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Level 3

BUSH FIRE ASSESSMENT REPORT

Special Fire Protection Purpose

lot 2 DP 1015609 Mungo Brush Road,

Hawks Nest, NSW

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Title	Bush Fire Assessment Report – Special Fire Protection Purpose			
Description	Caravan Park - lot 2 DP 1015609 Mungo Brush Road, Hawks Nest, NSW			
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Abbreviations and Acronyms

AHIMS	Aboriginal Historic Information Management System
APZ	Asset Protection Zone
AS/NZS 1221:1997	Australian Standard – Fire hose reels
AS1596-2014	Australian Standard – The storage and handling of LP Gas
AS2419-2017	Australian Standard – Fire hydrant installations
AS2441:2005	Australian Standard – Fire hose reels installation
AS3745:2010	Australian Standard – Planning for emergencies in facilities
AS3959-2018	Australian Standard – Construction of buildings in bush fire prone areas
AS4083:2010	Planning for emergencies – Health care facilities
BAL	Bush fire Attack Level
BCA	Building Code of Australia
BFSS	Bush Fire Strategic Study
BPA	Bush fire Prone Area (Also Bush fire Prone Land)
BPL Map	Bush fire Prone Land Map
BPMs	Bush fire Protection Measures
BV	Biodiversity Values
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
FFDI	Forest Fire Danger Index
GFDI	Grass Fire Danger Index
ha	Hectare
HOC	Heat Of Combustion
IPA	Inner Protection Area
kJ/kg	Kilo Joules per Kilo gram
LGA	Local Government Area
OPA	Outer Protection Area
PBP	Planning for Bush fire Protection
RF Act	*Rural Fires Act 1997*
RF Regs	*Rural Fires Regulations 2013*
RHG	Restricted Head Growth
SEED	Central Resource for Sharing and Enabling Environmental Data
SFR	Short Fire Run
SFPP	Special Fire Protection Purpose

1 EXECUTIVE SUMMARY AND RECOMMENDATIONS

BEMC Pty Ltd was engaged by Brett Phillips to complete a Bush Fire Assessment Report (BFAR) on proposed Special Fire Protection Purpose – Caravan Park located at lot 2 DP 1015609 Mungo Brush Road, Hawks Nest, NSW.

This report considers and assess the bush fire planning and construction requirements to determine compliance with the performance criteria in Planning for Bush fire Protection 2019.

In order to determine whether the proposed development is bush fire-prone, and if so, which setbacks and other relevant Bush fire Protection Measures (BPM) will be appropriate, this assessment adheres to the methodology and procedures outlined in Appendix 1 of PBP 2019 and adheres to the requirements appropriate to obtain a Bush Fire Safety Authority (BFSA).

In summary, based upon this assessment of the preliminary plans and site visit the following recommendations have been provided to inform a redesign of the project to meet acceptable bushfire construction and planning solutions to comply with PBP 2019.

Recommendation 1 - Asset Protection Zones
Long term casual occupants as per the Holiday Parks (Long Term Casual Occupation) Act 2002" located internal to the 17m BAL 29 setback, built as permanent structures to BAL construction standards.

Short term sites for casual occupation of less than 6 weeks located internally to the 25m BAL 29 setback built to BAL construction standards.

A temporary 25m APZ shall be provided for each stage of the development.

Some areas of increased tree density (>15%) may result due to council request to maintain tree canopy. These areas will be restricted to:

- Internal area of the development, >50m from the surrounding unmanaged classified vegetation.
- Shall have <10% of flammable shrub of landscape features under the canopy.
- Form small clusters with no canopy continuity to surrounding clusters or individual trees at maturity.

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

- No tree canopy within the BAL 29 set-back of 17m.
- Canopy not greater than 15% within 30m of the lot boundary.
- Canopy density increased internal area of the development, >50m from the surrounding unmanaged classified vegetation.
- Form small clusters with no canopy continuity to surrounding clusters or individual trees at maturity.
- Be no greater than 40% overall canopy density for the entire site.
- Shall have <10% of flammable shrub within development, and no shrub under any canopy within development area
- If fencing, retaining wall, garden/path edging is within 6m of a building or in areas of BAL-29 or greater shall illustrate constructed of non-combustible materials,
- A minimum 1-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 (<6m) 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).
- Trees do no touch or overhang buildings.
- 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

Long-term casual:

- If the manufactured home be placed internal to the BAL 29 setback (red line in Figure 3 of this report), built as permanent structures to BAL construction standards (Appendix 4).

Short term sites:

- If the manufactured home be placed internal to the BAL 29 setback (orange line in Figure 3 of this report), built to BAL construction standards (Appendix 5)

If the manufactured home be placed in excess of the 10kW/m^2 zone (aqua line in **Figure 3, page 22** of this report), BAL 12.5 construction standards will apply.

Recommendation 4 - Access

The road network of the final design shall meet the following provision:

- The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 8 tonnes); bridges and causeways are to clearly indicate load rating.
- 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.

PERIMETER ROADS: A perimeter trail is provided within the perimeter APZ that links to the internal road system and secondary emergency access within the north-western and south-western corner. The perimeter trail shall comply with the below requirements:

- Minimum 8m carriageway (gravel trail to allow two-way vehicle access,
- No parking,
- 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.

NON-PERIMETER ROADS: Minimum 5.5m carriageway width kerb to kerb; parking is provided outside of the carriageway width; hydrants are located clear of parking areas; there 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.

Private property access requirements can be applied within the primitive camping area only.

Recommendation 5 - Water Supply

Several static water supplies are to be provided no greater than 150m apart at strategic locations along the western, northern, and south boundaries for firefighting purposes to meet the following specifications:

- Static water is to be located to ensure fire appliance can access to within 4m of the static water supply.
- A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; 65mm Storz outlet with a ball valve is fitted to the outlet, and
- Ball valve and pipes are adequate for water flow and are metal, and
- Supply pipes from tank to ball valve have the same bore size to ensure flow volume, and
- Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank, and
- A hardened ground surface for truck access is supplied within 4m, and
- Above-ground tanks are manufactured from concrete or metal, and
- Raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F AS 3959), and
- Unobstructed access can always be provided, and
- Underground tanks are clearly marked, and
- Tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters, and
- All exposed water pipes external to the building are metal, including any fittings, and
- 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.

Recommendation 6 - Electricity services

Where practical, electricity placed underground. If overhead power supply is provided, 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.

Recommendation 7 - Gas services

Gas bottle supplies to meet the following specifications:

- 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.
- Shielding provided on the hazard side of gas bottle.
- 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 8 - Emergency Management

The DRAFT Bush Fire Emergency Management and Evacuation Plan is required to be updated prior to the issuance of the Occupation Certificate with relevant contact details and decision triggers. This shall be provided to the Local Emergency Management Committee for its information prior to occupation of the development.

Finally, the implementation of the adopted measures and recommendations forwarded within this report comply with PBP (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

2 INTRODUCTION

BEMC Pty Ltd was engaged by Brett Phillips to complete a Bush Fire Assessment Report (BFAR) on proposed Special Fire Protection Purpose – Caravan Park located at lot 2 / DP 1015609 Mungo Brush Road, Hawks Nest, NSW, hereafter referred to as the 'site' (Figure 1).

The identification of Bush fire Prone Areas (BPA) in NSW is required under section 10.3 of the *Environmental Planning and Assessment* (EP&A Act*)*. Section 4.14 of the EP&A Act requires development to comply with Planning for Bush fire Protection (PBP 2019) if any part of a development site is affected by bush fire hazard as indicated within the BPA Map. Section 100B of the *Rural Fires Act (1997)* (*RF Act)* identifies specific developments as integrated and requiring a Bush Fire Safety Authority (BFSA) from NSW RFS under S4.46 of the EP&A Act.

The proposed development is not listed under s45 of the *Rural Fire Regulation 2013* (RF Regs) excluded from requirements for BFSA. The proposed development is not listed under s46 of the RF Regs as an additional Special Fire Protection Purpose (SFPP) development requiring a BFSA. The proposed development is listed under s100B of the *Rural Fires Act* (RF Act) which requires the adherence to the requirements of cl. 44 of the RF Regs and the requirement to obtain a Bush Fire Safety Authority (BFSA).

In order to determine whether the proposed development is bush fire-prone, and if so, which setbacks and other relevant Bush fire Protection Measures (BPM) will be appropriate, this assessment adheres to the methodology and procedures outlined in Appendix 1 of PBP 2019 and cl. 44 of the RF Regs. Site Particulars are illustrated within **Table 2** and **Figure 1**, and development plans in **Appendix 1**.

2.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development is a short-term and long-term stay accommodation (camping, caravans and potentially manufacture homes) throughout the perimeter of the development and short-term tourism accommodation (caravan park) within the 10kW/m^2 zone.

This bushfire assessment has considered the proposed land-use and has assessed the proposal as a camping ground with considerations of constructions, access and emergency management within manufacture home estate.

Table 1 *Description of Proposed development*

Boundaries	Vegetation in all directions.
Topography	Slight downslope to the west, slight upslope to the east. Mungo Brush Road west of the development.
Type of development	SFPP - Caravan Park
Proposed dwellings	Caravan park - Short and long term accommodation.
Landscaping plan provided	No
Current land-use	Vacant
Fire weather	FFDI 80

2.2 Objectives of Assessment

This assessment has been undertaken to enable council to make a determination of the proposed development in consideration of the requirements of s4.46 of the EP&A Act PBP 2019 and Australian Standard 3959-2018 Construction of buildings in bush fire prone areas (AS3959:2018).

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

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

2.3 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 outline in Appendix B of AS3959:2018 Detailed BAL Assessment provides the mathematical methodology and accepted inputs that the simplified BAL assessment Method 1 matrix was derived. Method 2 fire design model consists of accurately determining input into nested calculations within the modelling that provide increased accuracy in determining radiant heat flux and flame length.

Furthermore, Method 2 can consider the impact of Kataburn rate of spread, radiant heat shielding, and short fire runs will have 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 detailed assessment (Method 2). The gaps in knowledge are 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, the effect on the outputs for the calculations should be considered.

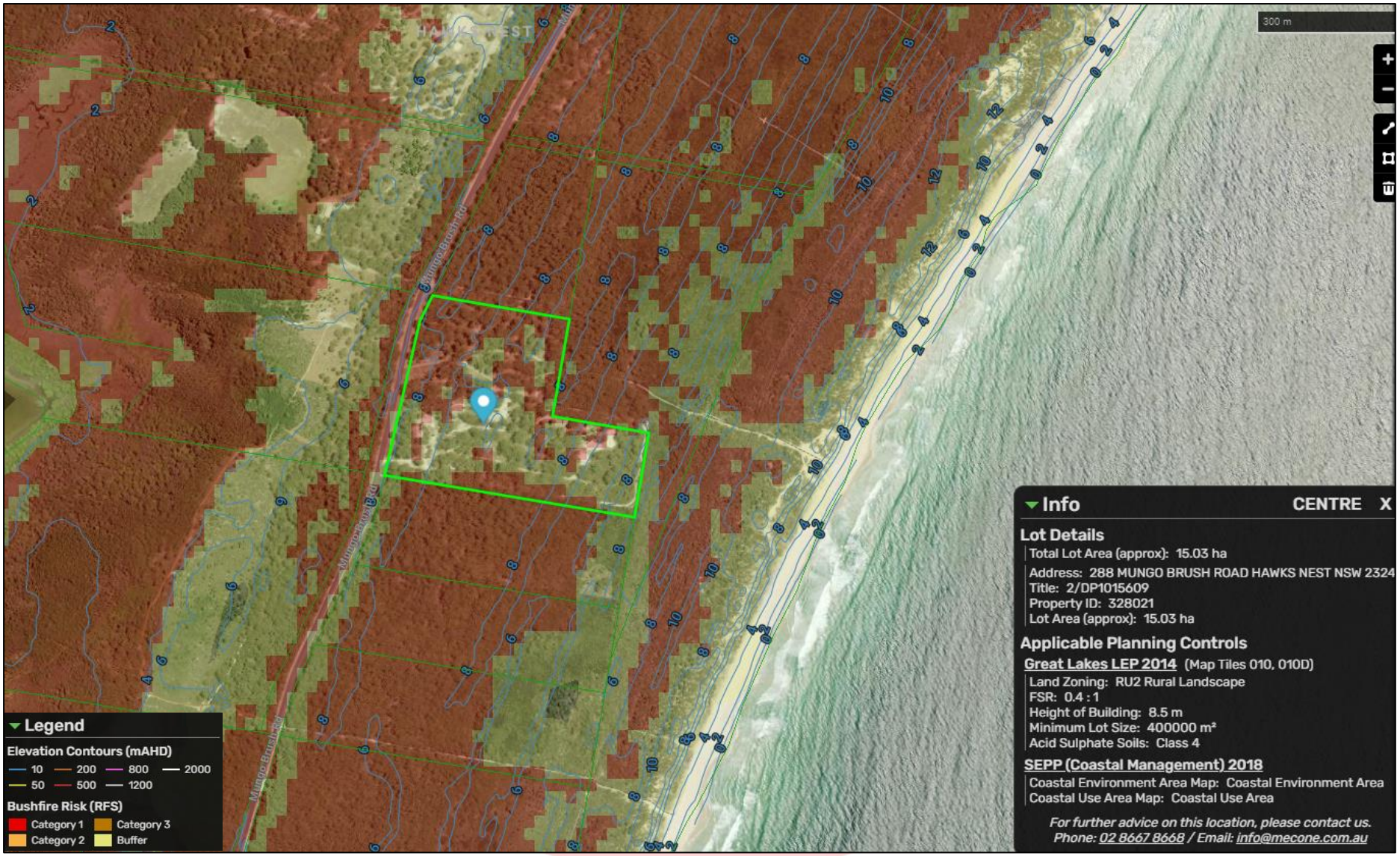

Figure 1 *Site Location of lot 2 DP 1015609 Mungo Brush Road, Hawks Nest, NSW (Mecone Mosaic, 2023)*

3 BUSH FIRE STRATEGIC STUDY

A Bush Fire Strategic Study (BFSS) has been prepared to inform the context of the assessment of the BFAR. The level of information gathered and analysis within the BFSS depends upon the nature of development, scale of the proposal, the bush fire risk, and potential impact on the wider community and emergency management arrangements. This process provides an opportunity to assess if a proposed development is appropriate in the bush fire hazard context.

Table 2 *Bush fire strategic study*

Adjoining land	The proposed development and changing land use do not impact on the ability of adjoining landowners to implement Bush fire Protection Measures.
Surrounding infrastructure	The proposed development does not significantly impact on the pressures or flows of existing water supplies and does not impact on high voltage power supplies or natural gas lines.
Access and egress	The capacity of the existing road network will not be significantly affected by the proposed development during a bush fire event. The proposed development is not isolated in the event of a bush fire.
Emergency services	The proposed development does not significantly impact on the ability of emergency service to plan, prepare, respond, or recover prior, during or after a bush fire event.
Land use assessment	The bush fire hazard is located in all direction of the proposed development. With the implementation of appropriate bushfire protection measures, including setbacks, water and emergency management the proposed siting of the development can be appropriate.
Bush fire landscape assessment	The bush fire hazards around the site are forested and heath vegetation in all directions. The potential fire behaviour and fire runs from the north-west will generate the greatest threat to the development. Ember attack and radiant heat are the principal bush fire attack mechanism on this development.

This Bush Fire Strategic Study identifies that the proposed development can meet the broad aims and objectives and the SFPP developments of PBP 2019 with the implementation of appropriate bushfire protection measures.

4 BUSH FIRE HAZARD ASSESSMENT

This section details the site assessment methodology in Appendix 1 of PBP2019 and includes the requirements of s44 of the RF Regs. It provides detailed analysis of the vegetation, slope, vegetation exclusions and downgrades to quantify the required Bush fire Protection Measures (BPMs).

4.1 FIRE DANGER INDEX

Method 2 assessment considers the worst-case scenario for bush fire impacts and calculates fire behaviour determined from specific inputs. This assessment utilises Douglas (2017) FFDI for Williamtown weather station of 106. Which is greater than the standard FFDI 100 utilised within the simplified method. This provides an accurate assessment of radiant heat and required separations.

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 follows:

- Nearmap and sixmap aerial Photograph Interpretation.
- Kogan 6*25 Laser distance finder.
- Photo Theodolite application supported by contour and terrain profiles.
- SEED Portal - Sharing and Enabling NSW Environmental Data portal.
- Reference to regional vegetation community mapping, and
- Site assessment in October 2021.

Plates 1 – 6 depict the elements in and around the site that are considered within the bush fire hazard assessment. The classified vegetation, separations, effective and site slope are identified in **Table 4** and displayed in **Figure 3**.

4.3 VEGETATION ASSESSMENT

In accordance with PBP 2019, an assessment of the vegetation over 140m in all directions from the building was undertaken.

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 CSRO Ecosystems Science and Bush fire Dynamics and Applications. The results of this research are commonly referred to as the '*NSW Comprehensive Fuel Loads'*.

4.3.1 Vegetation classification, exclusions, and downgrades

An analysis of the vegetation in and around the site has determined no vegetation exclusions of down grade are included in this assessment.

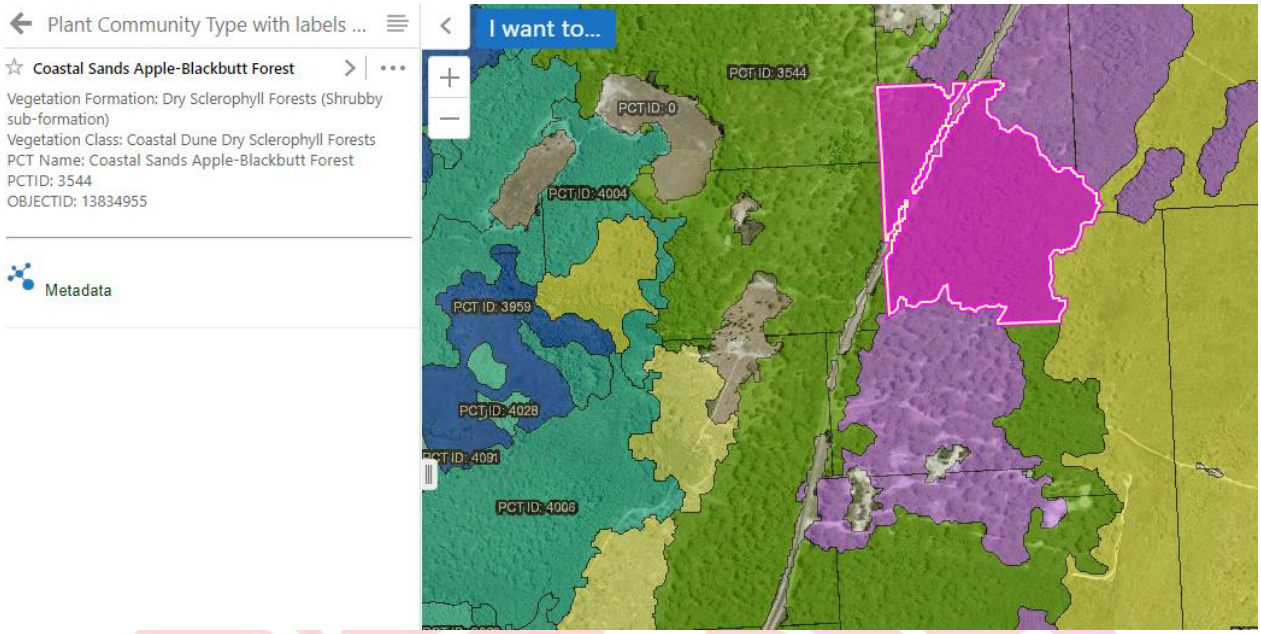

Figure 2 *Regional Vegetation Mapping (SEED portal, 2023)*

4.3.2 Predominant Vegetation Classification

Vegetation in and around the site is classified as PCT 3544: Coastal Sands Apple-Blackbutt Forest which is *Coastal Dune Dry 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 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 Zones to be accepted within the separation areas.

The separations between the classifiable vegetation and building are provided in **Table 4**.

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 the 100m of the proposed building envelop.

The effective and site slopes use within this assessment are provided in **Table 4**.

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). These values help determine the vegetation that possess bush fire threat and significantly influence fire behaviour.

4.6 Short Fire Run and Restricted Head 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.

4.7 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. 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 be not 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.

4.8 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 (1996) 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 *et al*. (1992). Edgar *et al.* (2015) 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 faster moving fire. Grumstup *et al.* (2017), Drysdale and Macmillan (1992) and Wu *et al.* (2000) illustrate the plume commences a pronounced lean when slopes exceed 15° angle and ground attachment commences although detachment quickly from the surface.

Edgar *et al.* (2015) research supports Dold and Zinoviev (2009); Wu *et al.* (2000) 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 *et al.* (2015b) 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 *et al.* (2016) 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 *et al.* (2016) reported distinctly different plume behaviour depending on whether the trench was inclined above or below the critical angle of 24°.

4.9 OTHER METHOD 2 INPUTS

Elevation of Receiver

Elevation of Received it the height of the body that received the radiant heat flux. Within bushfire, we are concerned with the most vulnerable element of the building to a bushfire event which is glazing on windows and doors. For this reason, the elevation of the received for a single-story building is at the centre point of standard windows at 1.8m, and for a two-story building is 4.5m. To provide redundancies in the calculations an elevation of received of 2.4m has ben 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.

Moisture Factor

Fuel moisture factor is only used in the Marsden–Smedley and Catchpole (1995) fire model 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 and 4, page 19.**

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Plate 1 *Access along Mungo brush Road, note electricity easement*

Plate 2 *Example of Coastal Dune Dry Sclerophyll Forests on site*

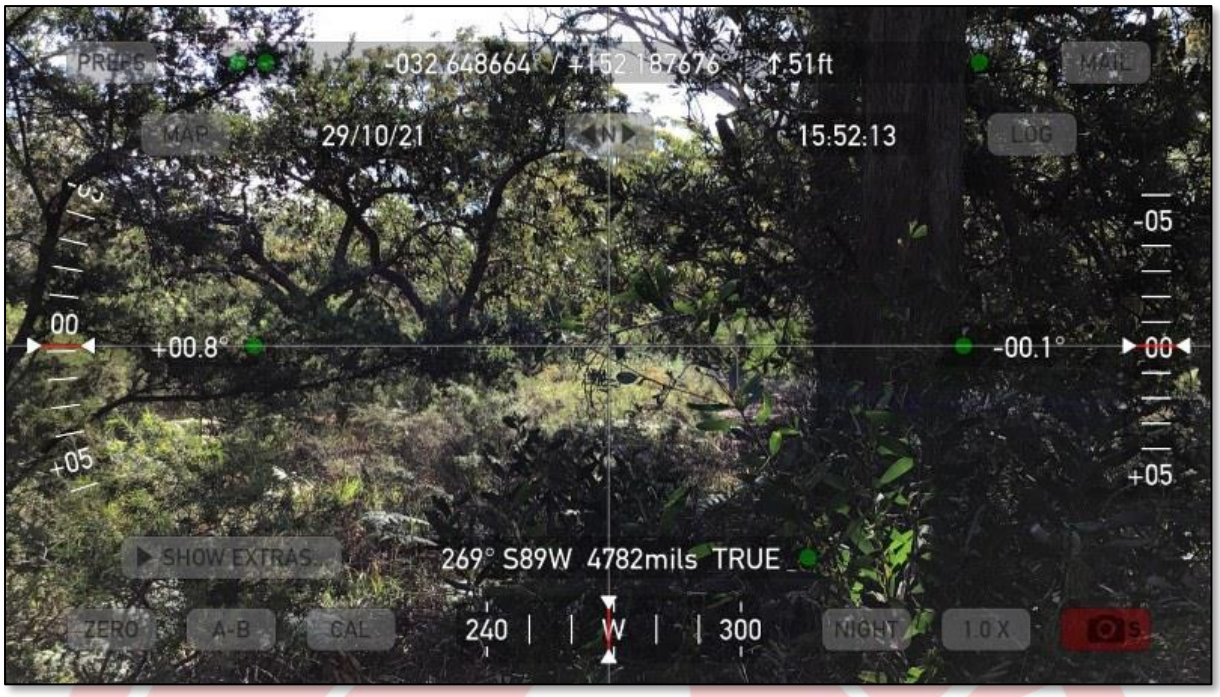

Plate 3 *Effective and site slope of Transect 1*

Plate 4 *Effective and site slope of Transect 2*

Plate 5 *Effective and site slope of Transect 3*

Plate 6 *Effective and site slope of Transect 4*

Table 3 *Bush fire Hazard Assessment (Method 2 AS3959:2018)*

Applied to the short-term sites "*reserved for use by long term casual occupants as per the Holiday Parks (Long Term Casual Occupation) Act 2002*".

Elements	Method (unit)	Transect 1, 2 and 3
Vegetation	NSW Comprehensive Fuel Loads	Coastal Dune DSF
Provided Separation	Site -Laser finder (m)	17m
Site slope	Site visit – Theodolite (°)	level
Effective slope	Site visit – Theodolite (°)	level
Shielding width	Site Plans / Site Visit (m)	N/A
Shielding height	Site Plans / Site Visit (m)	N/A
Elevation of receiver	Site Plans (m)	2.4 (single story)
Flame temperature	1090 / 1200 Kelvin	1090
Upslope fire	Kataburn correction	No
Fire Danger Index	Douglas Graham (2017)	80
Heat of Combustion	Default at 18600 kJ/kg	18600
Flame Emissivity	Default at 0.95	0.95
Moisture Factor	Default at 5	5
Ambient temperature	BoM (Default at 308 Kelvin)	308
Relative Humidity	BoM (Default at 25%)	25
SFR Fire Model	Vesta / McArthur	N/A
SFR length	Bush Fire Safety Study	N/A
OUTPUTS (Appendix 4)		
Separation to Achieve BAL29		17m
Separation to Achieve 10kW/m²		55m

Table 4 *Bush fire Hazard Assessment (Method 2 AS3959:2018)*

Applied to the long-term sites "*reserved for use by long term casual occupants as per the Holiday Parks (Long Term Casual Occupation) Act 2002*".

Elements	Method (unit)	Transect 1, 2 and 3
Vegetation	NSW Comprehensive Fuel Loads	Coastal Dune DSF
Provided Separation	Site -Laser finder (m)	25m
Site slope	Site visit – Theodolite (°)	level
Effective slope	Site visit – Theodolite (°)	level
Shielding width	Site Plans / Site Visit (m)	N/A
Shielding height	Site Plans / Site Visit (m)	N/A
Elevation of receiver	Site Plans (m)	2.4 (single storey)
Flame temperature	1090 / 1200 Kelvin	1200
Upslope fire	Kataburn correction	No
Fire Danger Index	Douglas Graham (2017)	80
Heat of Combustion	Default at 18600 kJ/kg	18600
Flame Emissivity	Default at 0.95	0.95
Moisture Factor	Default at 5	5
Ambient temperature	BoM (Default at 308 Kelvin)	308
Relative Humidity	BoM (Default at 25%)	25
SFR Fire Model	Vesta / McArthur	N/A
SFR length	Bush Fire Safety Study	N/A
OUTPUTS (Appendix 4)		
Separation to Achieve BAL29		25m
Separation to Achieve 10kW/m²		56m

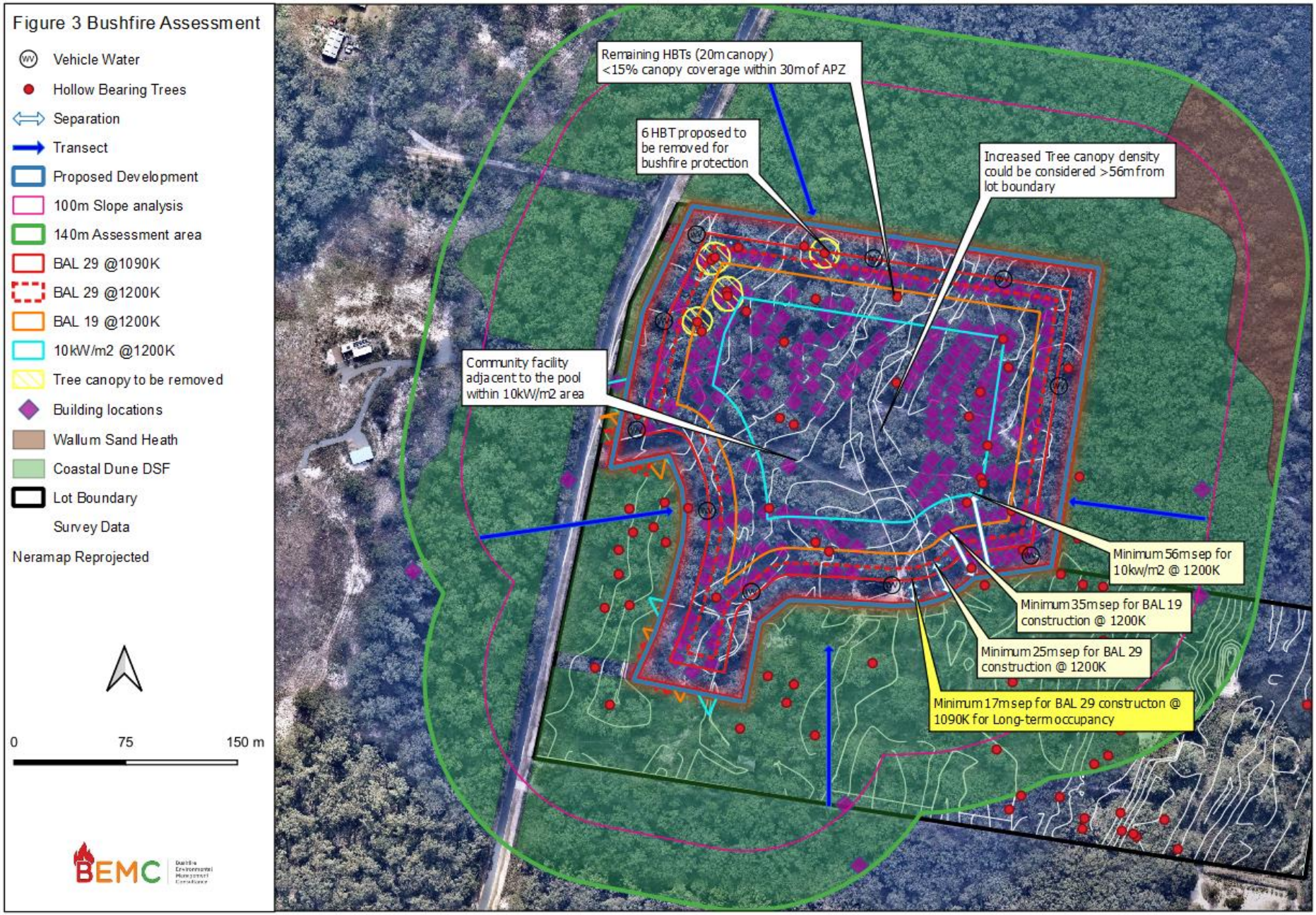
Figure 3 Bushfire Assessment
Vehicle Water
Hollow Bearing Trees
Separation
Transect
Proposed Development
100m Slope analysis
140m Assessment area
BAL 29 @1090K
BAL 29 @1200K
BAL 19 @1200K
10kW/m2 @1200K
Tree canopy to be removed
Building locations
Wallum Sand Heath
Coastal Dune DSF
Lot Boundary
Survey Data
Neramap Reprojected
0
75
150 m
BEMC
Remaining HBTs (20m canopy) <15% canopy coverage within 30m of APZ
6 HBT proposed to be removed for bushfire protection
Increased Tree canopy density could be considered >56m from lot boundary
Community facility adjacent to the pool within 10kW/m2 area
Minimum 56m sep for 10kw/m2 @ 1200K
Minimum 35m sep for BAL 19 construction @ 1200K
Minimum 25m sep for BAL 29 construction @ 1200K
Minimum 17m sep for BAL 29 constructon @ 1090K for Long-term occupancy

5 SIGNIFICANT ENVIRONMENTAL FEATURES

This section details the significant environmental features as requirements of s44 of the RF Regs. It provides an indication of the location and extent of environmental values to mitigate the potential for proposing BPMs over in the same location as significant environmental features.

5.1 THREATENED SPECIES, POPULATIONS AND COMMUNITIES

A search on the NSW Government Central Resource for Sharing and Enabling Environmental Data (SEED) for significant environmental values was completed. The search identified Umbrella sedge (*Cyprus eragrotis*) and Dark-flecked Garden sunskink (*Lampropholis delicata*) on site. Both species are not considered endangered. No ecologically endangered communities (EEC) or threatened species have been identified on site.

The results of the SEED search for significant environmental values is provides in **Appendix 2**.

5.2 ABORIGINAL CULTURAL VALUES

A search of the Aboriginal Historic Information Management System (AHIMS) was completed on the 2nd November 2021 which indicated no known aboriginal artefacts of site within the development area.

The results of the AHIMS search for aboriginal cultural values is provides in **Appendix 3.**

5.3 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 for subdivisions.

Registered fire trails on the property.

No registered fire trails are located on the property.

5.4 PBP 2019 ADDENDUM

The 2022 edition of the National Construction Code (NCC 2022) 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 effective date of this Addendum is 1 May 2023 to coincide with adoption of the National Construction Code 2022.

Developments in bush fire prone areas must comply with both the requirements of PBP and the NCC.

NCC 2022 identifies additional bush fire provisions for the construction, separation and access requirements for certain Class 9 buildings accommodating vulnerable occupants on bush fire prone land.

Class 9 buildings include some Special Fire Protection Purpose (SFPP) developments under section 100B of the Rural Fires Act 1997, such as Class 9a hospitals, Class 9b schools and child care centres and Class 9c residential care buildings.

Additional Performance Criteria and Acceptable Solutions relevant to BPMs within PBP for SFPP Class 9 buildings are identified in Appendix B of this Addendum. These Acceptable Solutions are consistent with the relevant provisions of NCC 2022.

Consistent with section 100B of the Rural Fires Act 1997, proposed SFPP's that are Class 9 Buildings in bush fire prone areas may be required to have bush fire protection measures additional to those specified in NCC 2022.

For the purposes of PBP 2019 the follow SEEPs are considered:

- The Coastal Management SEPP has been repealed and consolidated into the State Environmental Planning Policy (Resilience and Hazards) 2021,
- SEPP 36 – Manufactured Home Estates has been repealed and consolidated into the State Environmental Planning Policy (Housing) 2021, and
- Clause 30 of the SEPP (Educational Establishments and Child Care Facilities) 2017 has been consolidated into Chapter 3 Educational establishments and childcare facilities of the State Environmental Planning Policy (Transport and Infrastructure) 2021.

Primitive Camping

Primitive camping is covered by the Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2021.

Short-term rental accommodation

Short-term rental accommodation (STRA) are now deemed as a "use" of a residential dwelling under the *State Environmental Planning Policy (Housing), 2021* rather than new development that was previously considered under section 100B of the Rural Fires Act 1997.

6 BUSH FIRE ASSESSMENT

This section assesses Bushfire Performance Measures (BPMs) for the proposed development at Lot 2 DP 1015609 Mungo Brush Road 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 5 *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 lot 2 DP 1015609 Mungo Brush Road
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.	*REFER TO VARIATION* **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 and 4 page 20; Appendix 4, page 51** and illustrated on **Figure 3, page 22**. The community facility adjacent to the pool is proposed to be a last option shelter-on-site within the emergency management plan, which is located centrally within the development not exposed to radiant heat >10kW/m² (refer to **Figure 3, page 22**)
	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 on this site is wholly within the site boundaries and 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.	***REFER TO LANDSCAPING COMPLIANCE REQUIREMENTS***

	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** The APZ on this site is wholly within the site boundaries. No other structures within the lot are identified within 6m of the proposed development. A temporary 25m APZ shall be provided for each stage of the development. No structures are proposed within the 17m APZ surrounding the development.
	VARIATION: Camping and primitive camping: no performance criteria applicable.	• N/A	Asset Protection Zones are not required for Camping and primitive camping.
	VARIATION Manufactured home estates: APZs achieve radiant heat levels that are commensurate with the construction standard for the proposed dwellings.	• An APZ in accordance with Table A1.12.1 in Appendix 1 of this document is provided to all new dwellings; or • An APZ in accordance with Table A1.12.2 or A1.12.3 in Appendix 1 of this document is provided where it is demonstrated that all new dwellings will be constructed in accordance with BAL-29.	**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 and 4 page 20; Appendix 4, page 51** and illustrated on **Figure 3, page 22**. Long term casual occupants as per the Holiday Parks (Long Term Casual Occupation) Act 2002" located internal to the 17m BAL 29 setback, built as permanent structures to BAL construction standards. Short term sites for casual occupation of less than 6 weeks located internally to the 25m BAL 29 setback built to BAL construction standards.

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.	*REFER TO VARIATION*
	The proposed building can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact. **NCC Addendum: Specific requirements for hospitals, schools, child-care centres and residential care buildings**	• A construction level of BAL-19 or greater under AS 3959 and section 7.5 of PBP is applied.	This development is not affected by NCC update.
	VARIATION: Camping and primitive camping: No performance criteria applicable.	• N/A	**COMPLIES- ACCEPTABLE SOLUTION** Construction Levels are not required for Camping and primitive camping.
	VARIATION Manufactured home estates: The proposed manufactured home can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact.	• Where an APZ is provided in accordance with Table A1.12.1 in Appendix 1 of this document the construction standards for BAL-12.5 shall apply; **OR** • Where an APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1 of this document the construction standards for BAL-29 shall apply.	**COMPLIES - PERFORMANCE SOLUTION** Long term casual occupants as per the Holiday Parks (Long Term Casual Occupation) Act 2002" located internal to the minimum 17m BAL 29 setback, built as permanent structures to BAL 29 construction standards. Short term sites for casual occupation of less than 6 weeks located internally to the 25m BAL 29 setback built to BAL 29 construction standards. BAL 29 and 19 constructions can be applied, only where it can be demonstrated the cabins can been constructed to these BAL standards.

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.	**MADE CONDITION OF CONSENT** All electricity services are placed underground. If overhead power supply is provided, 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).
GAS	Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	• Reticulated or bottled gas is installed and maintained in accordance with AS/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. • 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	**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: ▪ 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.
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.	6 hollow bearing trees are recommended to be removed in the north-west portion of the development to reduce canopy density in the 'worst case' fire direction impacting on the site. The remaining canopy (calculated at 20m maturity canopy spread) is 7,900m^2 within 72,800m^2 (development area), equating to approximately 11%.

			Council are requesting the tree canopy be retained as much as possible. Appendix 1 (of this report) indicates the proposed canopy density for the development. This canopy density has been developed in consideration of the below criteria: ▪ No tree canopy within the BAL 29 set-back of 17m, ▪ Canopy not greater than 15% within 30m of the lot boundary. ▪ Canopy density increased internal area of the development, >50m from the surrounding unmanaged classified vegetation. ▪ Form small clusters with no canopy continuity to surrounding clusters or individual trees at maturity. ▪ Be no greater than 40% overall canopy density for the entire site. ▪ Shall have <10% of flammable shrub within development, and no shrub under any canopy within development area. The landscaping design intent provides guidance although a final landscaping plan shall illustrate: ▪ No tree canopy within the BAL 29 set-back of 17m. ▪ Canopy not greater than 15% within 30m of the lot boundary. ▪ Canopy density increased internal area of the development, >50m from the surrounding unmanaged classified vegetation. ▪ Form small clusters with no canopy continuity to surrounding clusters or individual trees at maturity. ▪ Be no greater than 40% overall canopy density for the entire site. ▪ Shall have <10% of flammable shrub within development, and no shrub under any canopy within development area

			▪ If fencing, retaining wall, garden/path edging is within 6m of a building or in areas of BAL-29 or greater shall illustrate constructed of non-combustible materials, ▪ A minimum 1-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 (<6m) 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). ▪ Trees do no touch or overhang buildings. ▪ 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	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.	**MADE CONDITION OF CONSENT** All roads/trails shall comply with this requirement.

		• 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.	
	Firefighting vehicles are provided with safe, all-weather access to structures and hazardous vegetation. **NCC Addendum: Specific requirements for hospitals, schools, child-care centres and residential care buildings**	• Vehicular access must be capable of providing continuous access for emergency vehicles to enable travel in a forward direction from a public road around the entire building; and • Must have a minimum unobstructed width of 6m with no part of its furthest boundary more than 18m from the building and in no part of the 6m width be built upon or used for any purpose other than vehicular or pedestrian movement; and • Must provide reasonable pedestrian access from the vehicular access to the building; and Must have a load bearing capacity and unobstructed height to permit the operation and passage of fire fighting vehicles; and • Must be wholly within the allotment except that a public road complying with above may serve as the vehicular access or part thereof	This development is not affected by NCC update.
	VARIATION: Primitive camping: Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	• Access is provided in accordance with the property access requirements of Table 5.3b.	**Refer to TABLE 5.3b PROPERTY ACCESS:** Firefighting vehicles can access camping areas and exit safely.
	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** The 23T carrying capacity of the road surface is required for NSW F&R Composite Category 1 fire appliances, In this case, the proposed development is located in a rural setting with RFS brigades and NPWS within 30mins response. Any wildfires in the area will be responded by Category 9 or 7 fire vehicle appliances

			with a gross vehicle mass of 8 Tonnes (NSW RFS Fire Trail Standards, 2019). The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 8 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 2419.1:2005 - 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** Static water is to be located to ensure fire appliance can access to within 4m of the static water supply.

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.	**MADE CONDITION OF CONSENT** Perimeter road is not provided to this standard. Three access points to the public road system are proposed. The central main access is all hour access with the northern and south access points available during emergency response. A perimeter trail is provided within the perimeter APZ that links to the internal road system and secondary emergency access within the north-western corner. A track links the eastern and south-western portion of the development along the southern boundary. The perimeter trail and trail that links the eastern and south-western portion of the development along the southern boundary (forming a perimeter trail) shall comply with the below requirements: ▪ Minimum 8m carriageway (gravel trail to allow two-way vehicle access, ▪ No parking, ▪ 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.

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.	**MADE CONDITION OF CONSENT** All non-perimeter roads shall comply with this requirement.

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 • A development comprising more than three dwellings has access by dedication of a road and not by right of way.	**MADE CONDITION OF CONSENT** Roads no delegated as perimeter, or facilitate access to constructed building, and only access camping areas shall be constructed to these requirements.

		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.	
WATER SUPPLIES	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.	**MADE CONDITION OF CONSENT** Static water supplied for firefighting purposes.
	Adequate water supplies is provided for firefighting purposes in installed and maintained. **NCC Addendum: Specific requirements for hospitals, schools, child-care centres and residential care buildings**	• Reticulated water is to be provided to the development, where available; and • Water for firefighting purposes must be made available and consist of: • A fire hydrant system installed in accordance with AS2419.1; or ○Where no reticulated water is available, a static water supply consisting of tanks, swimming pools, dams or the like, or a combination of these, together with suitable pumps, hoses and fittings, determined in consultation with NSW RFS that: - is capable of providing the required flow rate for a period of not less than 4 hours, or has a volume of 10,000 litres for each occupied building.	This development is not affected by NCC update.
	VARIATION to above only: Caravan and camping grounds/ Primitive camping: An adequate water supply for firefighting purposes is installed and maintained.	• Either a reticulated water supply is provided or a 10,000 litres minimum water supply on site.	**MADE CONDITION OF CONSENT** Site Layout plans to illustrate 10,000 litres static water for firefighting purposes is provided for each occupied building.

	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.	**N/A** Static water supply provided.
	Flows and pressure are appropriate	• Fire hydrant flows and pressures comply with Table 2.2 of AS 2419.1:2017.	**N/A** This report has not tested or determined if the fire hydrant flow and pressures to comply with Table 2.2 of AS 2419.1:2017.
	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** Site layout plans or construction schedules do not identify construction materials of above ground water supplies.
	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.	**MADE CONDITION OF CONSENT** Several static water supplies shall be provided no greater than 150m apart at strategic locations along the western, northern and south boundaries for firefighting purposes to meet the specifications within this performance criteria.

		• 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 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** The existing DRAFT bush fire emergency procedure for the proposed development shall be updated prior to OC with relevant contact details and decision triggers. This shall be provided to the Local Emergency Management Committee for its information prior to occupation of the development.
	VARIATION to above only: Caravan and camping grounds: 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.	**MADE CONDITION OF CONSENT** The existing DRAFT bush fire emergency procedure for the proposed development shall be updated prior to OC with relevant contact details and decision triggers. This shall be provided to the

	VARIATION to above only: Primitive camping: A Bush Fire Emergency Management and Evacuation Plan is prepared. **VARIATION to above only: Ecotourism:** A Bush Fire Emergency Management and Evacuation Plan is prepared.	• 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.	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** The existing DRAFT bush fire emergency procedure for the proposed development shall be updated prior to OC with relevant contact details and decision triggers. This shall be provided to the Local Emergency Management Committee for its information prior to occupation of the development.

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 detailed assessment pathway described in Appendix B of AS3959:2018. This BFAR found the classifiable vegetation of *Costal Dune DSF* and *Wallum Sand Heaths* as described by NSW Comprehensive Fuel Loads level in all directions 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. Implementation of the following recommendations will meet acceptable solutions for PBP 2019.

Asset Protection Zones

Long term casual occupants as per the Holiday Parks (Long Term Casual Occupation) Act 2002" located internal to the 17m BAL 29 setback, built as permanent structures to BAL construction standards.

Short term sites for casual occupation of less than 6 weeks located internally to the 25m BAL 29 setback built to BAL construction standards.

A temporary 25m APZ shall be provided for each stage of the development.

Some areas of increased tree density (>15%) may result due to council request to maintain tree canopy. These areas will be restricted to:

- Internal area of the development, >50m from the surrounding unmanaged classified vegetation.
- Shall have <10% of flammable shrub of landscape features under the canopy.
- Form small clusters with no canopy continuity to surrounding clusters or individual trees at maturity.

Landscaping

A Landscaping plan is required to illustrate:

- No tree canopy within the BAL 29 set-back of 17m.
- Canopy not greater than 15% within 30m of the lot boundary.
- Canopy density increased internal area of the development, >50m from the surrounding unmanaged classified vegetation.
- Form small clusters with no canopy continuity to surrounding clusters or individual trees at maturity.
- Be no greater than 40% overall canopy density for the entire site.
- Shall have <10% of flammable shrub within development, and no shrub under any canopy within development area
- If fencing, retaining wall, garden/path edging is within 6m of a building or in areas of BAL-29 or greater shall illustrate constructed of non-combustible materials,
- A minimum 1-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 (<6m) 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).
- Trees do no touch or overhang buildings.
- 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

Long-term casual:

- If the manufactured home be placed internal to the BAL 29 setback (red line in Figure 3 of this report), built as permanent structures to BAL construction standards (Appendix 4).

Short term sites:

- If the manufactured home be placed internal to the BAL 29 setback (orange line in Figure 3 of this report), built to BAL construction standards (Appendix 5)

If the manufactured home be placed in excess of the 10kW/m^2 zone (aqua line in **Figure 3, page 22** of this report), BAL 12.5 construction standards will apply.

Access

The road network of the final design shall meet the following provision:

- The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 8 tonnes); bridges and causeways are to clearly indicate load rating.
- 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.

PERIMETER ROADS: A perimeter trail is provided within the perimeter APZ that links to the internal road system and secondary emergency access within the north-western and south-western corner. The perimeter trail shall comply with the below requirements:

- Minimum 8m carriageway (gravel trail to allow two-way vehicle access,
- No parking,
- 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.

NON-PERIMETER ROADS: Minimum 5.5m carriageway width kerb to kerb; parking is provided outside of the carriageway width; hydrants are located clear of parking areas; there 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.

Private property access requirements can be applied within the primitive camping area only.

Water Supply

Several static water supplies are to be provided no greater than 150m apart at strategic locations along the western, northern and south boundaries for firefighting purposes to meet the following specifications:

- Static water is to be located to ensure fire appliance can access to within 4m of the static water supply.
- A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; 65mm Storz outlet with a ball valve is fitted to the outlet, and
- Ball valve and pipes are adequate for water flow and are metal, and
- Supply pipes from tank to ball valve have the same bore size to ensure flow volume, and
- Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank, and
- A hardened ground surface for truck access is supplied within 4m, and
- Above-ground tanks are manufactured from concrete or metal, and
- Raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F AS 3959), and
- Unobstructed access can always be provided, and
- Underground tanks are clearly marked, and
- Tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters, and
- All exposed water pipes external to the building are metal, including any fittings, and
- 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.

Electricity services

If overhead power supply is provided, 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.

Gas services

Gas bottle supplies to meet the following specifications:

- 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.
- Shielding provided on the hazard side of gas bottle.
- 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.

Emergency Management

The DRAFT Bush Fire Emergency Management and Evacuation Plan is required to be updated prior to the issuance of the Occupation Certificate with relevant contact details and decision triggers. This shall be provided to the Local Emergency Management Committee for its information prior to occupation of the development.

8 REFERENCES

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9 APPENDIX 1 CONCEPT DEVELOPMENT PLANS

COMMUNITY PLAN

HAWKS NEST HOLIDAY PARK

Address
288 MUNGO BRUSH SIDE ROAD HAWKS NEST NSW 2324

CLIENT	PROJECT No.	DATE	DRAWN
BRETT PHILLIPS	23003	31/5/2023	OGE

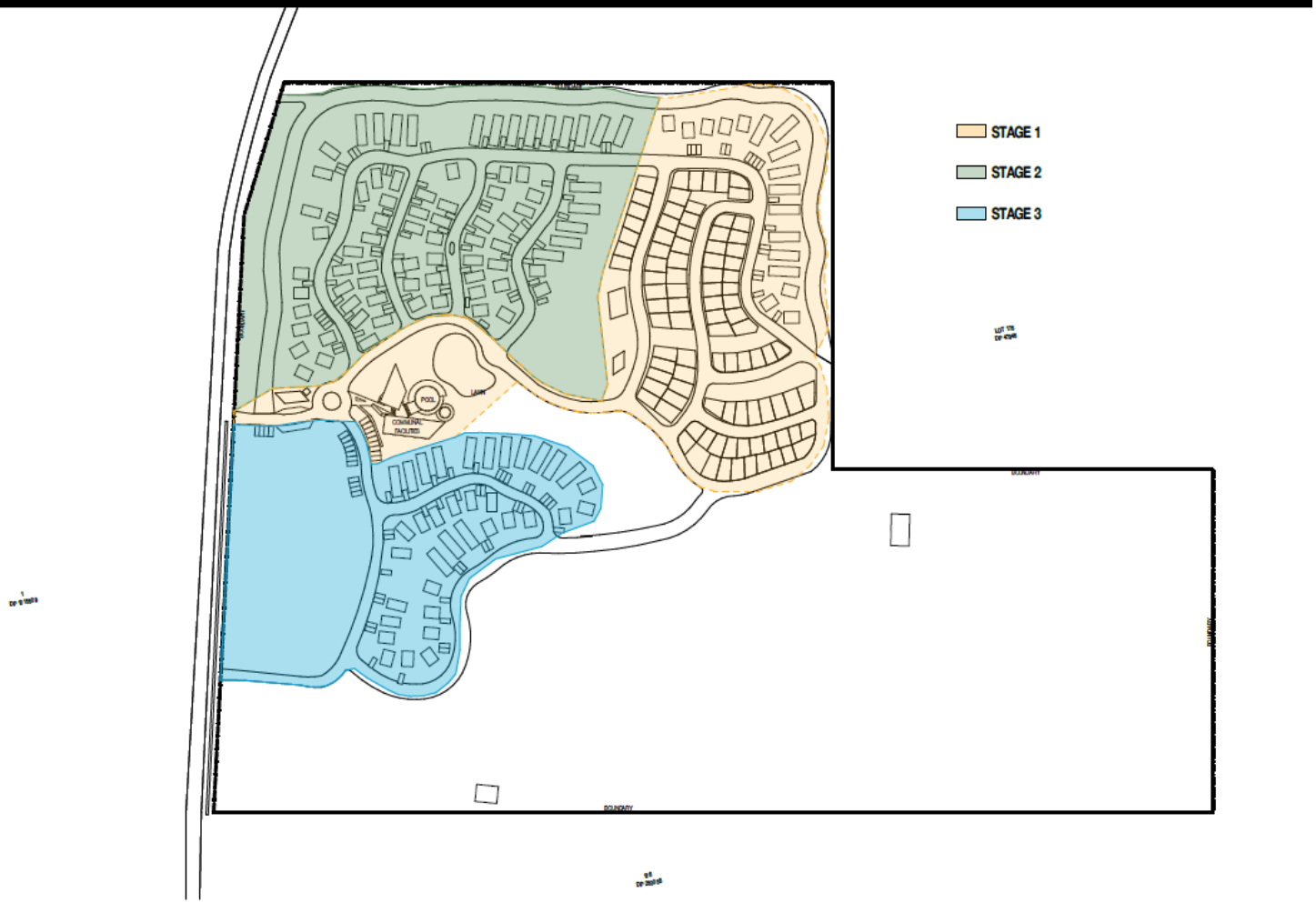
SK_2.02

0 10 20 50 100
SCALE 1:2000

N

O.G.E GROUP ARCHITECTS

STAGING PLAN



HAWKS NEST HOLIDAY PARK

Address
288 MUNGO BRUSH SIDE ROAD HAWKS NEST NSW 2324

CLIENT	PROJECT No.	DATE	DRAWN
BRETT PHILLIPS	23003	31/5/2023	OGE

SK_2.03

0 10 20 50 100
SCALE 1:2000

N

O.G.E GROUP ARCHITECTS

Landscape Design

3.2 MASTERPLAN

LEGEND

01 Entry Signage
02 Check-In
03 10m Landscape Buffer
04 8m wide perimeter fire trail
05 17m wide APZ
06 Central Facilities w/ Amenities
07 Central Pool Facilities
08 Communal Lawn
09 Exisiting Canopy Trees to be retained
10 Biofiltration Zones
11 Communal Facilities (Camp Social)
12 Existing hollow bearing trees
13 Short Term Sites (w/ 1m wide gravel surrounds)
14 Campsites
15 Native landscaping surrounding cabins
16 Fire trail access road
17 Playground
18 Campground entry gate
19 Canopy rehabilitation to balance of site

North Scale 1:2000 @ A3 0 5 10 25 50 100

Landscape Design

3.3 BUSH FIRE - CANOPY TO DEVELPOMENT AREA DIAGRAM

LEGEND

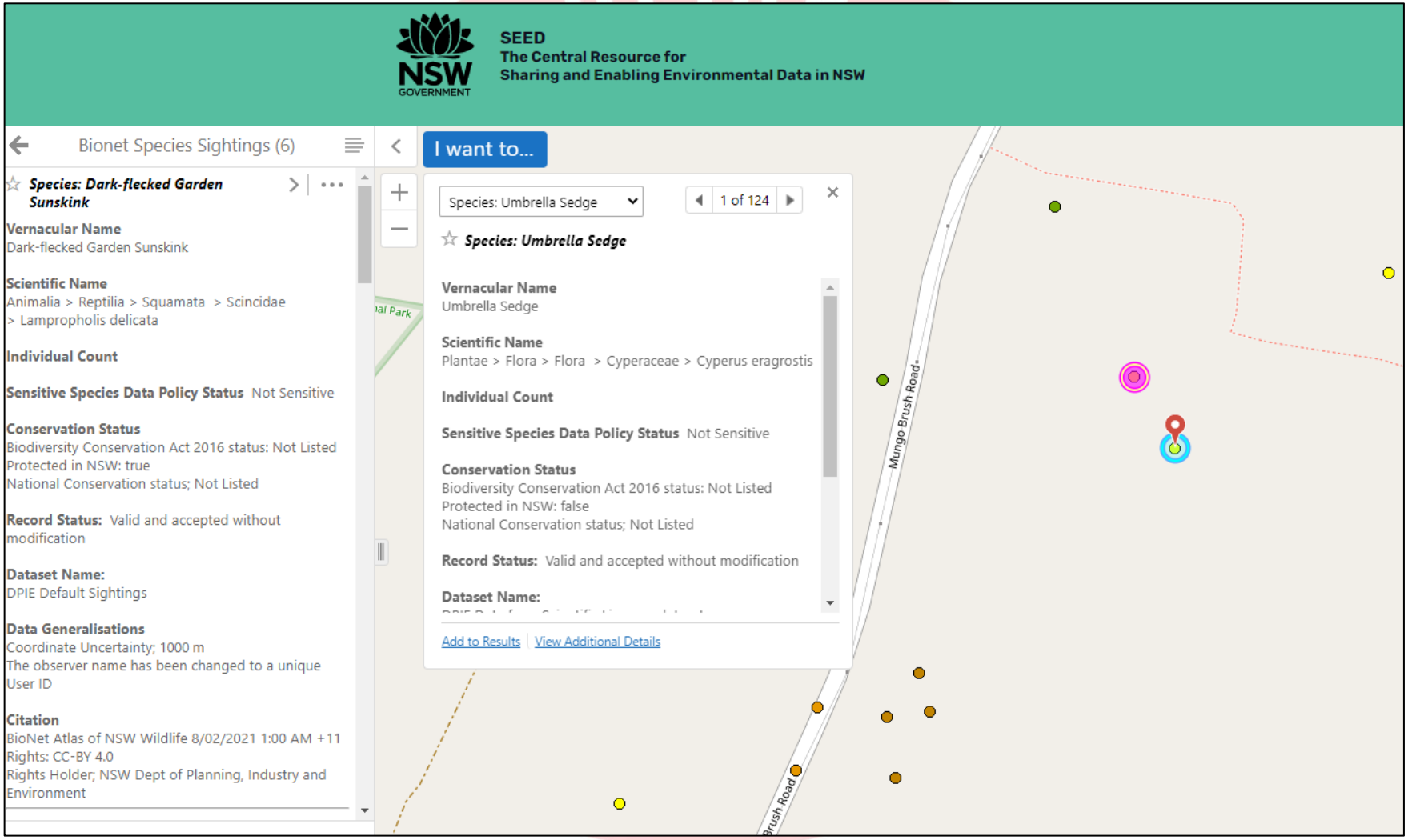
01	Canopy (Retained & Proposed)
02	APZ Internal Boundary
03	17m wide APZ (External boundarey

CANOPY TO AREA RATIO

APZ Internal Footprint	Approx. 54,000m²
Canopy footprint	Approx. 17,200m² (31.8%)

North Scale 1:2000 @ A3 0 5 10 25 50 100

10 APPENDIX 2 SHARING AND ENABLING ENVIRONMENTAL DATA SEARCH



11 APPENDIX 3 AHIMS SEARCH

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : mungo
Client Service ID : 635184

Duncan Scott-Lawson

Date: 02 November 2021

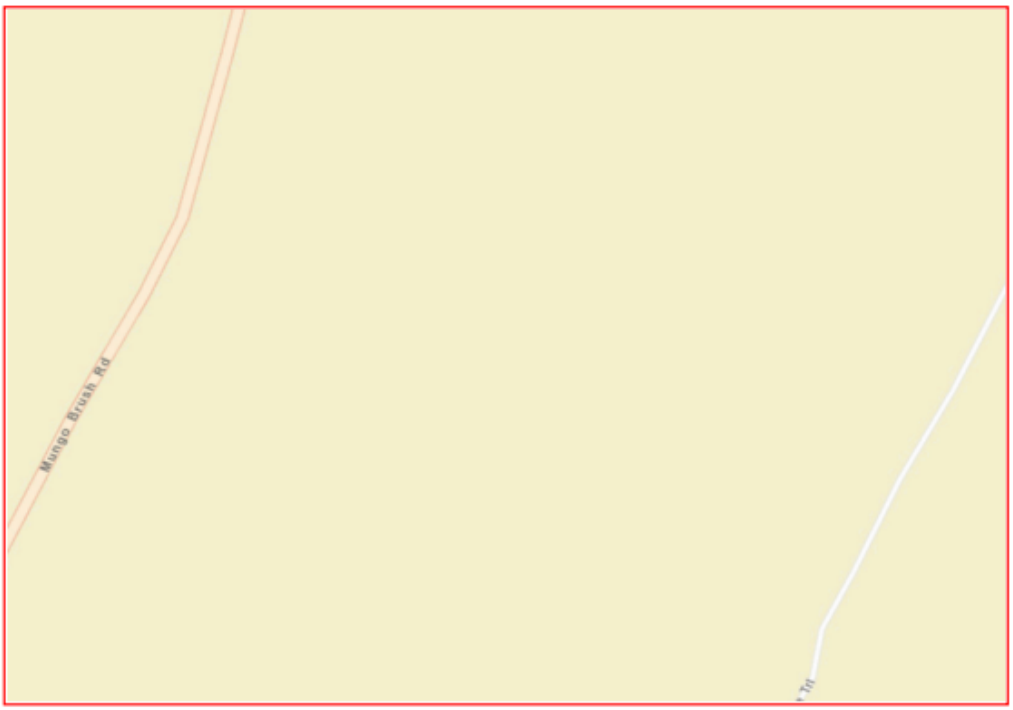
Attention: Duncan Scott-Lawson

Email: duncan@emconsultancy.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -32.65, 152.18 - Lat, Long To : -32.65, 152.19, conducted by Duncan Scott-Lawson on 02 November 2021.

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 4 METHOD 2 OUTPUTS

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 4/10/2022 **Assessment Date:** 4/10/2022

Site Street Address:	288 Mungo Brush Road, Hawks Nest
Assessor:	Duncan Scott-Lawson; BEMC
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: All Transect

Vegetation Information

Vegetation Type:	Coastal Dune DSF		
Vegetation Group:	Dry Sclerophyll Forests (Shrubby)		
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Level
Surface Fuel Load(t/ha):	20.5	**Overall Fuel Load(t/ha):**	31.1
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	0 Degrees	**Site Slope Type:**	Level
Elevation of Receiver(m):	2.4	**APZ/Separation(m):**	17

Fire Inputs

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

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 29	**Peak Elevation of Receiver(m):**	7.16
Radiant Heat(kW/m2):	27.92	**Flame Angle (degrees):**	55
Flame Length(m):	16.52	**Maximum View Factor:**	0.429
Rate Of Spread (km/h):	1.97	**Inner Protection Area(m):**	10
Transmissivity:	0.856	**Outer Protection Area(m):**	7
Fire Intensity(kW/m):	31622		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	13	17	25	36	56	2.4

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 4/10/2022 **Assessment Date:** 4/10/2022

Site Street Address: 288 Mungo Brush Road, Hawks Nest

Assessor: Duncan Scott-Lawson; BEMC

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: All Transect

Vegetation Information

Vegetation Type: Coastal Dune DSF

Vegetation Group: Dry Sclerophyll Forests (Shrubby)

Vegetation Slope: 0 Degrees **Vegetation Slope Type:** Level

Surface Fuel Load(t/ha): 20.5 **Overall Fuel Load(t/ha):** 31.1

Vegetation Height(m): 2 Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 0 Degrees **Site Slope Type:** Level

Elevation of Receiver(m): 2.4 **APZ/Separation(m):** 25

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 29 **Peak Elevation of Receiver(m):** 7.71

Radiant Heat(kW/m2): 27.82 **Flame Angle (degrees):** 67

Flame Length(m): 16.52 **Maximum View Factor:** 0.299

Rate Of Spread (km/h): 1.97 **Inner Protection Area(m):** 15

Transmissivity: 0.834 **Outer Protection Area(m):** 10

Fire Intensity(kW/m): 31622

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	18	25	35	48	56	2.4

13 APPENDIX 5 BUSH FIRE PROTECTION MEASURES AND INFORMATION

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

Why do buildings burn during bush fires?

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

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

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

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

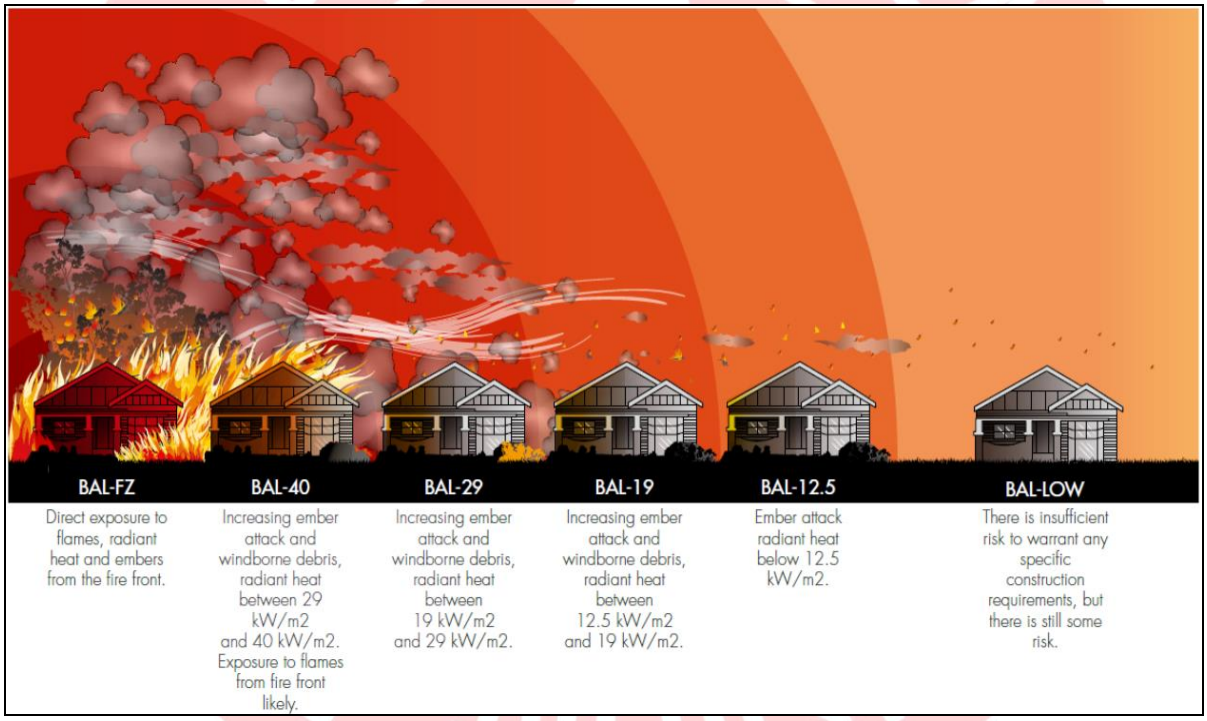
In terms of subdivision development, the research has illustrated maintaining the separations between the building and bush fire threat (known as the Asset Protection Zones (APZ)) to low flammability is critical. Elements within subdivision planning that can be incorporated are:

- **Restricted landscaping and gardens within the APZ.**
- **Delineate the edge of the APZ through fencing, bollarding and signage to mitigate vegetation creep over time.**
- **Registration of the APZ within the relevant bushfire risk management plan.**
- **Dedication of resources to ensure ongoing maintenance.**
- **Non-combustible fencing associated with the APZ.**
- **Ensure water provisions are provided on both the bushfire threat and building sides of roads.**

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

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

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



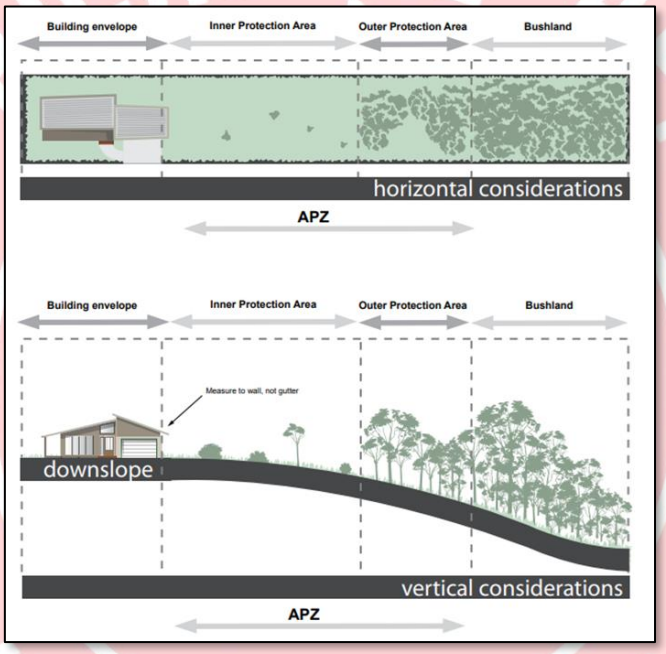
Relationship between fire behaviour and BAL (WA Guidelines for Planning in Bush fire Prone Areas, 2017)

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.



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

An APZ can include the following:

- Footpaths.
- Lawns.
- Discontinuous gardens.
- Swimming pools.
- Driveways.
- Unattached non-combustible garages with suitable separation from the dwelling.
- Open space / parkland; and
- Car parking.

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

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

Inner Protection Area (IPA)

The IPA extends from the edge of the OPA to the development. The IPA is the area closest to the asset and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and be a defendable space. The intent of an IPA is to stop the transmission of flame and reduce the transmission of radiant heat by the elimination of available fire fuel. This area also allows airborne embers to fall safely without igniting further outbreaks and provides a safer firefighting position and is operationally important for implementation of clear fire control lines.

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

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

Outer Protection Area (OPA)

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

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

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

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

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

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

Gardens and vegetation within the APZ

All vegetation will burn under the right conditions.

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

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

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

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

Consideration should be given to vegetation fuel loads present on site. Careful thought must be given to the type and physical location of any proposed site landscaping. **Inappropriately selected and positioned vegetation has the potential to 'replace' any previously removed fuel load.**

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a

suitable balance between visual and safety concerns be considered. The below list of well know ground fire-retardant plants is intended as a guide only, check with your local council for information more specific to your area.

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

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

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

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

- *Melia azederach* (Cape Lilac)
- *Brachychiton aecerifolius* (Flame tree)
- *Magnolia grandiflora*
- *Pyrus* (most ornamental pears)
- *Magnolia* Little Gem
- *Ulmus chinensis* (Chinese Elm)
- Acacia howitii
- *Cercis* (Judus Tree)
- *Acmena smithii* (Lilypily)
- *Prunus* (all including ornamental)
- *Cupaniopsis anacardiopsis* (Tuckeroo)
- *Malus* (apple trees)
- *Eleocarpus*
- *Mullbery*
- *Citrus* trees

- *Loquot*
- *Arbutus Quercus* (only the deciduous oak trees)
- *Feijoa*
- *Gleditzia*
- *Ficus* (all including edible)
- *Aloe* (all)
- *Correa*
- *Acacia iteaphyla*
- *Scaevola crassifolia*
- *Viburnum tinus*
- *Atriplex* (saltbush)
- *Escallonia*
- *Maireana* (Cottonbush)
- *Acacia Cyclops*
- *Eremophila* (Emu bush)
- *Melaleuca nodosa*
- *Syzygium* (lilypilly)
- *Photinia*
- *Rhagodia* (saltbush)
- *Strelitzia*
- *Coprosma*
- *Santolina*
- *Plectranthus*
- *Leucophyta brownii*
- *Senna* (Silver Cassia)

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

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

Landscaping features within the APZ

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

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

Further information can be found here - Landscaping for bushfires

Access Requirements

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

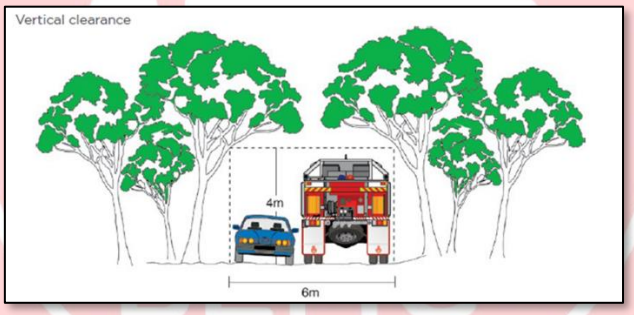
Local Area Traffic Management (LATM)

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

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

Vertical clearance

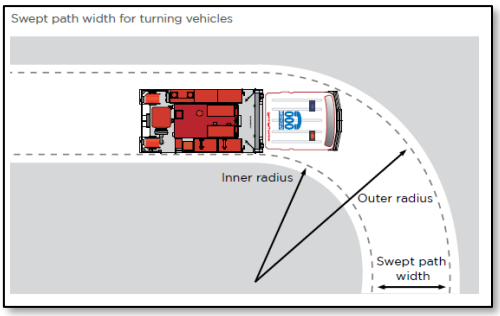
An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways/doorways, and overhanging structures (e.g., ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads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

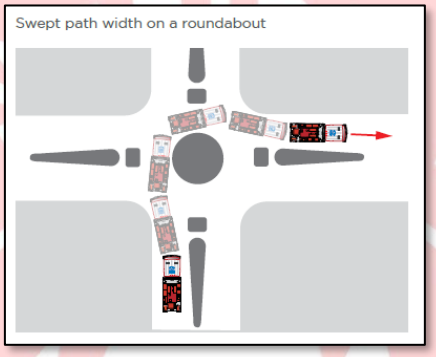


Vehicle Turning Requirements

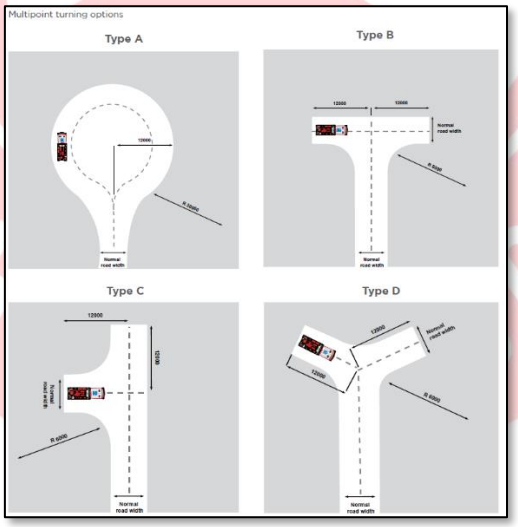
Fire crews must have rapid access and egress for vehicles, therefore curved carriageways should be constructed using the minimum swept path. The below diagrams from PBP2019 provide indication of the requirements to be achieved.

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





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



Passing Bays

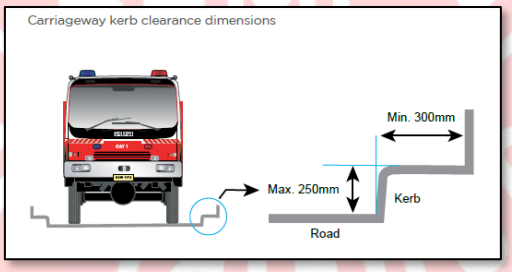
The construction of passing bays, where required, shall be 20m in length, provide a minimum trafficable width at the passing point of 6m.

Parking

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

Kerb Dimensions

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



Road Types

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

Water Supply

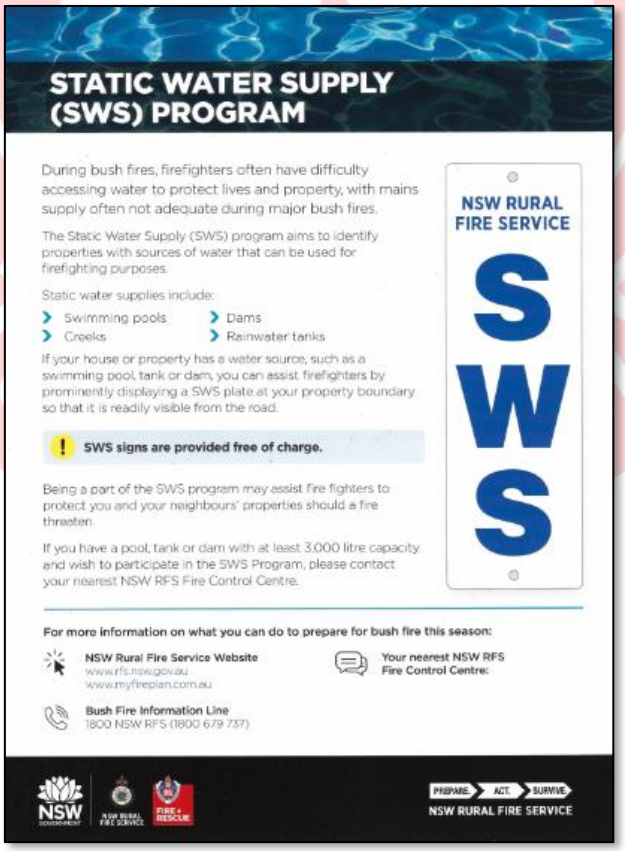
The intent of water measures is to provide adequate services of water for the protection of dwellings during and after the passage of a bush fire.

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

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

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

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



Electricity, Gas supplies and Hazardous materials

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

Electricity

Location of electricity services should limit the possibility of igniting the surrounding bush land or the fabric of buildings. Where practicable, electrical transmission lines are underground. If overhead, electrical transmission lines are installed with short pole spacing (30m), unless crossing gullies, gorges, or riparian areas, then no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

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

Gas

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

Hazardous Materials

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

Construction Requirements

Groundwork and Sub-structure construction phase

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

Groundwork and Sub-structure construction phase fire management plan should be developed. Preparation of the site should include mitigating fire ignition sources. This should include vegetation management such as slashing and mowing long grasses in and around the development site, car parking and access tracks. This is especially important during summer months where Rates of Spread of fire can significantly increase due to the prevailing weather condition.

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

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

Ongoing Operations

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

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

Construction Standards

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

Retrofitting

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

The current construction standards are based on your Bush fire Attack Level (BAL). Evidence from large wildfire events over the last 20 years illustrate that house ignition is concentrated within 100m

from the vegetation, although it can occur kilometres from the burning vegetation under worst case scenarios. Developments outside the bush fire prone area (100m from the vegetation) will benefit from increasing construction standards to withstand ember-attack to protect the building during a bush fire event.

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

Research has illustrated that ember-attack from the wildfire is the principal mechanism that ignites homes. The most vulnerable elements are timber decks, Eave fascia boards, gutters timber window frames and timber stairs. Furthermore, house-to-house fires occur following the ignition of a neighbouring property. Appropriate amount of effort should be placed to ensure that vegetation and landscaping should be maintained to reduce the likelihood of ember attack igniting fire fuels near the house, and separation between neighbouring houses is achieved to reduce house-to-house fires. The use of non-combustible fencing and appropriately positioned windows can go a long way to reducing the risk of house-to-house fires.

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

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

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

Some of the basic retrofitting that can be undertaken:

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

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

Electric Vehicles (EVs)

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

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

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

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

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

Bushfire Emergency / Survival Plan

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

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

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

The principal elements of the Bush fire survival Plans are:

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

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

fire event.

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

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

DISCUSS

STEP 1

DISCUSS WHAT TO DO IF A BUSH FIRE THREATENS YOUR HOME

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

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

PREPARE

STEP 2

PREPARE YOUR HOME AND GET IT READY FOR BUSH FIRE SEASON

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

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

KNOW

STEP 3

KNOW THE BUSH FIRE ALERT LEVELS

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

Download Step 3 (PDF, 166.1 KB).

KEEP

STEP 4

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

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

Download Step 4 (PDF, 219.1 KB).

Bushfire Management Plan

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

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

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

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

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

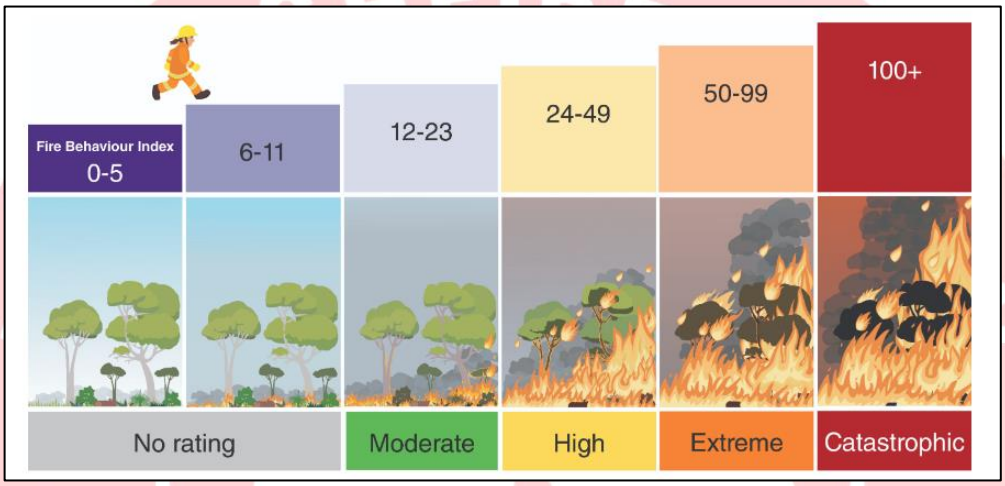
- 24/7 emergency contact details including alternative telephone contact.
- Location of site infrastructure and assets.
- Fire-fighting water supply plan.
- Site access and neighbour/ internal road plan.
- Identification of built, natural and cultural assets in and around the site.
- Emergency escape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

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.

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

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



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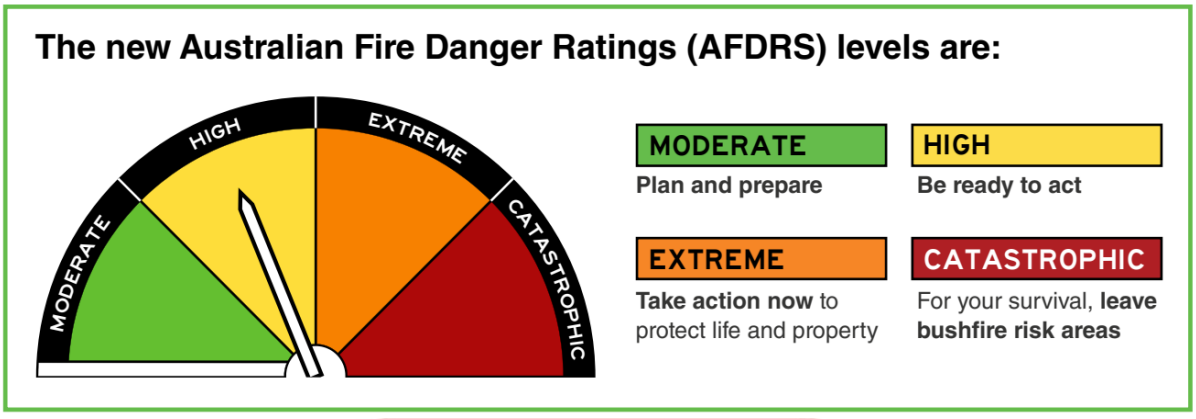


Accessed from AFAC: https://www.afac.com.au/initiative/afdrs/afdrs-faqs

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

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

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

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

Bushfire Environmental Management Consultancy

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

RFI

Special Fire Protection Purpose

lot 2 DP 1015609 Mungo Brush Road,

Hawks Nest, NSW

Our Reference: (CNR-59874) DA2023/0608 (Bushfire_2021561)

Your Reference: DA20230908003981-Original-1

Date: 19th March 2024

Wayne Sketchley
NSW RFS Development Assessment and Planning
4 Murray Rose Ave
SYDNEY OLYMPIC PARK NSW 2127
wayne.sketchley@rfs.nsw.gov.au

REQUEST FOR INFORMATION

A Request For Information (RFI) was issues on Thursday 27 October 2023 with a 100 day response requirement concerning an Integrated Development Application -s100B – SFPP – Caravan Park 288 MUNGO BRUSH ROAD HAWKS NEST 2324, 2//DP1015609.

This letter style report provides a response to the items raise within the RFS RFI.

1. The sites considered long-term casual sites have not been identified on the Site Plan.

Please refer to attachment 1.

2. There are no sites numbered so construction requirements can be clearly conditioned.

Please refer to attachment 1.

3. The Statement of Environmental Effects attempts to identify how the proposals' long-term casual accommodation meets the long-term requirements of Planning for Bush Fire Protection. The long-term casual sites agreement should have included a minimum occupancy of 42 days. This would align with the long-term requirements of Planning for Bush Fire Protection and provide certainty that the sites will be used accordingly.

Agreed, the long-term casual sites agreement will have included a minimum occupancy of 42 days. This has been updated in the revised SEE.

4. Short-term accommodation sites will experience greater than 10kW/m² Radiant Heat Flux.

Short term sites for casual occupation of less than 6 weeks located internally to the 10kW/m2, refer to attachment 1.

5. The Bushfire Attack Level of each site has not been identified for the construction of the future structure on that site.

Please refer to attachment 1 and table provided in attachment 3.

6. The road loading capacity of 23 Tonnes, comes from the Gross Vehicle Mass of a Category 6, Ultra Heavy Tanker and a Category 13, Bulk Tanker. Both have a Gross Vehicle Mass of 22.5 Tonnes. The 'rural setting' reasoning does not justify reducing the access requirements of the proposed development. A Category 1 Tanker may be the only emergency vehicle available to respond to an incident at the proposed development. Further, the Category 6 and 13 tankers may be required to access the water on-site to provide water to firefighting nearby. In accordance with the Use of Water and Works, Section 26 of the Rural Fires Act 1997. The 23 Tonne load capacity is the requirement.

All roads and trails will be constructed to 23T capacity.

7. Siting of the various Static Water Supplies should be identified on the Site Plan. The Bushfire Report did not identify a minimum capacity for the Static Water Supplies.

Reticulated water hydrant supplies are to be provided no greater than 150m apart at strategic locations along the western, northern and south boundaries and internally for firefighting purposes illustrated in Figure 3 of the Bushfire Assessment report (although are difficult to see in the map).

Attachment 2 provides an uncluttered map illustrating the proposed locations of the reticulated water hydrant supply which provides water within 70m of each building akin to residential development, as an added fire protection measure. At total of 24 locations are throughout the site.

The fire hydrant system will be on a ring name with pressure and installation in accordance with AS2419.1.

With regard to the issuance of the Bushfire Safety Authority, the limitations with PBP2019 and AS3959 apply, with the proposal to mitigate bushfire risk to acceptable levels, in considerations of the bushfire protection measures applied with PBP 2019 and performance solutions that sit outside PBP 2019.

We trust that the information within this report is satisfactory. Should you wish to discuss any of the above, please contact the undersigned.

Regards,

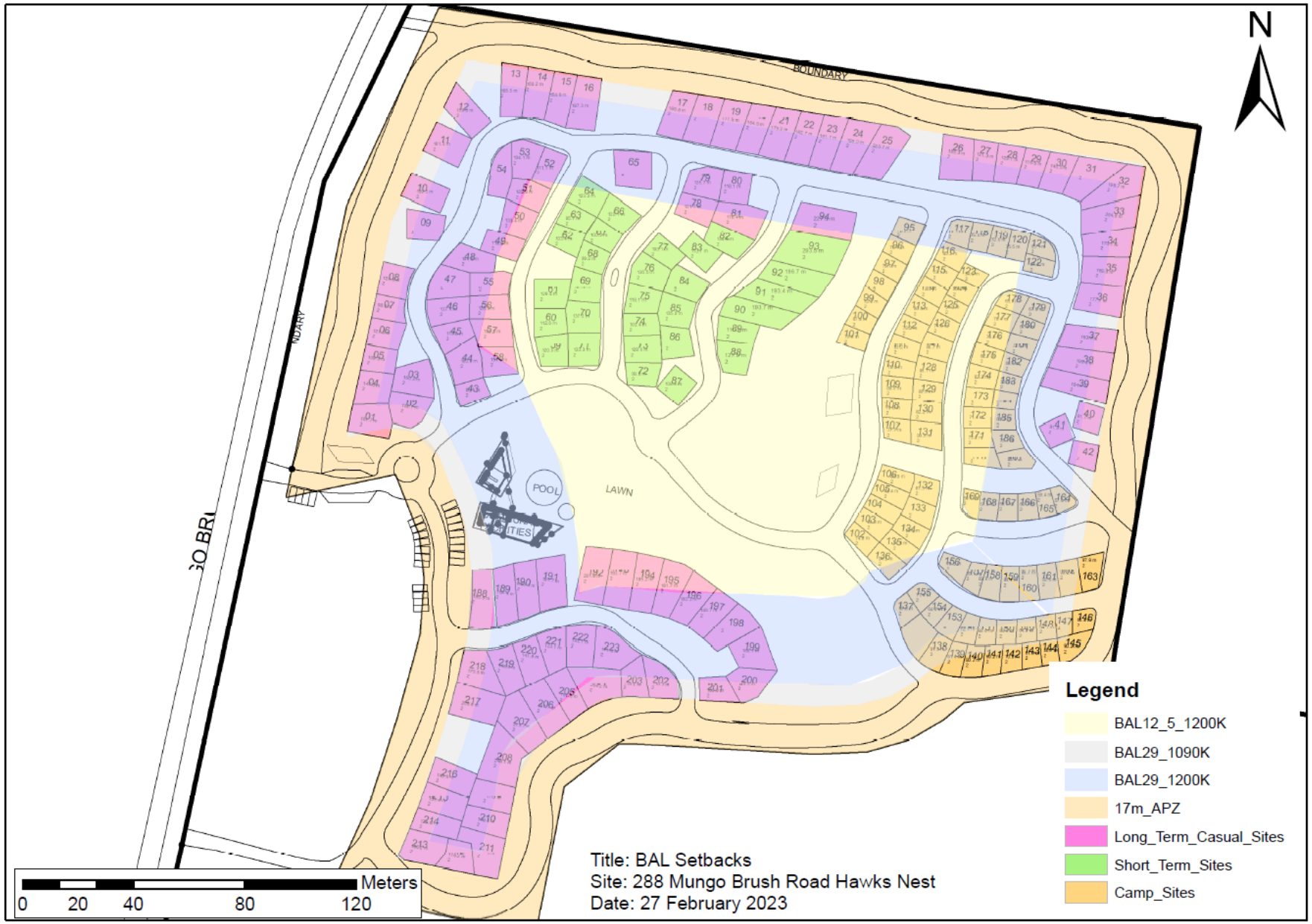
Duncan Scott-Lawson

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Accredited Bush fire Consultant

BPAD Accreditation #: 47789

ATTACHMENT 1 Layout plans



ATTACHMENT 2 Location of firefighting water supplies

ATTACHMENT 3 Spread sheet of sites

Site	Site Designation	BAL	Site	Site Designation	BAL	Site	Site Designation	BAL
1	Long Term Casual	29	33	Long Term Casual	29	65	Long Term Casual	12.5
2	Long Term Casual	29	34	Long Term Casual	29	66	Short Term	12.5
3	Short Term	29	35	Long Term Casual	29	67	Short Term	29 (1200K)
4	Long Term Casual	29	36	Long Term Casual	29	68	Short Term	12.5
5	Long Term Casual	29	37	Long Term Casual	29	69	Short Term	12.5
6	Long Term Casual	29	38	Long Term Casual	29	70	Short Term	12.5
7	Long Term Casual	29	39	Long Term Casual	29	71	Short Term	12.5
8	Long Term Casual	29	40	Long Term Casual	29	72	Short Term	12.5
9	Long Term Casual	29	41	Long Term Casual	29 (1200K)	73	Short Term	12.5
10	Long Term Casual	29	42	Long Term Casual	29	74	Short Term	12.5
11	Long Term Casual	29	43	Long Term Casual	29 (1200K)	75	Short Term	12.5
12	Long Term Casual	29	44	Long Term Casual	29 (1200K)	76	Short Term	12.5
13	Long Term Casual	29	45	Long Term Casual	29 (1200K)	77	Short Term	12.5
14	Long Term Casual	29	46	Long Term Casual	29 (1200K)	78	Long Term Casual	29 (1200K)
15	Long Term Casual	29	47	Long Term Casual	29 (1200K)	79	Long Term Casual	29 (1200K)
16	Long Term Casual	29	48	Long Term Casual	29 (1200K)	80	Long Term Casual	29 (1200K)
17	Long Term Casual	29	49	Long Term Casual	29 (1200K)	81	Long Term Casual	29 (1200K)
18	Long Term Casual	29	50	Long Term Casual	29 (1200K)	82	Short Term	12.5
19	Long Term Casual	29	51	Long Term Casual	29 (1200K)	83	Short Term	12.5
20	Long Term Casual	29	52	Long Term Casual	29 (1200K)	84	Short Term	12.5
21	Long Term Casual	29	53	Long Term Casual	29 (1200K)	85	Short Term	12.5
22	Long Term Casual	29	54	Long Term Casual	29 (1200K)	86	Short Term	12.5
23	Long Term Casual	29	55	Long Term Casual	29 (1200K)	87	Short Term	12.5
24	Long Term Casual	29	56	Long Term Casual	29 (1200K)	88	Short Term	12.5
25	Long Term Casual	29	57	Long Term Casual	29 (1200K)	89	Short Term	12.5
26	Long Term Casual	29	58	Long Term Casual	29 (1200K)	90	Short Term	12.5
27	Long Term Casual	29	59	Short Term	12.5	91	Short Term	12.5
28	Long Term Casual	29	60	Short Term	12.5	92	Short Term	12.5
29	Long Term Casual	29	61	Short Term	12.5	93	Short Term	12.5
30	Long Term Casual	29	62	Short Term	12.5	94	Long Term Casual	12.5
31	Long Term Casual	29	63	Short Term	12.5	95	Camp Site	n/a
32	Long Term Casual	29	64	Short Term	12.5	96	Camp Site	n/a

Site	Site Designation	BAL	Site	Site Designation	BAL	Site	Site Designation	BAL
97	Camp Site	n/a	129	Camp Site	n/a	161	Camp Site	n/a
98	Camp Site	n/a	130	Camp Site	n/a	162	Camp Site	n/a
99	Camp Site	n/a	131	Camp Site	n/a	163	Camp Site	n/a
100	Camp Site	n/a	132	Camp Site	n/a	164	Short Term	12.5
101	Camp Site	n/a	133	Camp Site	n/a	165	Short Term	12.5
102	Camp Site	n/a	134	Camp Site	n/a	166	Short Term	12.5
103	Camp Site	n/a	135	Camp Site	n/a	167	Short Term	12.5
104	Camp Site	n/a	136	Camp Site	n/a	168	Short Term	12.5
105	Camp Site	n/a	137	Camp Site	n/a	169	Short Term	12.5
106	Camp Site	n/a	138	Camp Site	n/a	170	Short Term	12.5
107	Camp Site	n/a	139	Camp Site	n/a	171	Short Term	12.5
108	Camp Site	n/a	140	Camp Site	n/a	172	Short Term	12.5
109	Camp Site	n/a	141	Camp Site	n/a	173	Short Term	12.5
110	Camp Site	n/a	142	Camp Site	n/a	174	Short Term	12.5
111	Camp Site	n/a	143	Camp Site	n/a	175	Short Term	12.5
112	Camp Site	n/a	144	Camp Site	n/a	176	Short Term	12.5
113	Camp Site	n/a	145	Camp Site	n/a	177	Short Term	12.5
114	Camp Site	n/a	146	Camp Site	n/a	178	Short Term	12.5
115	Camp Site	n/a	147	Camp Site	n/a	179	Short Term	12.5
116	Camp Site	n/a	148	Camp Site	n/a	180	Short Term	12.5
117	Camp Site	n/a	149	Camp Site	n/a	181	Short Term	12.5
118	Camp Site	n/a	150	Camp Site	n/a	182	Short Term	12.5
119	Camp Site	n/a	151	Camp Site	n/a	183	Short Term	12.5
120	Camp Site	n/a	152	Camp Site	n/a	184	Short Term	12.5
121	Camp Site	n/a	153	Camp Site	n/a	185	Short Term	12.5
122	Camp Site	n/a	154	Camp Site	n/a	186	Short Term	12.5
123	Camp Site	n/a	155	Camp Site	n/a	187	Short Term	12.5
124	Camp Site	n/a	156	Camp Site	n/a	188	Long Term Casual	29
125	Camp Site	n/a	157	Camp Site	n/a	189	Long Term Casual	29 (1200K)
126	Camp Site	n/a	158	Camp Site	n/a	190	Long Term Casual	29 (1200K)
127	Camp Site	n/a	159	Camp Site	n/a	191	Long Term Casual	29 (1200K)
128	Camp Site	n/a	160	Camp Site	n/a	192	Long Term Casual	29 (1200K)

Site	Site Designation	BAL
193	Long Term Casual	29 (1200K)
194	Long Term Casual	29 (1200K)
195	Long Term Casual	29 (1200K)
196	Long Term Casual	29 (1200K)
197	Long Term Casual	29 (1200K)
198	Long Term Casual	29 (1200K)
199	Long Term Casual	29 (1200K)
200	Long Term Casual	29
201	Long Term Casual	29
202	Long Term Casual	29
203	Long Term Casual	29
204	Long Term Casual	29
205	Long Term Casual	29
206	Long Term Casual	29
207	Long Term Casual	29
208	Long Term Casual	29
209	Long Term Casual	29
210	Long Term Casual	29
211	Long Term Casual	29
212	Long Term Casual	29
213	Long Term Casual	29
214	Long Term Casual	29
215	Long Term Casual	29
216	Long Term Casual	29
217	Long Term Casual	29
218	Long Term Casual	29
219	Short Term	29 (1200K)
220	Short Term	29 (1200K)
221	Short Term	29 (1200K)
222	Short Term	29 (1200K)
223	Short Term	29 (1200K)