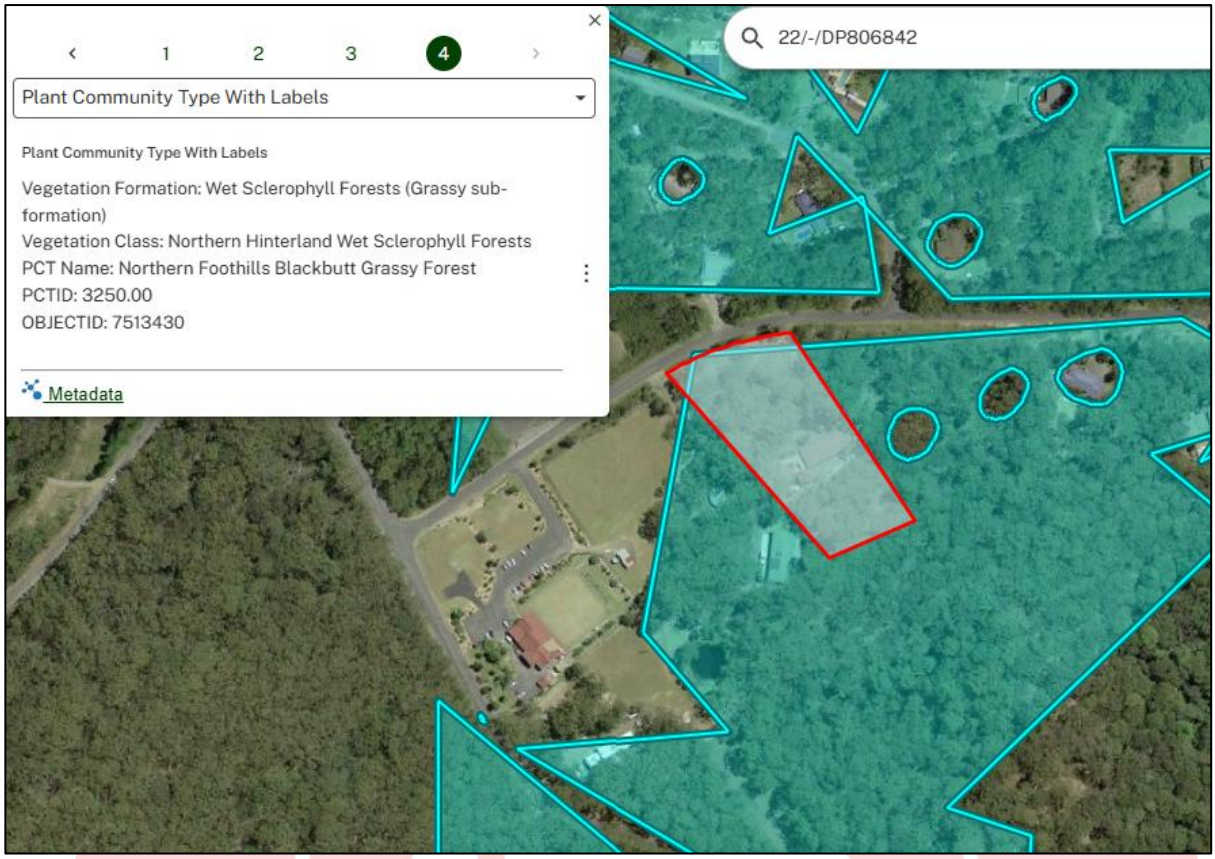


Figure 3 *Vegetation in and around the site (Extract from the SEED Portal)*

4.3.1 Vegetation classification, exclusions, and downgrades

An analysis of the vegetation in and around the site has determined that no vegetation exclusions or down grades are included in this assessment**.**

4.3.1 Predominant Vegetation Classification

Vegetation in and around the site is classified as PCTID: 3250 *Northern Foothills Blackbutt Grassy Forest,* which is *Northern Hinterland Wet Sclerophyll Forests* in accordance with the '*NSW Comprehensive Fuel Loads'*.

4.4 Separation Assessment

The separation between the proposed building envelope and the classifiable vegetation that creates bush fire threat is one of the significant BPMs to reduce the risk of bush fire impacting on the development. The land within the separation must conform to the standards of an Asset Protection Zone (APZ) to be accepted within the separation areas.

The separations between the classifiable vegetation and the proposed dwellings are provided in **Table 3, page 22,** illustrated in **Figure 2, page 9.**

4.5 Slope Assessment

This section details the site assessment methodology in Appendix 1 of PBP2019 to assess the effective slope (under classified vegetation) and site slope (slope between the vegetation and proposed development) within

100m of the proposed building envelope. The analysis of effective slope is undertaken in accordance with Fire Protection Association Australia Practise Note[17].

The effective and site slopes used within this assessment are provided in **Table 3, page 22,** illustrated in **Figure 2, page 9**.

4.5.1 Effective and Site Slope Assessment

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux.

The effective slope is the slope of the ground under the hazard (vegetation). The slope between the vegetation and the proposed building envelope is the site slope. When identifying the effective and site slopes, it may be found that there are a variety of slopes covering different distances. The effective slope is the slope under the vegetation which will most significantly influence the bush fire behaviour for each aspect.

The topography of the site and surrounds has been assessed to identify the maximum slope present under the classified vegetation (hazard). Slope data has been calculated from a 1m light detection and ranging (LiDAR) digital elevation model. The source data sets have been captured to standards that are generally consistent with the Australian intergovernmental committee on survey and Mapping LiDAR[18]. Acquisition Specifications with require a fundamental vertical accuracy of at least 0.30m (95% confidence) and horizontal accuracy of at least 0.80m (95% confidence). The fire run arrows indicated in **Figure 4, page 20** represents the slope calculated across the length of the arrow (worst case scenario fire run) utilising LiDAR data within ERSI software. These values help determine the vegetation that poses a bush fire threat and the slope that influences fire behaviour.

4.6 Shielding

Where an elevation is shielded from direct radiant heat arising from bush fire attack, then the construction requirements for that elevation can be reduced to the next lower BAL rating. An elevation is deemed to be not exposed to the source of bush fire attack if all the straight lines between that elevation and the source of bush fire attack are obstructed by another part of the building.

The shielding of an elevation shall apply to all the elements of the wall but shall not apply to subfloors or roofs. The construction requirements for a shielded elevation shall not be less than that required for BAL-12.5 unless the building has been assessed as being BAL-LOW. The reduced construction requirements do not apply where any elevation is BAL-FZ.

4.7 Wildfire Growth

An analysis of the size and shape of the classifiable vegetation in and around the site has determined no Short Fire Run (SFR) or Restricted Head Growth (RHG) considerations within this assessment.

[17] Fire Protection Association Australia. 2024. Practise Note PN-05 Calculating Effective Slope for BAL Assessment Report.

[18] Elevation Foundation Spatial Data (ELVIS), ANZLIC licence committee on survey and mapping. Accessed online: https://elevation.fsdf.org.au/

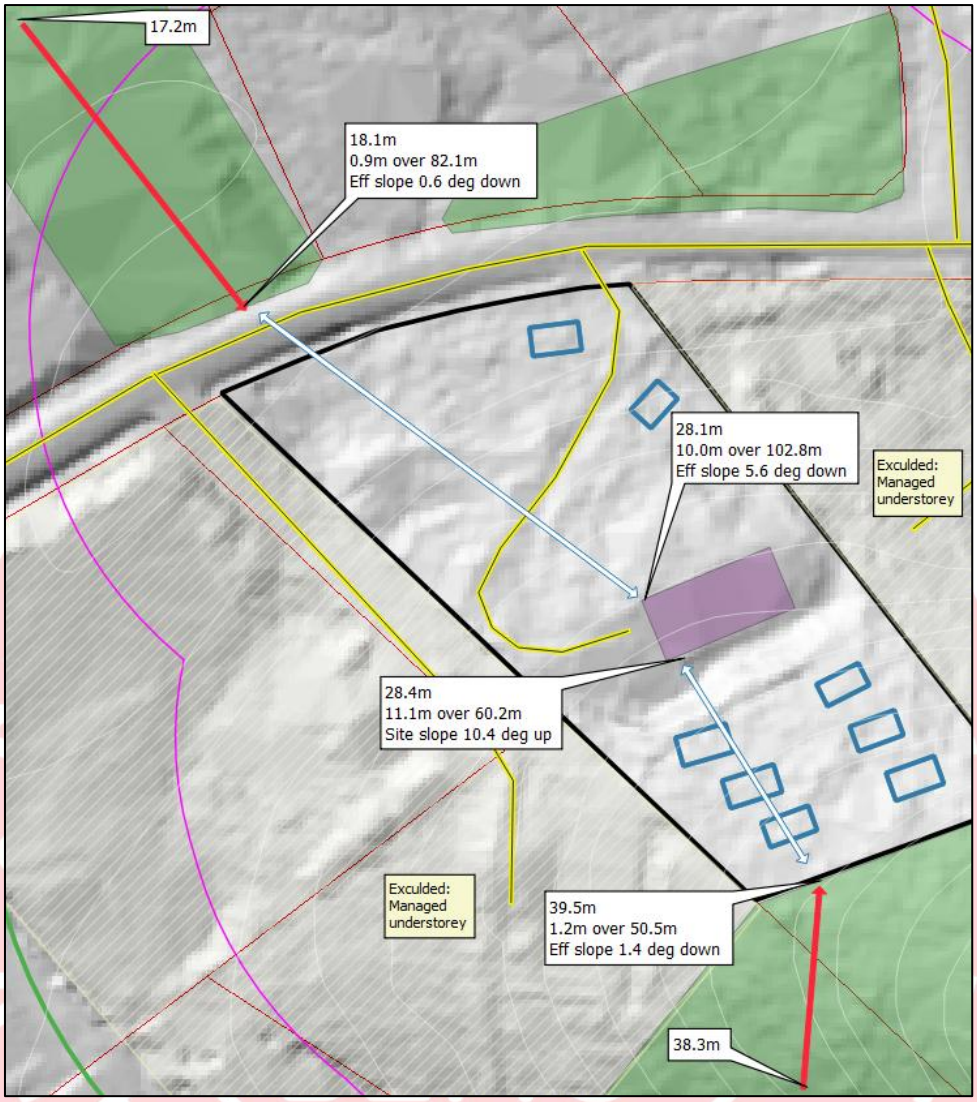


Figure 4 *LiDAR slope analysis*

4.8 FLAME LENGTH

Contemporary research illustrates that flame length ground attachment is not possible at slopes below horizontal and below 15 degrees and has not been considered further within this assessment given that the three transects assessed are all less than 15 degrees.

Further discussion of contemporary flame length research appears below:

Weise and Biging[19] research Byram's original equation relating fireline intensity to flame length overestimated flame length.

The 'trench effect' arises because of the geometry affects the flames and hot plume attaching to the bottom surface Drysdale[20] and Edgar[21] reported the flame and hot plume flow characteristics depended on the inclination, with the hot plume separating from the surface at 10 and 20 degrees, although a distinctly laminar structure developed, and the hot plume attached to the surface at 30 degrees which gave rise to hotter and

[19] Weise. D. R., Biging, G. S. 1996. Effects of wind velocity and slope on flame properties. Canadian Forestry Research. V26, pg 1849-1858
[20] Drysdale, D. D., Macmillan, A. J. R., 1992. Flame spread on inclined surfaces. Fire Safety Journal, 18(3), 245-254.
[21] Edgar, R.A., Sharples, J.J., Sidhu, H.S., 2015b. Investigation of flame attachment and accelerated fire spread. PCChE Congress incorporating Chemeca, Melbourne, Victoria.

faster moving fire. Grumstup[22], Drysdale and Macmillan[23] and Wu[24] illustrate the plume commences a pronounced lean when slopes exceed 15° angle and ground attachment commences although detaches quickly from the surface.

Edgar[25] [26]research supports Dold, Zinoviev[27] and Wu of a threshold angle of inclination that demarcates the separation between turbulent and laminar flow regime that predominantly determines flame attachment to the ground. This threshold angle is around 24 to 26 degrees. Edgar[33] reports the laminar flow, once established, was more stable within tunnels of greater inclination, indicating disruption of the laminar flow could be achieved at 20 degrees, although this disruption did not impact the laminar flow at 30 degrees. Edgar [34] illustrates that the attachment of the plume for tunnel inclinations above 24° was associated with the development of a pressure deficit in the region immediately upslope of the heat source, supporting the theory that the mechanism for flame attachment of the plume arises due to an imbalance between the upslope and downslope entrainment of air into the plume heat source and is independent of the convective intensity of the plume. Edgar[34] reported distinctly different plume behaviour depending on whether the trench was inclined above or below the critical angle of 24°.

In this case flame ground attachment is no longer considered.

4.9 Other Method 2 inputs

Elevation of Receiver

Elevation of Received it the height of the body that received the radiant heat flux and is calculated in accordance with B9 - step 8 of Appendix B of AS3959. If the purpose of the assessment is to determine the radiant heat flux to which a specific level of the site might be exposed.

Due to the bushfire risk identified in section 2 of this report the elevation of the received of the eave at 2.4m has been applied.

Heat of Combustion

Heat of Combustion (HoC) is an important characteristic in the simulation of wildfires. It is frequently used in the assessment of fuel flammability and is a key input to calculate fire-line intensity which provides for flame length calculations. Despite the variability of natural fuels, HoC is considered a constant. Research since the development of the Method 2 calculations illustrates that fuel moisture content has a significant impact on the HoC and argues that lowering the current default heat of combustion of 18600 kJ/kg in forest fire behaviour models could be considered. In this case default heat of combustion of 18600 kJ/kg is applied.

Flame Emissivity

AS3959:2018 indicates a nominal flame emissivity of 0.95 is justified, as the bush fire flames under design fire weather scenarios are generally optically thick ($\varepsilon \approx 1$). The predicted flame emissive power is extremely sensitive to flame temperature. The selection of the nominal flame temperature for calculation is critical to make sure that the construction standard determined with this flame temperature together with other input parameters can provide an adequate bush fire construction level. In this case nominal flame emissivity of 0.95 is applied.

[22] Grumstrup, T.P., McAllister, S.S., Finney, M.A. 2017. Qualitative Flow Visualization of Flame Attachment on Slopes. 10th U. S. National Combustion Meeting Organized by the Eastern States Section of the Combustion Institute April 23-26, College Park, Maryland.
[23] Drysdale, D. D., Macmillan, A. J. R., Shilitto. D., 1992 The King's Cross fire: Experimental verification of the 'Trench effect'. Fire Safety Journal Volume 18, Issue 1, 1992, Pages 75-82
[24] Wu, Y., H. Xing, and G. Atkinson (2000). Interaction of fire plume with inclined surface. Fire Safety Journal 35(4), 391–403.
[25] Edgar, R.A., Sharples, J.J., Sidhu, H.S., 2015. Revisiting the King's Cross Underground disaster with implications for modelling wildfire eruption. 21st International Congress on Modelling and Simulation, Gold Coast, Australia
[26] Edgar, R.A., Sharples, J.J., Sidhu, H.S., 2016. mining the effects of convective intensity on plume attachment in three dimensional trenches. PCChE Congress incorporating Chemeca, Adelaide, South Australia
[27] Dold, J. W., Zinoviev. A., 2009. Fire eruption through intensity and spread rate interaction mediated by flow attachment. Combustion Theory and Modelling 13(5), 763–793.

Moisture Factor

Fuel moisture factor is only used for Tussock Moorland and is default to 5. This input has no effect on fire modelling calculations in other vegetation and hence is not applicable to this study.

Ambient Temperature and Relative Humidity

The default value for ambient air temperature during worst-case scenario fire weather conditions defaults to 35°, or when converted to Kelvin is 308K. The default value for Relative Humidity is 25%. Worst case scenario fire weather conditions in NSW are generally from the north-west which have high temperatures and low relative humidity. For bush fire threats from directions other than the north, north-west, and west, the ambient temperature and relative humidity can significantly change, especially in coastal environments.

Outcomes of the Bushfire Attack Level assessment implementing Method 2 AS3959:2018 are outlined in **Table 3, below**.

Table 3 *Outcomes for the property with respect to Bush fire Hazard Assessment (Method 1 PBP 2019 / Method 2 AS3959:2018)*

Elements	Method (unit)	Fire Run 1	Fire Run 2
Vegetation	NSW Comprehensive Fuel Loads	Northern Hinterland WSF	Northern Hinterland WSF
Separation	Spatial analysis	102m	60m
Effective slope	Site visit – Theodolite (°)	1 deg down	2 deg down
Site slope	Site visit – Theodolite (°)	6 deg down	10 deg up
Shielding width	Site Plans / Site Visit (m)	N/A	N/A
Shielding height	Site Plans / Site Visit (m)	N/A	N/A
Elevation of receiver	Site Plans (m)	2.4	2.4
Flame temperature	1090 / 1200 Kelvin	1090	1090
Upslope fire	Kataburn correction	No	No
Fire Danger Index	Council Area	80	80
Heat of Combustion	Default at 18600 kJ/kg	18600	18600
Flame Emissivity	Default at 0.95	0.95	0.95
Moisture Factor	Default at 5	5	5
Ambient temperature	BoM (Default at 308 Kelvin)	308	308
Relative Humidity	BoM (Default at 25%)	25	25
RHG / SFR Fire Model	Vesta / McArthur	N/A	N/A
RHG / SFR length	Spatial analysis	N/A	N/A
OUTPUTS - Appendix 6, page 50			
BAL 40/FZ		<26m	<25m
Separation to Achieve BAL 29		26 - < 37m	25 - < 36m
Separation to Achieve BAL 19		37 - < 50m	36 - < 49m
Separation to Achieve BAL 12.5		50 - < 100m	49 - < 100m
Separation to Achieve <10kW/m²		58m	57m
Bush fire Attack Level (BAL)		**BAL 12.5**	**BAL 12.5**

5 ADDITIONAL S. 45 REQUIREMENTS

S. 45 of the RF Reg indicates the assessment requirements for S. 100B RF Act developments to obtain a bush Fire Safety Authority. This section illustrates the remaining elements identified within S. 45 of the RF Reg that are not covered within bush fire hazard assessment process (section 3 and 4 of this report) or within the performance criteria of PBP 2019 (section 6 of this report).

5.1 CL (2) (E) AND (F) S.45 RF REGS - THREATENED SPECIES, POPULATIONS AND COMMUNITIES

A search on the NSW Government Central Resource for Sharing and Enabling Environmental Data for significant environmental values was completed.

The search identified no Critical Endangered Ecological Communities (CEEC) or species listed under the *Biodiversity Conservation Act 2016* near or within the site.

The results of the Sharing and Enabling Environmental Data is provided in **Appendix 2, page 47.**

There will be no additional impacts on natural heritage values.

No vegetation within the 140m Assessment has been identified within the Biodiversity Values (BV) Map provided in **Appendix 3, page 48**.

A search of the Aboriginal Historic Information Management System (AHIMS) was completed on the 12th April 2025 which indicated the development area is not known to have any Aboriginal significance.

The output of the search is provided in **Appendix 4, page 49.**

There will be no additional impacts on cultural heritage values**.**

5.2 CL (2) (G) ADDITIONAL BUSH FIRE ASSESSMENT

The capacity of nearby public roads to handle increased volumes of traffic when a bush fire emergency occurs.

The surrounding public road system is two-way, sealed with multiple routes to safer places away from the bush fire threat. This designed will be able to accommodate the elevated level of traffic created by this development.

Whether or not nearby public roads that link with the fire trail network have two-way access.

No linkages between the public road system and fire trails exist within the assessment area.

The adequacy of sprinkler systems and other fire protection measures to be incorporated into the development.

There are no bushfire spray systems or fire protection measure proposed outside the performance criteria.

Registered fire trails on the property.

No registered fire trails are located on the property.

6 BUSHFIRE ASSESSMENT AND PERFORMANCE MEASURES

This section assesses Bushfire Performance Measures (BPMs) for the proposed development at 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842 in consideration of the acceptable solutions required for each performance criteria within PBP 2019. Outcomes are outlined in **Table 4**, below. Where acceptable solutions are not met details of the performance-based solution are provided.

Table 4 *Planning for bush fire protection compliance (PBP 2019*) – Chapter 6 - *Special Fire Protection Purpose (SFPP) developments on bush fire prone lands.*

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
APZs	Radiant heat levels of greater than 10kW/m² (calculated at 1200K) will not be experienced on any part of the building.	• The building is provided with an APZ in accordance with Table A1.12.1 in Appendix 1.	**See variation below**.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	• APZs are located on lands with a slope less than 18 degrees.	**COMPLIES - ACCEPTABLE SOLUTION** The APZ is not located on land >18 degrees slope.
	APZs are managed and maintained to prevent the spread of fire to the building.	• The APZ is managed in accordance with the requirements of Appendix 4 of this document and is wholly within the boundaries of the development site.	**COMPLIES - ACCEPTABLE SOLUTION** The APZ is not wholly within the site boundaries, although complies with section 3.2 of PBP 2019. The following recommendation are made in the absence of arborist or biodiversity reports to inform the bush fire analysis. Arborist and/or biodiversity report may be required to determine APZ compliance. At the commencement of building works and in perpetuity the entire lot around the proposed development shall be maintained as an inner protection area (IPA) as outlined

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
			within Appendix 4 of PBP 2019 and the NSW RFS document standards for asset protection zones[28].
	The APZ is provided in perpetuity.	• APZ are wholly within the boundaries of the development site; and • Other structures located within the APZ need to be located further than 6m from the refuge building.	**COMPLIES - ACCEPTABLE SOLUTION** A 2-storey brick garage exists within 6m of the proposed refuge and a brick studio exists within 6m of the garage. To mitigate building-to-building fire spread both buildings will be required to the same BAL as the refuge building.
	VARIATION: **Ecotourism**: Radiant heat levels of greater than 10kW/m² (1200K) are not experienced by emergency service personnel and occupants during firefighting and emergency management around a building on site that can be used as a refuge.	• An APZ is provided in accordance with Table A1.12.1 in Appendix 1 of this document around the entire refuge building or structure.	**COMPLIES - PERFORMANCE SOLUTION** Performance-based solution has been performed. Method 2 calculations were used to determine the radiant heat exposure and Bush fire Attack Levels. The inputs to the Method 2 calculations are provided in **Table 3, page 22; Appendix 5, page 50** and illustrated on **Figure 2, page 9**.
CONSTRUCTION	The proposed building can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact.	• A construction level of BAL-12.5 or greater under AS 3959 and section 7.5 of PBP is applied.	**MADE CONDITION OF CONSENT** New construction must comply with section 3 and section 5 (BAL 12.5) 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

[28] NSW Rural Fire Service (2005). Standards for Asset Protection Zones. NSW Rural Fire Service, Sydney.

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
	VARIATION: **Ecotourism:** The proposed refuge building can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact.	• A construction level of BAL-12.5 or greater is applied to the refuge building in accordance with AS 3959 or NASH Standard and 7.5 of PBP	**MADE CONDITION OF CONSENT** The proposed refuge building, 2-storey brick garage and brick studio must comply with section 3 and section 5 (BAL 12.5) 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.
	VARIATION: **Ecotourism:** Occupants of the ecotourism facility are provided with appropriate shelter in the event of a bush fire.	• A refuge building is provided; • The refuge building must have sufficient space for all occupants and comply with the occupancy levels permissible for that structure; and • The refuge building must be constructed to BAL-12.5 or greater in accordance with AS 3959 or NASH Standard and 7.5 of PBP.	**COMPLIES - ACCEPTABLE SOLUTION** A refuge building is provided (refer to **Figure 2, page 9**). The total maximum occupancy of the facility is 58. The refuge building is approximately 400m^2 which is adequate to accommodate a minimum 0.75 m^2 and 1.2 m^3 per person. The building provides direct accessible egress path to a safe place outside the building.
ELECTRICITY	Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	• Where practicable, electrical transmission lines are underground; and • Where overhead, electrical transmission lines are proposed as follows: ○ Lines are installed with short pole spacing (30m), 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.	**ACCEPTABLE SOLUTION** Maintain electricity underground.
GAS	Location and design of gas services will not lead to ignition of surrounding bushland	• Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements	**MADE CONDITION OF CONSENT** Any reticulated or bottled gas shall be installed and maintained in accordance with the below requirements as outlined in Table 7.4a of PBP:

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
	or the fabric of buildings.	of relevant authorities, and metal piping is used. • All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side. • Connections to and from gas cylinders are metal. • 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; • Polymer-sheathed flexible gas supply lines are not used; and • Above-ground gas service pipes are metal, including and up to any outlets	▪ Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014[29] and the requirements of relevant authorities, and metal piping is used. ▪ All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side. ▪ Connections to and from gas cylinders are metal. ▪ Polymer-sheathed flexible gas supply lines are not used; and ▪ Above-ground gas service pipes are metal, including and up to any outlets.
LANDSCAPING	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	• Landscaping is in accordance with Appendix 4; and • Fencing is constructed in accordance with section 7.6.	**MADE CONDITION OF CONSENT** Landscaping is required to be managed and maintained in perpetuity. A Landscaping plan is required to illustrate: • Landscape species are reflected in the landscaping plan to ensure tree canopy cover is less than 15% (IPA), and less than 30% (OPA) at maturity and trees do no touch or overhang buildings. • Fencing and gates within BAL 29 areas or higher, and within 6m of the occupied dwelling shall be non-combustible. • 1.5m separation is provided between the building-to-shrub/garden vegetative fuels with a smooth ground surface within this separation immediately adjacent to buildings. • No flammable rough ground surfaces (bark/mulch gardens beds) within 6m of the building, stairs or decks.

[29] Councils of Standards Australia (2002), AS 1596:2002: Storage and handling of LPG Gas. SAI Global

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
			• Planting does not provide a continuous canopy to the building (i.e., trees or shrubs are isolated or located in small clusters). • Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies. • Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown. • Avoid planting of deciduous species that may increase fuel at surface/ ground level (i.e., leaf litter); • Avoid climbing species to walls and pergolas. • Locate combustible materials such as woodchips/mulch, flammable fuel stores away from the building. • Locate combustible structures such as garden sheds, pergolas, and materials such as timber garden furniture away from the building, and • Low flammability vegetation species are used.
ACCESS (GENERAL) REQUIREMENTS)	Firefighting vehicles are provided with safe, all-weather access to structures and hazardous vegetation.	• SFPP access roads are two-wheel drive, all-weather roads. • Access is provided to all structures. • Traffic management devices are constructed to not prohibit access by emergency services vehicles. • Access roads must provide suitable turning areas in accordance with Appendix 3; and • One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	***Refer to variation***

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
VARIATION: **Ecotourism:** fire fighting vehicles are provided with safe, all-weather access to the proposed refuge building.	• Vehicular access is provided to the refuge building from a public road in accordance with property access requirements of Table 5.3b; • Accommodation is within 100m of the refuge building; and • Pedestrian paths from accommodation to the refuge building/s are provided and clearly signposted.	**MADE CONDITION OF CONSENT** Firefighting vehicles shall meet the follow requirements: • Firefighting vehicular access is provided to the refuge building from a public road in accordance with property access requirements of Table 5.3b; • Accommodation is within 100m of the refuge building; and • Pedestrian paths from accommodation to the refuge building/s are provided and clearly signposted.
The capacity of access roads is adequate for firefighting vehicles	• The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	**MADE CONDITION OF CONSENT** Firefighting vehicles shall meet the follow requirement: • The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.
There is appropriate access to water supply	• Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression. • Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2021 - Fire hydrant installations System design, installation and commissioning; and • There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	**MADE CONDITION OF CONSENT** Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2021 - Fire hydrant installations System design, installation and commissioning. Section 3.5.2 of AS2419.1.2021 Fire Hydrant Installation provides design requirements. Street hydrants shall be considered external feed fire hydrants and located in a position that allows for the hydrant to conform to Clause 3.5.3.1 and 3.5.3.2 (Note Clause 3.2.2 and 3.5.3.1(e) do not apply). Clause 3.5.3.1 and 3.5.3.2 stipulates that external feed fire hydrants are located that provide pedestrian access to the building; not <10m from the building; have 500mm side and 1m front clearance; be provided no greater than 20m from fire appliance hardstand; and all parts of the building or open yard shall be no greater than 70m from that hardstand.

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
			NSW F&R "Fire Safety Guideline – Access for fire brigade vehicles and firefighters – Version 05.01, November 2020" applies to and development intended to meet the National Construction Code (NCC) within NSW. The performance requirements of CP9 of the NCC required fire brigade access to facilitate fire brigade intervention. Both NSW F and Rescue and NSW RFS have different fire appliances that are specifically designed to perform a different range of functions.
PERIMETER ROADS	Perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	• Are two-way sealed roads. • Minimum 8m carriageway width kerb to kerb. • Parking is provided outside of the carriageway width. • Hydrants are located clear of parking areas. • Are through roads, and these are linked to the internal road system at an interval of no greater than 500m. • Curves of roads have a minimum inner radius of 6m. • The maximum grade road is 15 degrees and average grade of not more than 10 degrees. • The road crossfall does not exceed 3 degrees; and • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	**N/A** Section 3.4.1 of PBP 2019 indicates '*perimeter roads should be provided to separate bush land from urban area'*. This proposal is not located in an urban setting and perimeter roads are not required.

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
NON-PERIMETER ROADS	Non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	• Minimum 5.5m carriageway width kerb to kerb. • Parking is provided outside of the carriageway width. • Hydrants are located clear of parking areas. • Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m. • Curves of roads have a minimum inner radius of 6m. • The maximum grade road is 15 degrees and average grade of not more than 10 degrees. • The road crossfall does not exceed 3 degrees; and • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	**N/A** Section 3.4.2 of PBP 2019 indicates non-perimeter roads are the interconnecting roads between the perimeter road and the existing and/or broader road network'. As perimeter roads are not provided, this development does not require non-perimeter roads.

PROPERTY ACCESS	**TABLE 5.3b PROPERTY ACCESS: Only required for variations** Firefighting vehicles can access the dwelling and exit the property safely.	• 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 dwelling 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 access 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. • 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; and	**MADE CONDITION OF CONSENT** Firefighting vehicles shall meet the follow requirement: •Minimum 4m carriageway width. •In forest, woodland and heath situations, rural property access 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. •Provide a suitable turning area in accordance with Appendix 3 of PBP 2019. •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; and •A development comprising more than three dwellings has 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.*

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
		• A development comprising more than three dwellings has access by dedication of a road and not by right of way.	
WATER	Adequate water supplies is provided for firefighting purposes in installed and maintained.	• Reticulated water is to be provided to the development where available, OR • A 10,000 litres minimum static water for firefighting purposes is provided for each occupied building where no reticulated water is available.	**COMPLIES - ACCEPTABLE SOLUTION** Reticulated water supplied for firefighting purposes.
	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 2419.1:2021; • Hydrants are not located within any road carriageway; and • Reticulated water supply to SFPPs uses a ring main system for areas with perimeter roads.	**MADE CONDITION OF CONSENT** A water hydrant is located on Paradise Drive (**Figure 2, page 9**). Access to this water supply is readily accessible and easily located to assist in fire suppression operations. Section 3.5.2 of AS2419.1.2021 Fire Hydrant Installation[30] provides design requirements. Street hydrants shall be considered external feed fire hydrants and located in a position that allows for the hydrant to conform to Clause 3.5.3.1 and 3.5.3.2 (Note Clause 3.2.2 and 3.5.3.1(e) do not apply). Clause 3.5.3.1 and 3.5.3.2 stipulates that external feed fire hydrants are located that provide pedestrian access to the building; not <10m from the building; have 500mm side and 1m front clearance; be provided no greater than 20m from fire appliance hardstand; and all parts of the building or open yard shall be no greater than 70m from that hardstand.
	Flows and pressure are appropriate	• Fire hydrant flows and pressures comply with Table 2.2 of AS 2419.1:2021.	**N/A** This report has not tested or determined if the fire hydrant flow and pressures to comply with Table 2.2 of AS 2419.1:2021.
	The integrity of the water supply is maintained.	• All above-ground water service pipes are metal, including and up to any taps.	**MADE CONDITION OF CONSENT** All above-ground water service pipes are metal, including and up to any taps.

[30] Councils of Standards Australia (2021), AS2419.1.2021 Fire Hydrant Installation. SAI Global

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
	Water supplies are adequate in areas where reticulated water is not available	• A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; a 65mm Storz outlet with a ball valve is fitted to the outlet. • Ball valve and pipes are adequate for water flow and are metal. • Supply pipes from tank to ball valve have the same bore size to ensure flow volume. • Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. • A hardened ground surface for truck access is supplied within 4m of the access hole. • Above-ground tanks are manufactured from concrete or metal. • Raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F AS 3959). • Unobstructed access is always provided. • Tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters; and • Underground tanks are clearly marked. • All exposed water pipes external to the building are metal, including any fittings. • 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	**N/A** Reticulated water supplied for firefighting purposes.

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
		firefighting connected to the pump shall be 19mm internal diameter. • Fire hose reels are constructed in accordance with AS/NZS 1221:1997 Fire hose reels and installed in accordance with the relevant clauses of AS 2441:2017 Installation of fire hose reels.	
EMERGENCY MANAGEMENT	A Bush Fire Emergency Management and Evacuation Plan is prepared.	• Bush Fire Emergency Management and Evacuation Plan is prepared consistent with the: ○ The NSW RFS document: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan; ○ NSW RFS Schools Program Guide; ○ Australian Standard AS 3745:2010 Planning for emergencies in facilities; and ○ Australian Standard AS 4083:2010 Planning for emergencies – Health care facilities (where applicable). • The Bush Fire Emergency Management and Evacuation Plan should include planning for the early relocation of occupants. *Note: A copy of the Bush Fire Emergency Management and Evacuation Plan should be provided to the Local Emergency Management Committee for its information prior to occupation of the development*	**MADE CONDITION OF CONSENT** There are no bush fire emergency procedures for the proposed development. A Bush Fire Emergency Management and Evacuation Plan is prepared that complies with the requirements of Table 6.8d within PBP2019 prior to the issuing of an occupation certificate. The Bush Fire Emergency Management and Evacuation Plan shall: • Be provided to the Local Emergency Management Committee for its information prior to occupation of the development. • 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; and • A Emergency Planning Committee is established to consult with staff in developing and implementing an Emergency Procedures Manual. • Detailed plans of all emergency assembly areas including on-site and off-site arrangements as stated in AS 3745:2010 are clearly displayed, and an annually emergency evacuation is conducted. • Consider the amount of travel likely to be generated during an emergency evacuation; the capacity of the broader road network to facilitate safe emergency evacuation; limitations/constraints inherent in the road system; and management of potential traffic conflicts (such as emergency vehicles versus evacuating members of the public).

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
VARIATION to above only: Ecotourism: A Bush Fire Emergency Management and Evacuation Plan is prepared.	• A Bush Fire Emergency Management and Evacuation Plan is prepared consistent with the NSW RFS document: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan, and AS 3745:2010. • For proposals in isolated or remote areas which involve large travel distances through bush fire prone vegetation, the following issues should be determined and addressed: ○ The amount of travel likely to be generated during an emergency evacuation. ○ The capacity of the broader road network to facilitate safe emergency evacuation. ○ Limitations/constraints inherent in the road system; and ○ Management of potential traffic conflicts (such as emergency vehicles versus evacuating members of the public). • The Bush Fire Emergency Management and Evacuation Plan must consider a mechanism for the early relocation of occupants on days when adverse fire weather is notified, or adverse fire activity occurs in the local government area in which the development operates. *Note: A copy of the Bush Fire Emergency Management and Evacuation Plan shall*	**MADE CONDITION OF CONSENT** There are no bush fire emergency procedures for the proposed development. A Bush Fire Emergency Management and Evacuation Plan shall be prepared prior to Occupation Certificate is issued that complies with the requirements of Table 6.8d within PBP2019 prior to the issuing of an occupation certificate. The Bush Fire Emergency Management and Evacuation Plan shall: • Be provided to the Local Emergency Management Committee for its information prior to occupation of the development. • 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; and • Consider the amount of travel likely to be generated during an emergency evacuation; the capacity of the broader road network to facilitate safe emergency evacuation; limitations/constraints inherent in the road system; and management of potential traffic conflicts (such as emergency vehicles versus evacuating members of the public).

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 28 Paradise Drive, Smiths Lake, NSW, 2428 - Lot 22 / DP 806842
		be provided to the Local Emergency Management Committee for its information prior to occupation of the development.	
	Appropriate and adequate management arrangements are established for consultation and implementation of the Bush Fire Emergency Management and Evacuation Plan.	• An Emergency Planning Committee is established to consult with residents (and their families in the case of aged care accommodation and schools) and staff in developing and implementing an Emergency Procedures Manual; and • Detailed plans of all emergency assembly areas including on-site and off-site arrangements as stated in AS 3745:2010 are clearly displayed, and an annually emergency evacuation is conducted.	**MADE CONDITION OF CONSENT** There are no bush fire emergency procedures for the proposed development. The Bush Fire Emergency Management and Evacuation Plan shall: • A Emergency Planning Committee is established to consult with staff in developing and implementing an Emergency Procedures Manual. • Detailed plans of all emergency assembly areas including on-site and off-site arrangements as stated in AS 3745:2010 are clearly displayed, and an annually emergency evacuation is conducted.

7 CONCLUSION AND RECOMMENDATIONS

It is clear from this investigation and assessment that the site is located within Bush fire Prone Land. An assessment in accordance with Appendix 1 of PBP2019 has been undertaken implementing the detailed assessment pathway described in Appendix B of AS3959:2018. This BFAR found the classifiable vegetation of *Northern Hinterland Wet Sclerophyll Forests* as described by NSW Comprehensive Fuel to the north south of the site creates a bush fire threat.

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 bush fire 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 recommended that development consent be granted subject to the following conditions:

Asset Protection Zones

The following recommendation are made in the absence of arborist or biodiversity reports to inform the bush fire analysis. Arborist and/or biodiversity report may be required to determine APZ compliance.

At the commencement of building works and in perpetuity the entire lot 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.

Landscaping

A Landscaping plan is required to illustrate:

- Direct accessible egress path between the cabins and refuge building and to a safe place outside the refuge building.
- Landscape species are reflected in the landscaping plan to ensure tree canopy cover is less than 15% (IPA), and less than 30% (OPA) at maturity and trees do no touch or overhang buildings.
- Fencing and gates within BAL 29 areas or higher, and within 6m of the occupied dwelling shall be non-combustible.
- A minimum 1-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.
- Planting is limited in the immediate vicinity of the building.
- Planting does not provide a continuous canopy to the building (i.e., trees or shrubs are isolated or located in small clusters).
- Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies.
- Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown.
- Avoid planting of deciduous species that may increase fuel at surface/ ground level (i.e., leaf litter).
- Avoid climbing species to walls and pergolas.
- Locate combustible materials such as woodchips/mulch, flammable fuel stores away from the building.
- Locate combustible structures such as garden sheds, pergolas, and materials such as timber garden furniture away from the building, and
- Low flammability vegetation species are used.

Construction Standards

The proposed refuge building, 2-storey brick garage and brick studio must comply with section 3 and section 5 (BAL 12.5) 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

Access to the property and development site is noted on **Figure 2, page 9**.

Private property access shall be provided to the refuge building that comply with the below requirements:

- Direct accessible egress path between the cabins and refuge building and to a safe place outside the refuge building.
- Private property access shall be two-wheel drive, all weather roads.
- The capacity of private property access of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.
- Category 1 fire appliance to within 4m of the static water supply.
- At least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200m from a public tough road.
- Minimum carriageway width of 4m.
- 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°.
- Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads.

Water Supply

The proposed development relies on reticulated water provisions and meets the performance criteria through the acceptable solutions.

Electricity services

Maintain electricity underground.

Gas services

Any reticulated or bottled gas shall be installed and maintained in accordance with the below requirements as outlined in Table 7.4a of PBP:

- Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used.
- All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side.
- Connections to and from gas cylinders are metal.

- Polymer-sheathed flexible gas supply lines are not used; and
- Above-ground gas service pipes are metal, including and up to any outlets.

Bush Fire Management Plan - Emergency Management

Prior to the issue of an Occupation Certificate, a Bush Fire Management Plan prepared in accordance with the requirements of A2.6 of Planning for Bushfire Protection 2019 is to be submitted to and approved by the Council. The Bush Fire Management Plan this includes emergency management, and management and monitoring of bushfire protection measures shall:

- Be consistent with the NSW RFS document: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*.
- Be provided to the Local Emergency Management Committee for its information prior to occupation of the development.
- Plan for early evacuation.
- A Emergency Planning Committee is established to consult with staff in developing and implementing an Emergency Procedures Manual.
- Detailed plans of all emergency assembly areas including on-site and off-site arrangements as stated in AS 3745:2010 are clearly displayed, and an annually emergency evacuation is conducted.
- List and spatially illustrate the bushfire protection measures that are required to be established and maintained and provide an annual review/monitoring program prior to bushfire season to ensure bushfire protection measures are maintained for the life of the property.
- Consider the amount of travel likely to be generated during an emergency evacuation; the capacity of the broader road network to facilitate safe emergency evacuation; limitations/constraints inherent in the road system; and management of potential traffic conflicts (such as emergency vehicles versus evacuating members of the public).

8 APPENDIX 1 PLATES(PHOTOGRAPHS)

Plates 1 –12 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 22** and displayed in **Figure 2, page 9**.

Plate 1 *(P1) Access along Paradise Drive*

Plate 2 *(P2) Entrance into property from Paradise Drive*

Plate 3 *(P3) Private property access*

Plate 4 *(P4) Private property access to the southern cabins along western lot boundary*

Plate 5 *(P5) Private property access to the southern cabins along western lot boundary*

Plate 6 *(P6) Proposed location of northern cabins*

Plate 7 *(P7) Proposed location of southern cabins*

Plate 8 *(P8) Existing buildings to act as refuge*

Plate 9 *(P9) Excluded land to the east*

Plate 10 *(P10) Excluded land to the west*

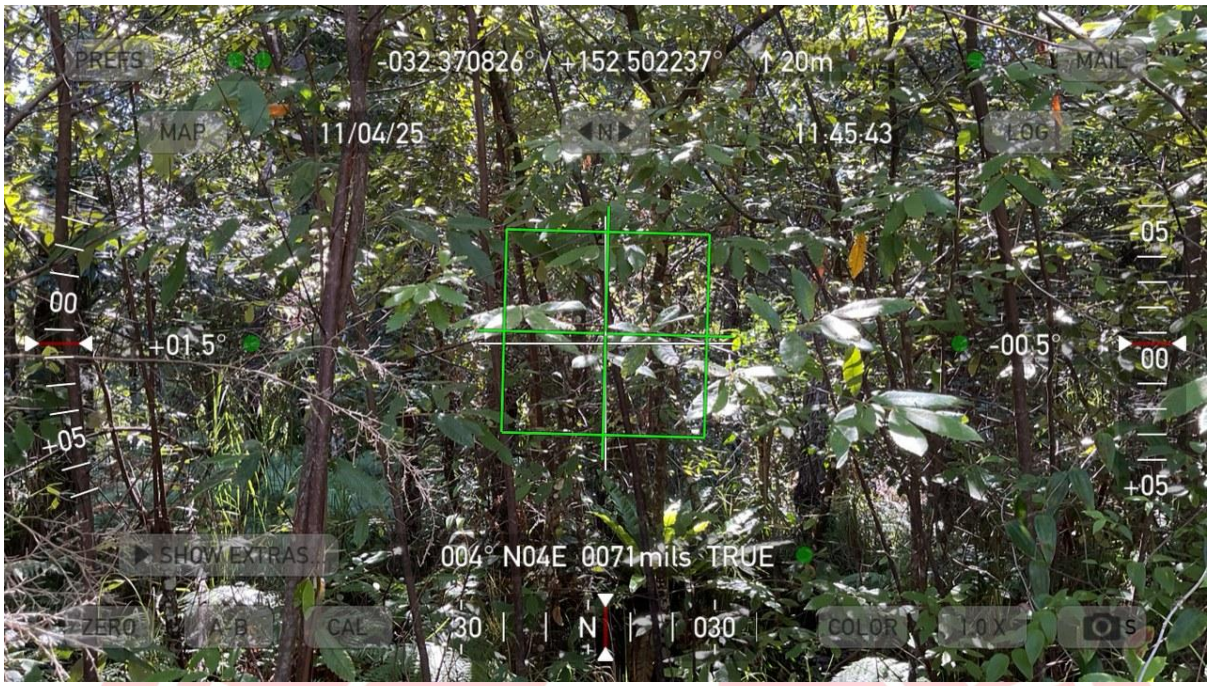
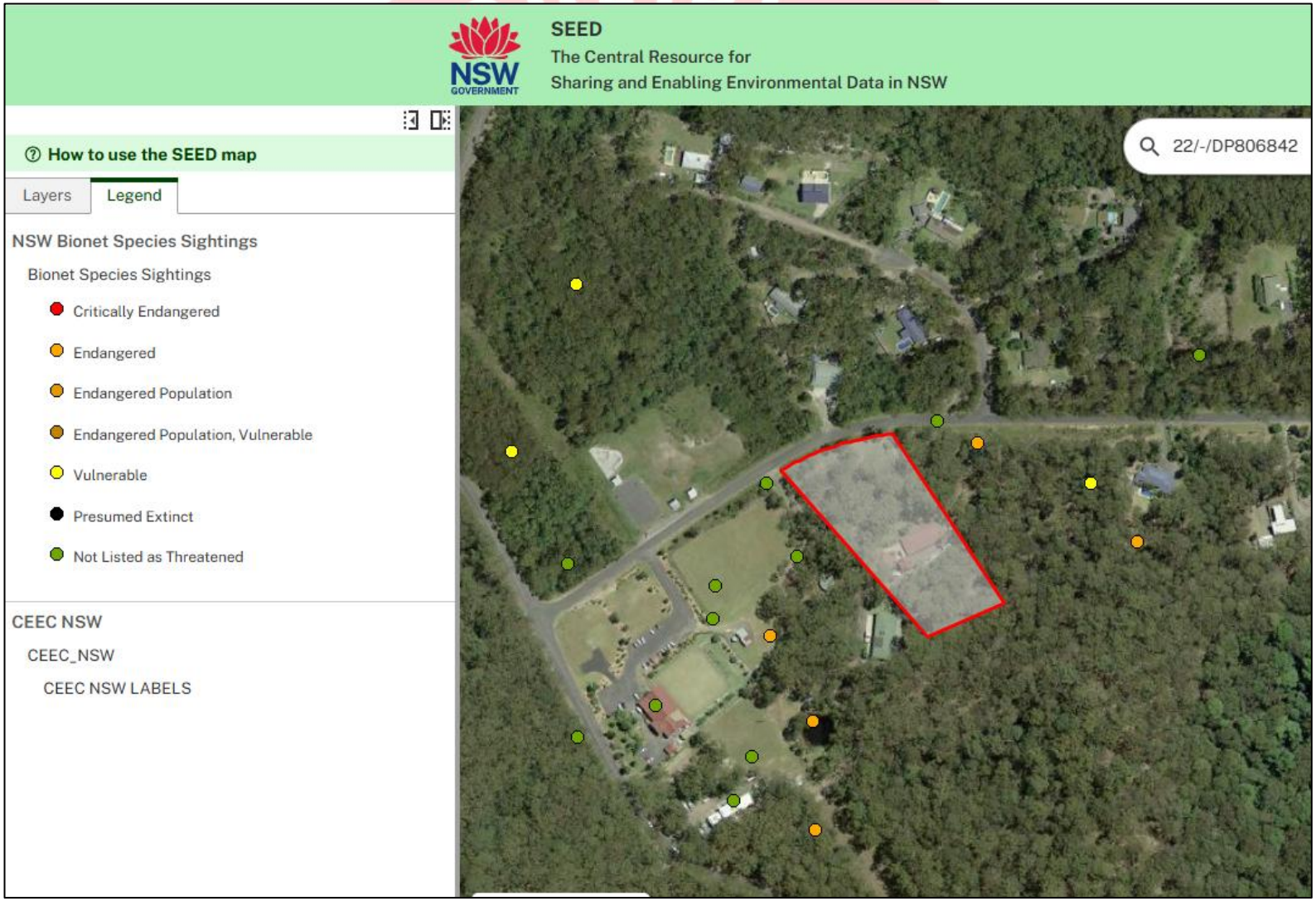


Plate 11 *(P11) Effective slope of fire run 1*

Plate 12 *(P12) Effective slope of fire run 2*

9 APPENDIX 2 NSW SHARING AND ENABLING ENVIRONMENTAL DATA



10 APPENDIX 3 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.

11 APPENDIX 4 AHIMS SEARCH

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Smiths Lake
Client Service ID : 995109

Duncan Scott-Lawson

Date: 12 April 2025

PO Box 182
Salamander Bay New South Wales 2317

Attention: Duncan Scott-Lawson

Email: duncan@emconsultancy.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 22, DP:DP806842, Section : - with a Buffer of 50 meters, conducted by Duncan Scott-Lawson on 12 April 2025.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

12 APPENDIX 5 METHOD 2 OUTPUTS

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 12/04/2025 **Assessment Date:** 12/04/2025

Site Street Address:	28 Paradise Drive, Smiths Lake
Assessor:	Duncan Scott-Lawson; BEMC P/L
Local Government Area:	Mid-Coast
Alpine Area:	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Fire Run 1

Vegetation Information

Vegetation Type:	Northern Hinterlands WSF (Grassy)		
Vegetation Group:	Wet Sclerophyll Forests (Grassy)		
Vegetation Slope:	1 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	20	**Overall Fuel Load(t/ha):**	33.1
Vegetation Height(m):	0.9	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	6 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	2.4	**APZ/Separation(m):**	102

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1200

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Level of Construction:	BAL LOW	**Peak Elevation of Receiver(m):**	0
Radiant Heat(kW/m2):	3.74	**Flame Angle (degrees):**	88
Flame Length(m):	17.34	**Maximum View Factor:**	0.046
Rate Of Spread (km/h):	2.06	**Inner Protection Area(m):**	72
Transmissivity:	0.733	**Outer Protection Area(m):**	30
Fire Intensity(kW/m):	35181		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	19	26	37	50	58	2.4

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 12/04/2025 **Assessment Date:** 12/04/2025

Site Street Address:	28 Paradise Drive, Smiths Lake
Assessor:	Duncan Scott-Lawson; BEMC P/L
Local Government Area:	Mid-Coast
Alpine Area:	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Fire Run 2

Vegetation Information

Vegetation Type:	Northern Hinterlands WSF (Grassy)		
Vegetation Group:	Wet Sclerophyll Forests (Grassy)		
Vegetation Slope:	2 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	20	**Overall Fuel Load(t/ha):**	33.1
Vegetation Height(m):	0.9	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	10 Degrees	**Site Slope Type:**	Upslope
Elevation of Receiver(m):	2.4	**APZ/Separation(m):**	60

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1200

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	19.06
Radiant Heat(kW/m2):	9.22	**Flame Angle (degrees):**	66
Flame Length(m):	18.3	**Maximum View Factor:**	0.107
Rate Of Spread (km/h):	2.2	**Inner Protection Area(m):**	40
Transmissivity:	0.77	**Outer Protection Area(m):**	20
Fire Intensity(kW/m):	37694		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	18	25	36	49	57	2.4

16 APPENDIX 6 BUSHFIRE PROTECTION MEASURES AND INFORMATION

The following information on building survivability and the application of Bushfire Protection Measures is provided for the landowners and 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.

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 three main passive protection measures are critical to the survivability of a building to a bushfire attack:

1. **The size of the separation between the bushfire threat (unmanaged vegetation) and building;**
2. **The standard of landscaping and vegetation management within the above separation; and**
3. **The construction standards of the building.**

In terms of the above, the following principles should be applied throughout the lifetime of the building:

1. Any future alterations and additions to the building are undertaken with materials that comply with the relevant BAL of the building at the time of construction.
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.

The risk to an existing building, and what improvements can be made can be assessed through The Resilient Building Council found at https://rbcouncil.org/ and the Bushfire Resilience Rating Home Self-Assessment App https://rbcouncil.org/resilience-ratings/ .

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 (Western Australian Government, (2017) The WAPC's Guidelines for Planning in Bushfire Prone Areas (Guidelines), https://www.planning.wa.gov.au/dop pub pdf/Bushfire Guidelines Version 1.2 Aug2017.pdf)

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.

NCC 2022 indicates that the class 1 buildings should be protected from other building fires and provides a minimum 900mm separation between the boundary and dwelling. Consideration should be given to increasing the side-set back to 6m to neighbouring buildings to limit the potential of building-to-building fires. If this separation is not possible, upgrading the elevation facing the adjacent building to BAL40 standards, reducing glazing-to-glazing construction between buildings and other fire protection measures such as sprinklers should be considered when the residential developments are designed.

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[31], and incorporate simplified roof that can 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 1.5m 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 .

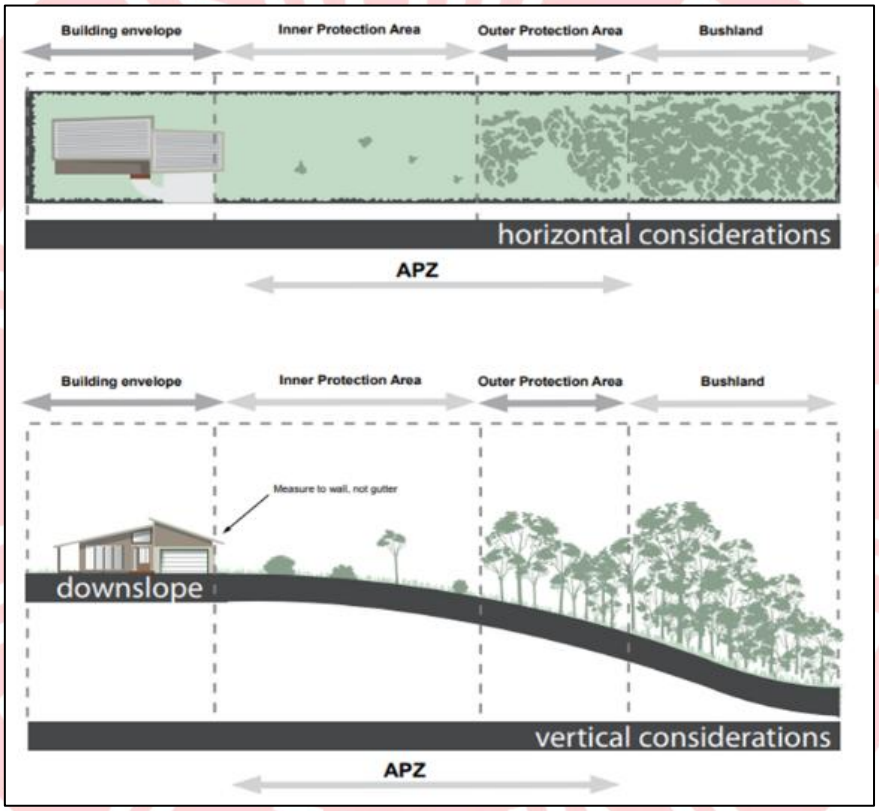
An APZ can consist of both an Inner Protection Area (IPA) and an Outer Protection Area (OPA) as indicated below. An APZ can include footpaths, lawns, swimming pools, driveways, open space / parkland, car parking, and suitable class 10 structures (fences, pools decks etc).

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.

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.

[31] Quarles, S.L., Christine Standohar-Alfano. C., Hedayati, F., Gorham, D. J., 2023. Factors influencing ember accumulation near a building. International Journal of Wildland Fire 32(3) 380-387 https://doi.org/10.1071/WF22132

Definition of Asset Protection Zones



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

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 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 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.

Best practise 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. Best practise landscaping is:

- All outbuildings are located >10m from the dwelling and any deck stair and building attachments. There is no flammable material (garden or landscaping) within the 10m separation.
- If the outbuildings are located <10m the elevation of both buildings facing each other should be upgraded to a 60/60/60 FRL.

- A 1.5m clear egress is provided around the immediate curtilage of the dwelling and any deck stair and building attachments.
- Provide clear pedestrian egress with no flammability within 6m either side (evacuation route) from the public road (or driveway if public road is >70m from dwelling) to the dwelling.
- Remove other flammable objects within 6m of the dwelling[32]. These include caravans, outdoor furniture, barbeques, gas bottles, wood piles and organic mulch.
- Fencing and gates in BAL 29 or within 6m of a building should be of non-combustible materials.
- Avoid flammable mulches within the entire APZ. Alternatives include gravel, coffee rock, scoria, pebbles, shells or recycled crushed bricks.
- Use non-combustible, moveable containers and pots that can be relocated within 6m of the building.
- Restrict the use of timber and use materials such as brick, earth, stone, concrete and galvanised iron
- An intensive area of planting perpendicular to the bush fire vegetation centred on a contoured garden mound provide in the outer limits of the inner protection area can be effective screening.
- Clumping shrubs and trees so they do not form a continuous canopy in a direction towards the buildings 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)

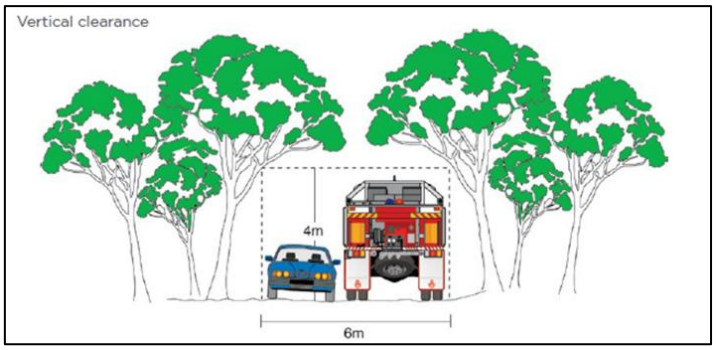
The objective of LATM is to attain an acceptable level of speed, volume, and composition of traffic within a local area and reduce the number of road accidents. This is achieved by modifying the street environment through the installation of various traffic control devices. LATM devices by their nature 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.

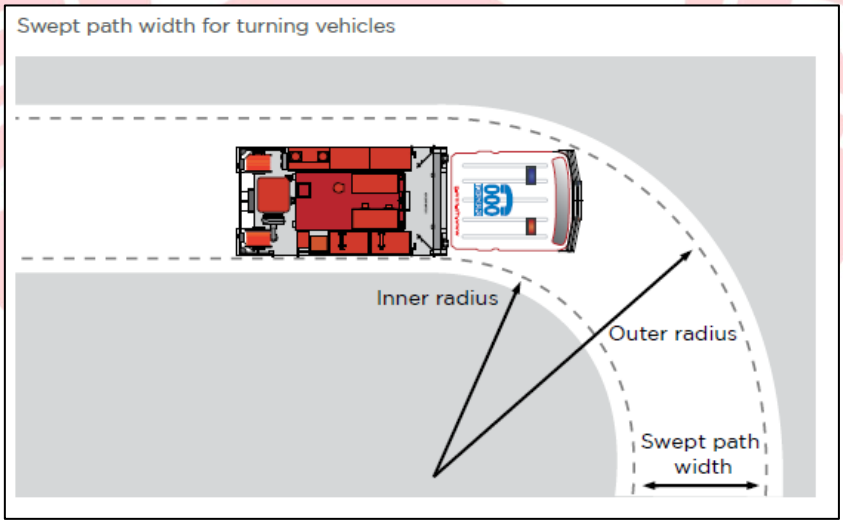
[32] Hedayati F., Stansell C., Gorham D.J., Quarles S.L., 2018. Near-Building Non-combustible Zone. (Insurance Institute for Business & Home Safety). Available at https://ibhs.org/wp-content/uploads/member_docs/Near-Building_Noncombustible_Zone_Report_IBHS.pdf

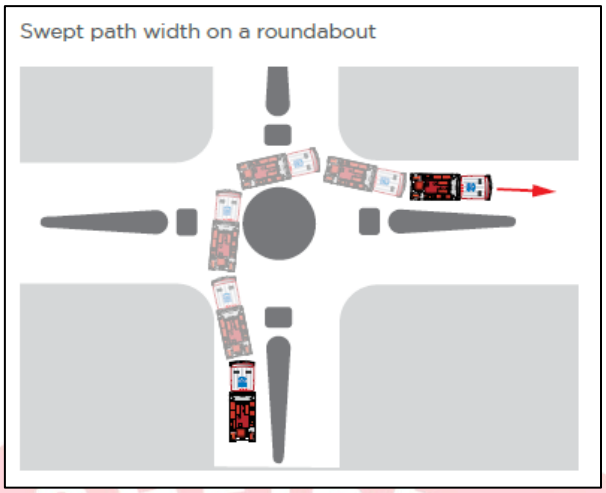


Vehicle Turning Requirements

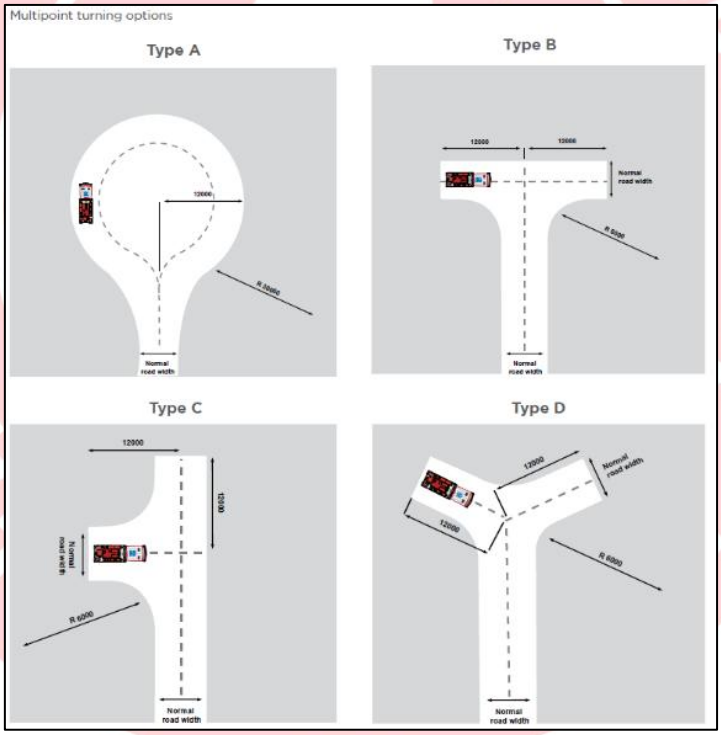
Fire crews must have rapid access and egress for vehicles, therefore curved carriageways should be constructed using the minimum swept path. The below diagrams from PBP2019 provide indication of the requirements to be achieved.

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

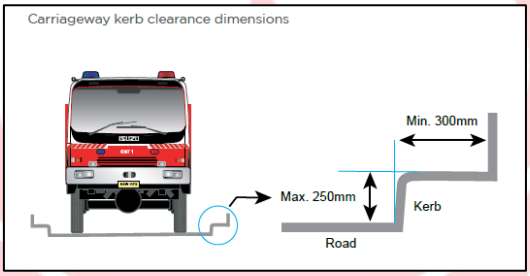
The construction of passing bays, where required, shall be 20m in length, provide a minimum trafficable width at the passing point of 6m.

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.

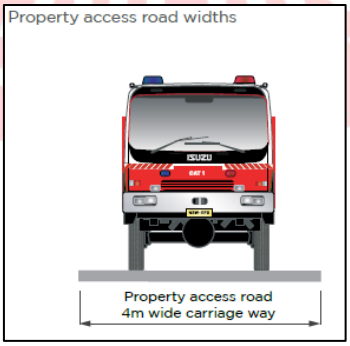
Kerb Dimensions

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

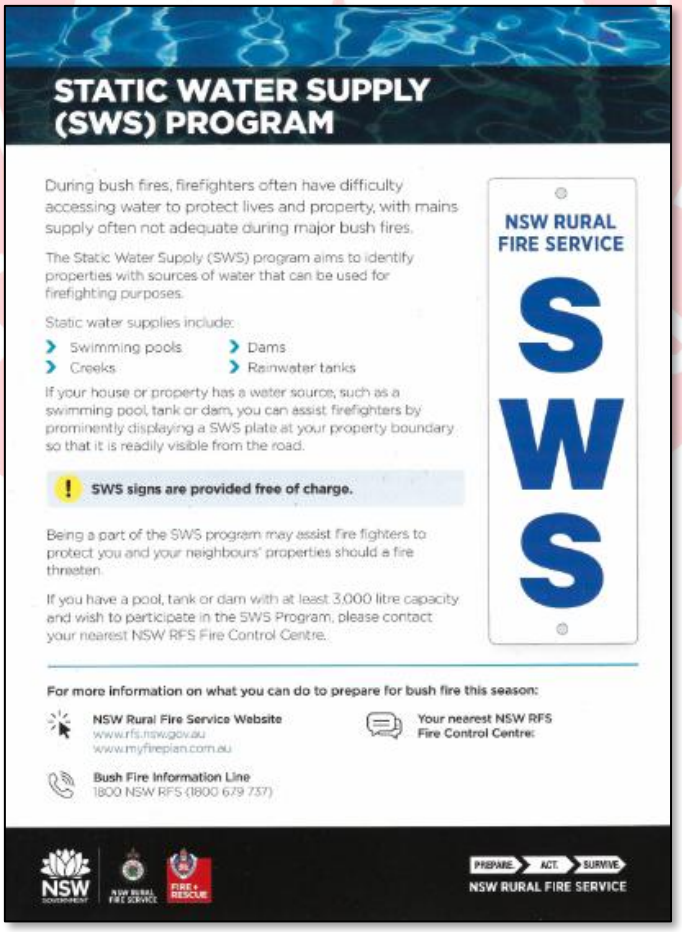
The intent of water measures is to provide adequate services of water for the protection of dwellings during and after the passage of a bush fire. Reticulated water (street hydrants) is the preferred option although pressure loss is common during large fires and the provision of an alternative water supply provides obvious benefits to fire suppression.

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 the only water supply for firefighting purposes 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 measures and equipment generally occur annually and are supported by a Bushfire Management Plan (see below). 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), regenerating trees which all contribute to accumulating fire fuel levels in the APZs. Ensuring flammable vegetation and landscaping (beyond the prescription within the consent condition for the development) is not introduced into the APZ is essential. Other measures include maintaining building fire hygiene such as cleaning gutters and down pipes, thinning out permitted gardens and ensuring pedestrian access around the immediate curtilage of al buildings.

Developing and annually reviewing a Bushfire Management 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 2000 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[33].

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

[33] NSW Rural Fire Service, Best Practise Guidelines – Dwelling upgrades, Accessed online: https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0018/4365/Building-Best-Practice-Guide.pdf

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 >10m from any building or flammable vegetation will significantly mitigate risk of an EV fire spreading.

Further information can be obtained at: https://www.evfiresafe.com/ or Dudley-Nicholson, Jennifer. (2024). Electric wreck picked to bits in pursuit of fire safety. https://www.aap.com.au/news/electric-wreck-picked-to-bits-in-pursuit-of-fire-safety/

Bushfire Management Plan

No matter how big or small the development is within a bushfire prone area, a Bushfire Management Plan (focuses on preparation) 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. A Bushfire Management Plan helps you determine your preparedness level and facilitates the development of Bushfire Emergency / Survival Plan (your response).

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.

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 you leave, 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 the 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.

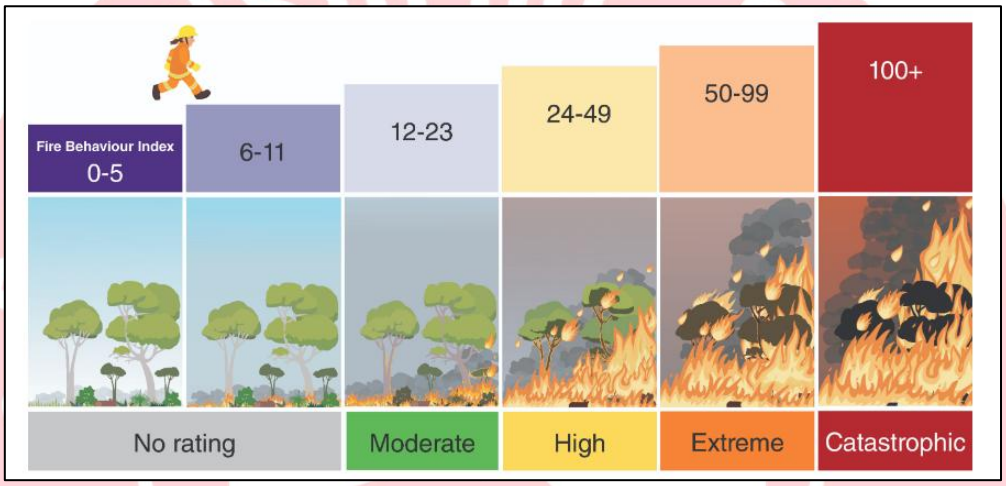
Download Step 4 (PDF, 219.1 KB).

Updated Australian Fire Danger Rating System

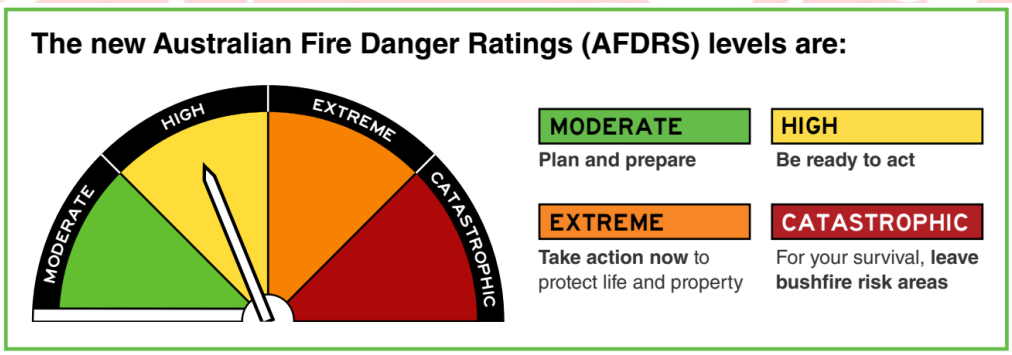
The principal objective of the new Australian Fire Danger Rating System (AFDRS) is to implement a more accurate and nationally consistent system that will enable improved decision-making by response agencies and industry and provoke the desired community response to messaging to improve public safety. 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.



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



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.