Local Government Use

BUSHFIRE PRONE PLANNING

Bushfire Attack Level & Planning Report

Produced Applying AS 3959:2018 Bushfire Attack Level Determination Methodology

Lot 157 Furnissdale Road, Furnissdale

Shire of Murray

Report Date: **28 November 2025**

Job Reference No: **250923**

COMPANY AND BUSHFIRE CONSULTANT DETAILS

BPP GROUP PTY LTD

T/A BUSHFIRE PRONE PLANNING
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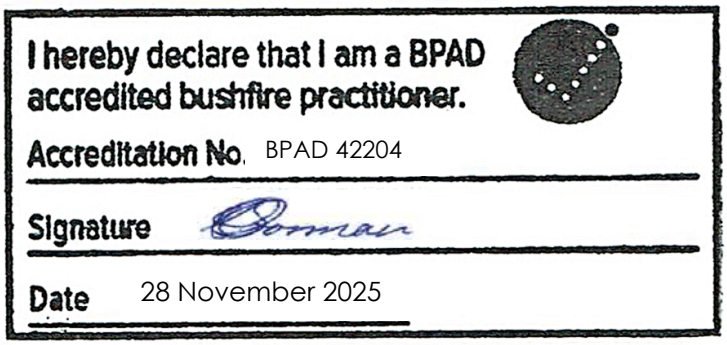
08 6477 1144 | admin@bushfireprone.com.au



Authorised Practitioner Stamp

Author:	Sarina Gorman (BPAD Level 2 No. 42204)

ASSESSMENT AND REPORT DETAILS

Version	Details	Site Assessment Date	Report Date
1.0	Original	27 November 2025	28 November 2025
-	-		

Report Preparation: *This report has been prepared by an accredited BPAD practitioner using the simplified BAL determination procedure (Method 1) as detailed in section 2 of AS 3959:2018.*

Warranty of the Accrediting Body: *FPA Australia makes no warranties as to the accuracy of the information provided in the report. All enquiries related to the information and conclusions presented in this report must be made to the BPAD Accredited Practitioner.*

Period of Validity: *Reliance on the assessment and determination of the Bushfire Attack Level contained in this report should not extend beyond a period of 12 months from the date of issue of the report. If this report was issued more than 12 months ago, it is recommended that the validity of the determination be confirmed with the accredited practitioner and where required an updated report and/or BAL certificate issued.*

Limitations: *The protection measures that will be implemented based on information presented in this report are minimum requirements and they do not guarantee that buildings or infrastructure will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating.*

This is substantially due to the unpredictable nature and behaviour of fire and fire weather conditions. Additionally, the correct implementation of the required protection measures (including bushfire resistant construction) and any other required or recommended measures, will depend upon, among other things, the ongoing actions of the landowners and/or operators over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the proposed development or use are made in good faith based on information available to Bushfire Prone Planning at the time. All maps included herein are indicative in nature and are not to be used for accurate calculations.

Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences whether or not due to the negligence of their consultants, their servants or agents, arising out of the services provided by their consultants.

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1 SUMMARY OUTCOME

The Bushfire Attack Level (BAL)Contour Map is a scaled map of the Proposed Showrooms, Storage Facility and Motor Vehicle Repair located at Lot 157 Furnissdale Road, Furnissdale, in the Shire of Murray. It uses the principles of AS 3959 to illustrate the potential radiant heat impacts and associated indicative BAL ratings in reference to any classified vegetation remaining within 150m metres of the subject site.

2 PROPERTY DETAILS AND DESCRIPTION OF BUILDING WORKS OR USE

PROPERTY DETAILS	
Address Details	Lot 157 Furnissdale Road, Furnissdale
Applicable Local Government	Shire of Murray
Total Area of Subject Lot	1.82 hectares
REPORT PURPOSE	
This report is to accompany a Development Application to be submitted to Local Government.	
DESCRIPTION OF THE RELEVANT BUILDING(S) AND/OR PROPOSED WORKS AND/OR USE	
EXPLANATORY INFORMATION Note: A habitable building is defined in the *Planning and Development (LPS) Regulations 2015* to mean: A permanent or temporary structure on land that: (a) Is fully or partially enclosed; and (b) Has at least one wall of solid material and a roof of solid material; and (c) Is used for a purpose that involves the use of the interior of the structure by people for living, working, studying or being entertained.	
Existing Habitable Building(s)	N/A
Change of Use:	N/A
Primary Construction Works	Construction of a habitable building other than a single house or ancillary dwelling
Associated Construction Works	N/A
BCA Classification(s)	Class 7b (warehouse/storage/wholesale)
Additional Description Details:	
This BAL Contour Report has been prepared to accompany a Development Application for the construction of Showrooms, Storage Facility and Motor Vehicle Repair, located at Lot 157 Furnissdale Road, Furnissdale.	
Is a Bushfire Management Plan required?	Yes ☐ / No ☑
Assessment Supporting Details: Part 10A of the *Planning and Development (Local Planning Schemes) Regulations 2015*, specify that where a proposal, is within the gazetted Bushfire Prone Area and includes a habitable building, that a planning approval is only required under Part 10A when a BAL contour identifies the site as BAL40 or above. The proposal is exposed to BAL below BAL29 and therefore does not trigger an application for planning under Part 10A. Notwithstanding this, BPP accepts that there are other planning provisions that trigger the requirement for a planning application in this instance.	

In regard to the level of bushfire documentation required to support the planning application, the new Guidelines (2024) state that where a "*a development application for the construction of, or addition to a habitable building for commercial or industrial uses in an area subject to pre-development radiant heat impact exceeding 29kW/m2 and designated as Area 1 or 2, should address the requirements within this section [i.e. Part 7 – Development – Commercial and Industrial]*".

As the BAL Contour in Figure 3 demonstrates, this proposal is not subject to a pre-development radiant heat impact exceeding 29kW/m^2 and therefore a Bushfire Management Plan is not required to address the SPP3.7 / Guidelines.

A102 4

1

PINJARRA ROAD

ROAD WIDENING

2.5m DUP

Covered Walkway

Auto Shop
373 m²

Showroom 1
460 m²

Showroom 2
471 m²

Showroom 3
537 m²

Showroom
136 m²

ENTRY

Showroom 4
827 m²

ATU, Leach Drains & Landscaping

BIN STORE

SHARED DRIVEWAY

Self-Storage Facility
1784 m²

Self-Storage Facility
2868 m²

Showroom 5
333 m²

Showroom 6
347 m²

ATU

Leach Drains & Landscaping

Gas

2.0m ROAD DUP

2.0m WIDENING DUP

FURNISSDALE ROAD

2100mm Security Fence

Colorbond Fence

EXIT

R/DOOR

New Lot Area:	18,208.50 sq.m
GFA:	8,158.11 sq.m
Road Widening(sq.m) (Includes DUP)	1,611.31sq.m (8.8%)
Landscaping(m²)	1,088.59 sq.m/ 6%

ParsonsGroup

MW URBAN planning and development

Proposed Showrooms, Storage & Motor Vehicle Repair

LOT 151 PINJARRA ROAD FURNISSDALE

Site & Floor Plan

NO.	REVISION	DATE
1	DA Draft Plan	19/11/2025
2		
3		

DRAWN BY: PMG

A101

SCALE 1:600

A3 SIZE

North

3

2 A102

3 INFORMATION FOR LOCAL GOVERNMENT BUILDING SERVICES (& THE LANDOWNER)

BUSHFIRE ATTACK LEVELS (BAL) - UNDERSTANDING THE RESULTS

The potential transfer (flux/flow) of radiant heat from the bushfire to a receiving object is measured in kW/m^2. The AS 3959:2018 BAL determination methodology establishes the ranges of radiant heat flux that correspond to each bushfire attack level. These are identified as BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ.

The bushfire performance requirements for certain classes of buildings are established by the Building Code of Australia (Vol. 1 & 2 of the NCC). The BAL will establish the bushfire resistant construction requirements that are to apply in accordance with AS 3959:2018 - Construction *of buildings in bushfire prone areas* and the NASH Standard – *Steel framed construction in bushfire areas (NS 300 2021),* whose solutions are deemed to satisfy the NCC bushfire performance requirements.

DETERMINED BAL RATINGS

A BAL Certificate can be issued for a determined BAL. A BAL can only be classed as 'determined' for an existing or future building/structure when:

1. It's final design and position on the lot are known and the stated separation distance from classified bushfire prone vegetation exists and can justifiably be expected to remain in perpetuity; or

2. It will always remain subject to the same BAL regardless of its design or position on the lot after accounting for any regulatory or enforceable building setbacks from lot boundaries as relevant and necessary (e.g., R-codes, restrictive covenants, defined building envelopes) or the retention of any existing classified vegetation either onsite or offsite.

INDICATIVE BAL RATINGS

A BAL Certificate cannot be issued for an indicative BAL. A BAL will be classed as 'indicative' for an existing or future building/structure when the required conditions to derive a determined BAL are not met.

This class of BAL rating indicates what BAL(s) could be achieved and the conditions that need to be met are stated.

Converting the indicative BAL into a determined BAL is conditional upon the currently unconfirmed variable(s) being confirmed by a subsequent assessment and evidential documentation. These variables will include the future building(s) location(s) being established (or changed) and/or classified vegetation being modified or removed to establish the necessary vegetation separation distance. This may also be dependent on receiving approval from the relevant authority for that modification/removal.

3.1 BAL Assessment Summary (Contour Map Format)

INTERPRETATION OF THE BAL CONTOUR MAP

The BAL contour map is a diagrammatic representation of the results of the bushfire attack level assessment.

The map presents different coloured contours extending out from the areas of classified vegetation. Each contour represents a set range of radiant heat flux that potentially will transfer to an exposed element (building, person or other defined element), when it is located within that contour.

Each of the set ranges of radiant heat flux corresponds to a different BAL rating as defined by the AS 3959:2018 BAL determination methodology.

The width of each shaded BAL contour will vary dependant on both the BAL rating and the relevant parameters (calculation inputs) for the subject site. Their width represents the minimum and maximum vegetation separation distances that correspond to each BAL rating (refer to the relevant table below for these distances).

The areas of classified vegetation to be considered in developing the BAL contours, are those that will remain at the intended end state of the subject development once earthworks, clearing and/or landscaping and re-vegetation have been completed. Variations to this statement that may apply include:

- Both pre and post development BAL contour maps are produced; and/or
- Each stage of a development is assessed independently.

3.1.1 BAL Determination Method(s) Applied and the Location of Data and Results

Procedure Method (AS 3959:2018)	Applied to the BAL Assessment	Location of the Site Assessment Data			Location of the Results
		Site Assessment Map	Calculation Input Variables		Assessed Bushfire Attack Levels and/or Radiant Heat Levels
			Summary Data	Detailed Data with Explanatory and Supporting Information	
Method 1 (Simplified)	Yes	Figure 2	Table 1	Appendix A1	Section 3.1.2 BAL Contour Map
Method 2 (Detailed)	No	N/A	N/A	N/A	N/A

3.1.2 BAL Ratings Derived from the Contour Map

Indicative and determined BAL(s) for existing and/or proposed building works.

BUSHFIRE ATTACK LEVEL FOR EXISTING/PLANNED BUILDINGS/STRUCTURE [1]		
Building/Structure Description	Indicative BAL [2]	Determined BAL [2]
Storage Facility 1	BAL-12.5	N/A
Storage Facility 2	BAL-12.5	N/A
Show Rooms 1-3 & Auto Shop	BAL-12.5	N/A
Showrooms 4-6	BAL-19	N/A

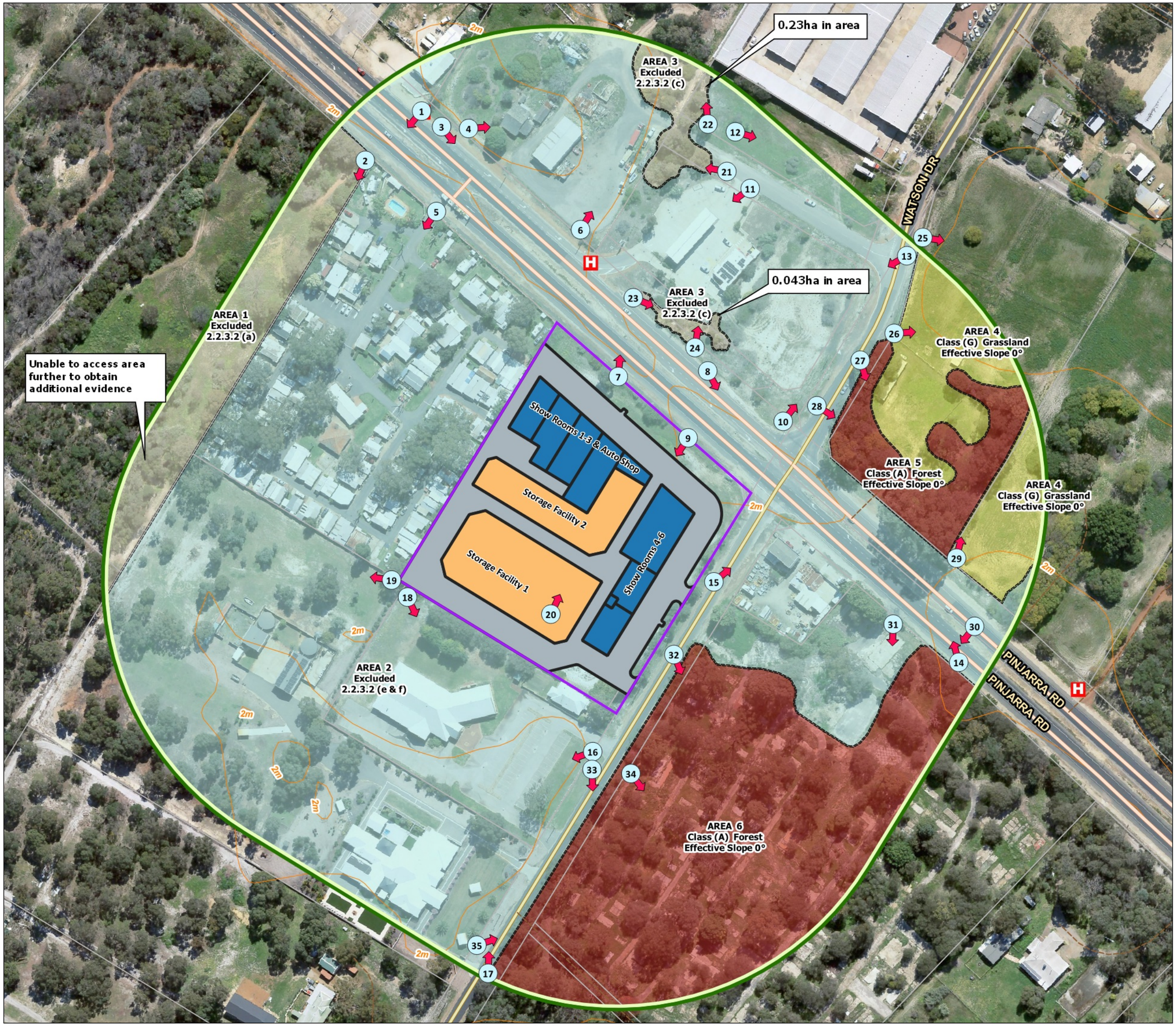
[1] The assessment data used to derive the BAL ratings is sourced from Table 1 and Figure 2.

[2] Refer to the start of Section 3 for an explanation of indicative versus determined BAL ratings.

Figure 2

Classified Vegetation & Topography Map

Lot 157 on Plan / Diagram: D040912
Furnissdale Road,
Furnissdale
Shire of Murray



------ LEGEND ------

- Photo and Direction
- Hydrants
- Elevation (m)
- Cadastral
- Subject Site

Proposal
- Storage Facility
- Show Rooms/Auto Shop
- Hardstand/Parking

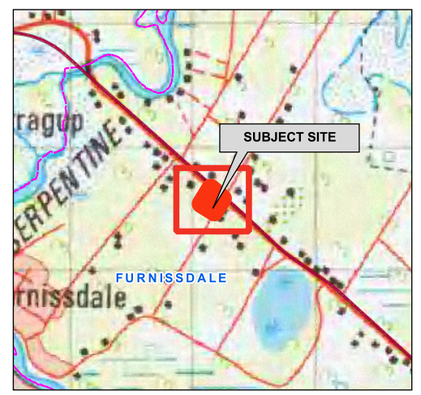
Assessment Area
- 150m Assessment Area

Classified Vegetation
- Forest
- Grassland
- Excluded 2,2,3,2 (a),(b),(c) and (d)
- Excluded 2,2,3,2 (f)

0 20 40 60 80 100

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 28-11-2025
SCALE (A3): 1 : 1800

BUSHFIRE PRONE PLANNING

250923_VegTop_Lot 157 Furnissdale Road Furnissdale (BAL Cont).qgz

Figure 3

BAL Contour Map

Lot 157 on Plan / Diagram: D040912
Furnissdale Road,
Furnissdale
Shire of Murray

------ **LEGEND** ------

- Hydrants
- Cadastral
- Subject Site

Proposal

- Storage Facility
- Show Rooms/Auto Shop
- Hardstand/Parking

Assessment Area

- 100m Assessment Area
- 150m Assessment Area

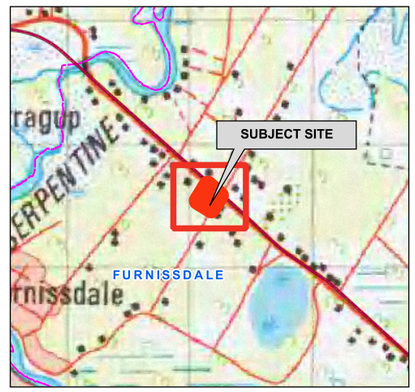
Bushfire Attack Levels

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

0 20 40 60 80 100

Metres

------ **LOCALITY** ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 28-11-2025
SCALE (A3): 1 : 1800

BUSHFIRE PRONE PLANNING

3.1.5 Site Assessment Data Applied to Construction of the BAL Contour Map(s)

RELEVANT CLASSIFIED VEGETATION	
Identification of Classified Vegetation that is Relevant to the Production of the BAL Contour Map(s)	Relevant Map
All identified areas of classified vegetation that exist at the time of the site assessment – both within the subject site (onsite) and external to the subject site (offsite) will be the relevant vegetation.	Figure 2
The areas of classified vegetation that will remain at the intended end state of the subject development once earthworks, any clearing and/or landscaping and re-vegetation have been completed, will be the relevant vegetation for the post-development BAL contour map.	Figure 3
Supporting Assessment Details: Non required	

Table 1: Calculation inputs applied to deriving the vegetation separation distances corresponding to different levels of potential radiant heat transfer.

DATA APPLIED TO CALCULATE THE SITE SPECIFIC VEGETATION SEPARATION DISTANCES CORRESPONDING TO POTENTIAL RADIANT HEAT TRANSFER LEVELS [1]												
Applied BAL Determination Method		METHOD 1 - SIMPLIFIED PROCEDURE (AS 3959:2018 CLAUSE 2.2)										
The Calculation Input Variables - Corresponding to the Applied BAL Determination Method [2]												
Methods 1 and 2		Method 1		Method 2								
Vegetation Classification		FDI	Effective Slope		Site Slope	FFDI or GFDI	Flame Temp.	Elevation of Receiver	Flame Width	Fireline Intensity	Flame Length	Modified View Factor
			Applied Range	Measured								
Area	Class		degree range	degrees	degrees		K	metres	metres	kW/m	metres	% Reduction
1	Excluded cl 2.2.3.2(a)	N/A	N/A	N/A								
2	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A								
3	Excluded cl 2.2.3.2(c)	N/A	N/A	N/A								
4	(G) Grassland	80	Upslope or flat 0	flat 0								
5	(A) Forest	80	Upslope or flat 0	flat 0								
6	(A) Forest	80	Upslope or flat 0	flat 0								

Note 1: The values used to indicate levels of potential radiant heat transfer (from fire in bushfire prone vegetation to exposed elements at risk), will be stated in subsequent tables as either as a bushfire attack level (BAL) and/or as kilowatts per square metre (kW/m2), as relevant to the application of the value and the type and use of the element at risk.

Note 2: All data and information supporting the determination of the classifications and values stated in this table is presented in Appendix A. Where the values are stated as 'default' these are either the values stated in AS 3959:2018, Table B1 or the values calculated as intermediate or final outputs through application of the equations of the AS 3959:2018 BAL determination methodology. They are not values derived by the assessor.

Table 2: Vegetation separation distances corresponding to the stated levels of potential radiant heat transfer.

THE CALCULATED (SITE SPECIFIC) VEGETATION SEPARATION DISTANCES CORRESPONDING TO THE STATED LEVEL OF POTENTIAL RADIANT HEAT TRANSFER (METRES) [1]									
Vegetation Classification		Maximum Radiant Heat Transfer (Flux)							
		>40 kW/m^2	40 kW/m^2	29 kW/m^2	19 kW/m^2	12.5 kW/m^2	N/A [2]	10 kW/m^2	2 kW/m^2
		Bushfire Attack Levels							
Area	Class	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW		
1	Excluded cl 2.2.3.2(a)	N/A	N/A	N/A	N/A	N/A	N/A		
2	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A	N/A	N/A	N/A		
3	Excluded cl 2.2.3.2(c)	N/A	N/A	N/A	N/A	N/A	N/A		
4	(G) Grassland	<6	6-<8	8-<12	12-<17	17-<50	>50		
5	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100		
6	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100		

Note 1: The calculated results are illustrated in Figure 3 as a BAL Contour Map and/or additional defining lines as necessary. All applied calculation input variables are presented in Table 1.

Note 2: The BAL-LOW rating does not represent a maximum level of radiant heat transfer. The rating is applied when the separation distance is at least 100m from all classified vegetation except Grassland, for which 50m applies.

APPENDIX A: BAL ASSESSMENT DATA (DETAILED) AND SUPPORTING INFORMATION

A1: Assessed Site Inputs Common to the Method 1 and Method 2 Procedures

A1.1: FIRE DANGER INDICES (FDI/ FDI/GFDI)

When using Method 1 the relevant FDI value required to be applied for each state and region is established by AS 3959:2018, Table 2.1. Each FDI value applied in Tables 2.4 – 2.7 represents both the Forest Fire Danger Index (FFDI) and a deemed equivalent for the Grassland Fire Danger Index (GFDI), as per Table B2 in Appendix B. When using Method 2, the relevant FFDI and GFDI are applied.

The values may be able to be refined within a jurisdiction, where sufficient climatological data is available and in consultation with the relevant authority.

Relevant Jurisdiction:	WA	Region:	Whole State	Method 1	Applied FDI:	80
				Method 2	Applied FFDI:	N/A
					Applied GFDI:	N/A

A1.2: VEGETATION ASSESSMENT AND CLASSIFICATION

Vegetation Types and Classification

In accordance with AS 3959:2018 clauses 2.2.3 and C2.2.3.1, all vegetation types within 100 metres of the 'site' (defined as "the part of the allotment of land on which a building stands or is to be erected"), are identified and classified. Any vegetation more than 100 metres from the site that has influenced the classification of vegetation within 100 metres of the site, is identified and noted. The maximum excess distance is established by AS 3959: 2018 cl 2.2.3.2 and is an additional 100 metres.

Classification is also guided by the Visual Guide for Bushfire Risk Assessment in WA (WA Department of Planning February 2016) and any relevant FPA Australia practice notes.

Modified Vegetation

The vegetation types have been assessed as they will be in their natural mature states, rather than what might be observed on the day. Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its expected re-generated mature state. Modified areas of vegetation can be excluded from classification if they consist of low threat vegetation (refer to Appendix B) and that any required active management can be expected to continue in perpetuity, and this can be adequately justified.

The Influence of Ground Slope

Where significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

THE INFLUENCE OF VEGETATION GREATER THAN 100 METRES FROM THE SUBJECT SITE	
Vegetation area(s) within 100m of the site whose classification has been influenced by the existence of bushfire prone vegetation from 100m – 200m from the site:	None
Assessment Statement:	No vegetation types exist close enough, or to a sufficient extent, within the relevant area to influence classification of vegetation within 100 metres of the subject site.

VEGETATION AREA 1						
Classification	**N/A**					
Types Identified	Open forest A-03		Open scrub D-14			
Exclusion Clause	2.2.3.2 (a) >100m from site					
Effective Slope	Measured	N/A	Applied Range (Method 1)	N/A		
Foliage Cover (all layers)	N/A	Shrub/Heath Height	N/A	Tree Height	N/A	
Description/Justification:	Area 1 has been excluded under clause 2.2.3.2 (a) of AS3959-2018 as identified vegetation is located more than 100 metres from the development site.					
Post Development Assumptions:	Not Applicable.					

PHOTO ID: 1

PHOTO ID: 2

<table>
<tr><th colspan="8">VEGETATION AREA 2</th></tr>
<tr><td>Classification</td><td colspan="7">N/A</td></tr>
<tr><td>Types Identified</td><td colspan="7">N/A</td></tr>
<tr><td>Exclusion Clause</td><td colspan="7">2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - minimal fuel condition.</td></tr>
<tr><td>Effective Slope</td><td>Measured</td><td colspan="2">N/A</td><td>Applied Range (Method 1)</td><td colspan="3">N/A</td></tr>
<tr><td colspan="2">Foliage Cover (all layers)</td><td>N/A</td><td>Shrub/Heath Height</td><td>N/A</td><td>Tree Height</td><td colspan="2">N/A</td></tr>
<tr><td colspan="2">Description/Justification:</td><td colspan="6">Managed private properties and associated gardens, street frontages and median strips/road verges. Grasses slashed and maintained to less than 50mm in accordance with the Shire of Murray Bushfire Compliance Notice. Footpaths/hardstand areas cleared of unmanaged vegetation.

Note – Some sparse grasses / other vegetation present. This will not support a running fire.</td></tr>
<tr><td colspan="2">Post Development Assumptions:</td><td colspan="6">Not Applicable.</td></tr>
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VEGETATION AREA 2						
Classification	**N/A**					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - minimal fuel condition.					
Effective Slope	Measured	N/A	Applied Range (Method 1)	N/A		
Foliage Cover (all layers)	N/A	Shrub/Heath Height	N/A	Tree Height	N/A	
Description/Justification:	As above.					
Post Development Assumptions:	As above.					

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VEGETATION AREA 2						
Classification	**N/A**					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - minimal fuel condition.					
Effective Slope	Measured	N/A	Applied Range (Method 1)	N/A		
Foliage Cover (all layers)	N/A	Shrub/Heath Height	N/A	Tree Height	N/A	
Description/Justification:	As above.					
Post Development Assumptions:	As above.					

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VEGETATION AREA 2						
Classification	**N/A**					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - minimal fuel condition.					
Effective Slope	Measured	N/A	Applied Range (Method 1)	N/A		
Foliage Cover (all layers)	N/A	Shrub/Heath Height	N/A	Tree Height	N/A	
Description/Justification:	As above.					
Post Development Assumptions:	As above.					

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VEGETATION AREA 3						
Classification	**N/A**					
Types Identified	Open forest A-03		Open scrub D-14			
Exclusion Clause	2.2.3.2 (a) >100m from site					
Effective Slope	Measured	N/A	Applied Range (Method 1)	N/A		
Foliage Cover (all layers)	N/A	Shrub/Heath Height	N/A	Tree Height	N/A	
Description/Justification:	Area 3 has been excluded under clause 2.2.3.2 (c) of AS3959-2018 as identified vegetation is less than 0.25ha in area and not located within 20 metres of the development site or other areas of vegetation being classified.					
Post Development Assumptions:	Not Applicable.					

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VEGETATION AREA 4				
Classification	**G. GRASSLAND**			
Types Identified	Dense sown pasture G-25		Sown pasture G-26	
Exclusion Clause	N/A			
Effective Slope	Measured	flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees
Description/Justification:	Assessed as Grassland due to areas of grasses present in paddock/open areas. Whilst it is recognised that some sections appear to be managed in accordance with the Shire of Murray Bushfire Compliance Notice, there are other sections that do appear unmanaged. And as the area is not under the control of the proponent, the area has been classified in accordance with AS3959-2018 as a precautionary measure. Foliage cover less than 10%.			
Post Development Assumptions:	Not Applicable			

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VEGETATION AREA 5						
Classification	**A. FOREST**					
Types Identified	Open forest A-03		Woodland B-05			
Exclusion Clause	N/A					
Effective Slope	Measured	flat 0 degrees		Applied Range (Method 1)	Upslope or flat 0 degrees	
Foliage Cover (all layers)	30-70%	Shrub/Heath Height	>2m	Tree Height	Up to 30m	
Description/Justification:	Forest Dominated Area - Mixed composition inclusive of Eucalypts. Understorey consists of unmanaged grasses, low shrub and low trees. Other sections have minimal understorey. Occasional open areas between canopies. Note – As with Area 4 above - It is recognised that some sections do appear to be managed in accordance with the Shire of Murray Bushfire Compliance Notice. However, there are other sections that do appear unmanaged. And as the area is not under the control of the proponent, the area has been classified in accordance with AS3959-2018 as a precautionary measure.					
Post Development Assumptions:	Not Applicable.					

PHOTO ID: 27

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PHOTO ID: 29

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<tr><th colspan="8">VEGETATION AREA 6</th></tr>
<tr><td>Classification</td><td colspan="7">A. FOREST</td></tr>
<tr><td>Types Identified</td><td colspan="7">Open forest A-03 Woodland B-05</td></tr>
<tr><td>Exclusion Clause</td><td colspan="7">N/A</td></tr>
<tr><td>Effective Slope</td><td>Measured</td><td colspan="2">flat 0 degrees</td><td>Applied Range (Method 1)</td><td colspan="3">Upslope or flat 0 degrees</td></tr>
<tr><td>Foliage Cover (all layers)</td><td colspan="2">30-70%</td><td>Shrub/Heath Height</td><td colspan="2">>2m</td><td>Tree Height</td><td>Up to 30m</td></tr>
<tr><td>Description/Justification:</td><td colspan="7">Forest Dominated Area - Mixed composition inclusive of Eucalypts. Understorey consists of unmanaged grasses, low shrub and low trees. Other sections have minimal understorey. Occasional open areas between canopies.</td></tr>
<tr><td>Post Development Assumptions:</td><td colspan="7">Not Applicable.</td></tr>
<tr><td colspan="4"> 
</td><td colspan="4"> 
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<tr><td colspan="4">PHOTO ID: 30</td><td colspan="4">PHOTO ID: 31</td></tr>
<tr><td colspan="4"> 
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<tr><td colspan="4">PHOTO ID: 32</td><td colspan="4">PHOTO ID: 33</td></tr>
</table>

VEGETATION AREA 6						
Classification	**A. FOREST**					
Types Identified	Open forest A-03		Woodland B-05			
Exclusion Clause	N/A					
Effective Slope	Measured	flat 0 degrees		Applied Range (Method 1)	Upslope or flat 0 degrees	
Foliage Cover (all layers)	30-70%	Shrub/Heath Height	>2m	Tree Height	Up to 30m	
Description/Justification:	As above.					
Post Development Assumptions:	As above.					

PHOTO ID: 34

PHOTO ID: 35

A1.3: EFFECTIVE SLOPE

EXPLAINING THE ASSESSMENT METHODOLOGY APPLIED BY BUSHFIRE PRONE PLANNING

DEFINITION: Effective slope is "the slope under that classified vegetation which most influences the bushfire attack" (AS 3959:2018, Clause 1.5.11).

"The effective slope under the classified vegetation is not the same as the average slope for the land surrounding the site of the proposed building. The effective slope is that slope which most significantly influences bushfire behaviour" (AS 3959:2018, Clause CB4).

The slope is described as upslope, flat or downslope when viewed from an exposed element (e.g., building) and looking towards the vegetation. It is measured in degrees.

[Note: Additional relevant guidance provided by AS 3959:2018 and NSW RFS, Planning for Bushfire Protection (2019) is incorporated into the applied assessment methodology and is presented at the end of this explanation.]

COMPOUND SLOPES UNDER VEGETATION AND DETERMINING SLOPE SIGNIFICANCE

Non-Linear Slopes: When the slope of ground under the vegetation out to the distance to be assessed (100 m or further if necessary), is not a straight line or nearly straight line slope, then it is made up of several different slopes i.e., it is a compound slope. The different slope angles and lengths must be factored into the determination of the effective slope value to be applied. Different slopes will potentially influence the bushfire rate of spread and intensity, both increasing and decreasing it.

Significant Slope: The AS 3959:2018 bushfire attack level determination methodology, with default inputs, models a fully developed bushfire. Therefore, a 'significant' slope is one that will significantly influence bushfire behaviour. To be 'significant' the length of the slope must be 'sufficient' to support a fully developed fire on that slope. The angle of a significant slope could be the determined effective slope for the area of classified vegetation if it is the one that 'most influences the bushfire attack'.

Sufficient Slope Length: Is a slope that will, as a minimum, allow the entire flame depth (flaming zone) of a fully developed fire (100m flame width) to exist on that slope.

The expected flame depth of a fully developed bushfire is a function of the length of time the flaming phase will exist on a section of the fuel bed (the 'residence time') and the bushfire's 'rate of spread'. For a given rate of spread, longer residence times result in greater flame depths. Greater flame depths are correlated with greater flame temperatures and greater flows of radiant heat.

The primary factors that will increase the residence time are:

- Heavier fine fuel loads of grass, leaf litter, twigs, bark etc less than 6mm in width and existing within the surface and near surface layers (and elevated fuel layers when contiguous with the base layers); and
- A greater percentage of larger fine fuels within the fuel load.

The primary factors that increase the rate of spread (apart from fire weather factors), include finer fuels, drier fuels, horizonal continuity of fuel and steeper upward ground slope in the direction of fire travel.

Example values:

- Residence Time: Grassfire 5 – 15 seconds, Forest fire 25 -50 seconds.
- Rate of Spread: Grassfires of a few km/hr are considered fast moving, 5-10 km/hr is common and fastest in the order of 25km/hr. Forest fire typically recorded in metres/hour with 1-1.5 km/hr being considered fast moving and fastest in the order of 3–4 km/hr.
- Flame Depth: More typically, a few metres for grasses to tens of metres for forest fires.

An Isolated Slope: For scenarios where there is a single significant slope (based on the above criteria) additional consideration would need to be given to the time and distance consumed by a bushfire still in its 'developing' phase. This will require due consideration be given to how it is potentially ignited i.e., from a single or multiple points, as this will influence the time and distance required to fully develop. For such scenarios, a normally significant slope may not be sufficiently long. It may be necessary to determine the potential bushfire impact more accurately by

justifying the application of a lesser effective slope, or a lower threat vegetation classification, or calculating a reduced head fire width (using short fire run modelling).

Determined Effective Slope: Only a 'significant' slope can potentially be the effective slope by itself. In which case, for a defined area of classified vegetation area, the worst significant slope under that vegetation is to apply.

The table below presents Bushfire Prone Planning's considerations applied to assessing short and/or compound slopes in determining the effective slope.

Slope Length (m)	Considered a Significant Slope	Considerations in Determining the Effective Slope
< 5	No	Where these short slopes exist as part of a compound slope under an area of classified vegetation, they can be ignored as they will not influence the fire behaviour in that vegetation.
5-20	No	These slopes will have a range of influence on fire behaviour from very little to a degree of influence that must be accounted for to some extent by the determined effective slope that is applied (i.e., with a greater length apply to a greater extent). But the actual slope of these shorter slopes is likely not to be applied as it is not a 'significant' length.
20-30	Maybe	The same considerations applied to the 5-20m slope lengths should be applied here. However, more justification would need to be presented to support their assessment as not being 'significant' slopes. For these slope lengths, consideration must be given more broadly to the potential level of risks associated with a bushfire event in this location. The risk level will be a function of the bushfire hazard threat levels (direct attack mechanisms) within the immediate and broader assessment area as influenced by local topography, vegetation extents and types and the exposure and vulnerability of persons and/or buildings/structures to these threats. Higer risk levels require greater precaution meaning these slopes should be considered 'significant', and vice versa. Consider the potential for a bushfire on adjoining or nearby land be a source of ignition and/or pre-heating to vegetation on the subject slope. Consider if vegetation on the slope is likely be ignited by a single ignition point or is multipoint ignition possible from bushfire an adjoining slopes or the surrounding area. Single point ignition will require a fire to travel further before being fully developed (DFES considers less than 100m fire runs may be considered a short fire run for forest, woodland and scrub vegetation classifications, RFS NSW applies 150m). Isolated slopes of this length are less likely to be considered significant as compared to when part of a compound slope.
>30	Yes	Likely to always be a significant slope unless isolated (i.e., exists alone) – in which case, justifying the application of a lesser effective slope, or a lower threat vegetation classification, or calculating a reduced head fire width, are approaches that may need to be applied.

BPP Approach - Slope Variation Within Areas of Vegetation

When multiple 'significant' slope lengths with large differences in degrees of effective slope (or different applicable slope ranges when AS 3959:2018 Method 1 is applied), exists under a single vegetation classification, these will be delineated as separate vegetation areas of classified vegetation to account for the difference in potential bushfire behaviour and impact, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

Effective Slope Variation Due to Multiple Development Sites

When the effective slope, under a single area of bushfire prone vegetation, will vary significantly relative to multiple proposed development sites (exposed elements), then the effective slopes corresponding to each of the different

locations, are separately identified. The relevant (worst case) effective slope is determined in the direction corresponding to the potential directions of fire spread towards the subject building(s).

AS 3959:2018 EFFECTIVE SLOPE DETERMINATION - GUIDANCE

The Standard presents a broad set of guidance statements that indicate the intent of deriving an effective slope value for use in calculations, rather than detailing the 'in the field' determination process. These include:

- Highlighting the importance of the value by stating "The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the severity of the fire and the ultimate level of radiant heat flux" (Clause C2.2.5). [Note: A common rule of thumb is that for every 10 degrees of upslope, a fire will double its rate of spread if moving in the direction of the prevailing wind].
- It may be necessary to consider the slope under the classified vegetation for distances greater than 100 m in order to determine the effective slope for that vegetation classification.
- "Where there is more than one slope within the classified vegetation, each slope shall be individually assessed, and the worst case Bushfire Attack Level shall apply" (Clause 2.2.5).

NSW RFS 2019, PLANNING FOR BUSHFIRE PROTECTION - APPENDIX A1.5 - ADDITIONAL DETERMINATION GUIDANCE

- "In identifying the effective slope - it may be found that there are a variety of slopes covering different distances within the vegetation. The effective slope is considered to be the slope under the vegetation which will most significantly influence the bushfire behaviour for each aspect. This is usually the steepest slope. In situations where this is not the case, the proposed approach must be justified".
- "Vegetation located closest to an asset may not necessarily be located on the effective slope".

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

The effective slopes determined from the site assessment are recorded in Table 1 of this Bushfire Management Plan.

When their derivation requires additional explanation and justification, this is provided below.

A1.4: SEPARATION DISTANCE

Measuring

The separation distance is the distance in the horizontal plane between the receiver (building/structure or area of land being considered) and the edge of the classified vegetation (AS 3959:2018, clause 2.2.4)

The relevant parts of a building/structure from which the measurement is taken is the nearest part of an external wall or where a wall does not exist, the supporting posts or columns. Certain parts of buildings are excluded including eaves and roof overhangs.

The edge of the vegetation, for forests and woodlands, will be determined by the unmanaged understorey rather than either the canopy (drip line) or the trunk (AS 3959:2018, clause C2.2.5).

Measured Separation Distance as a Calculation Input

If a separation distance can be measured because the location of the building/structure relative to the edge of the relevant classified vegetation is known, this figure can be entered into the BAL calculation. The result is a determined BAL rating.

Assumed Separation Distance as a Calculation Input

When the building/structure location within the lot is not known, an assumed building location may be applied that would establish the closest positioning of the building/structure relative to the relevant area of vegetation.

The assumed location would be based on a factor that puts a restriction on a building location such as:

- An established setback from the boundary of a lot, such as a residential design code setback or a restrictive covenant; or
- Within an established building envelope.

The resultant BAL rating would be indicative and require later confirmation (via a Compliance Report) of the building/structure actual location relative to the vegetation to establish the determined BAL rating.

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

Measured and assumed separation distances determined from the site assessment are recorded in Table 1 of this report and illustrated in Figure 3.

When their derivation requires additional explanation and justification, including when the relevant R-Code or other regulated building setbacks are being applied, this is provided below.

For the subject site additional information is not required.

APPENDIX B: GUIDANCE – ASSET PROTECTION ZONES AND BUSHFIRE ATTACK LEVELS

B1: The Asset Protection Zone (APZ)

THE APZ – DESCRIPTION, DIMENSION AND TECHNICAL REQUIREMENTS

DESCRIPTION AND PURPOSE

An asset protection zone (APZ) is an area surrounding a habitable or specified building that is not vegetated and/or supports retained or planted vegetation that can be considered to present a low bushfire threat as a result of flammability and/or moisture content characteristics and/or minimal fuel loads (either naturally or as a result of continual maintenance).

The primary objectives of establishing an APZ are to ensure:

- A reduction in the exposure of the building/structure to bushfire direct attack mechanisms (threats) of flame contact, radiant heat transfer and ember attack, by establishing appropriate separation from each area of classified vegetation. [The required APZ dimensions will be dependent on site specific conditions and the use of the site and are measured from the nearest part of an external wall and/or supporting posts of building parts without external walls]; and
- A reduction in the exposure of the building/structure to bushfire indirect attack mechanisms (threats) by:
    - Preventing surface fire spreading to the building/structure;
    - Minimising the potential for tree strike; and
    - Limiting the potential for consequential fire to impact the building/structure by eliminating, reducing and/or shielding consequential fire fuels. These fuels include accumulated debris, stored combustible/flammable items and constructed combustible items. Consequential fire, typically ignited by embers, is the primary cause of building loss in a bushfire event; and
- To provide a defendable space for firefighting activities.

DIMENSIONS

Established by the Guidelines

No APZ dimensions are established by the Planning for Bushfire Guidelines, DPLH/WAPC (as amended). The Guidelines are intended to inform the application of State bushfire planning policy. For planning approval purposes, it only needs to be demonstrated that a BAL-29 dimensioned APZ can be appropriately established, surrounding a building/structure for the specific development site conditions.

For certain vulnerable land uses, evidence of the ability to implement a larger APZ may be required to inform planning decisions. These include dimensions corresponding to radiant heat impact levels of 10 kW/m^2 and/or 2 kW/m^2 and calculated using a flame temperature of 1200 K rather than 1090 K.

Established by the 'Determined' BAL Rating

The dimensions of the APZ that will be the responsibility of a landowner to implement and maintain around a habitable or specified building - to align the building's bushfire resistance construction level, to its level of exposure to flames, radiant heat and embers - will be those corresponding to the building's 'determined' BAL rating.

This rating will account for the relevant physical characteristics of a specific site and the applicable building's separation distance from classified vegetation, the type of vegetation it is exposed to and the slope of the ground supporting that vegetation.

Variations to these dimensions (i.e. vegetation separation distances) will only exist as the result of either:

- A requirement presented within an associated Bushfire Management Plan to increase the size of the APZ as part of a required additional protection measure; or
- A directive of the relevant Local Government through their annual notice, issued under s.33 of the Bushfires Act 1954 (see below), that results in a larger dimension.

Established by the Relevant Local Government

To satisfy the local governments requirements, a required APZ dimension may be stated in the notice issued annually by the relevant local government under s.33 of the Bushfires Act 1954 (e.g. Bushfire Risk Reduction Notice or Firebreak and Hazard Reduction Notice etc).

For certain vegetation/sites, based on environmental considerations, a maximum allowable dimension may be established, typically that corresponding to a BAL-29 rating for the relevant building – which will vary in response to the site specific conditions.

The existence of any such restrictions is information that would need to be sought from the relevant local government planning department.

TECHNICAL REQUIREMENTS

Established by the Guidelines

The relevant technical requirements for an APZ are established in the Planning for Bushfire Guidelines (DPLH/WAPC) (as amended), Appendix B2: Siting and design and available online at Planning WA - SPP 3.7 Bushfire

Established by the Relevant Local Government

Refer to the notice issued annually by the relevant local government under s33 of the Bushfires Act 1954 (e.g. Bushfire Risk Reduction Notice or Firebreak and Hazard Reduction Notice etc). It may state technical requirements that vary from and/or are additional to those established by the Guidelines to be complied with. Refer to the ratepayer notice and/or the local government's website for the current version.

The local government's technical requirements may be established by their gazetted local planning scheme.

B2: Vegetation Excluded from Classification – Ensure Continued Low Threat Status

MAINTAINING THE LOW THREAT STATUS OF EXCLUDED VEGETATION

When applying AS 3959:2018 BAL determination methodology, vegetation adjoining or adjacent to the subject site can be excluded from classification based on being a 'low bushfire threat'. To maintain this status, certain requirements must continue to be met in accordance with the below extract from AS3959:2018. Refer to the 'Classified Vegetation and Topography Map' for the relevant low threat areas associated with the subject site.

Determination of 'low threat' vegetation is based on factors such as - proximity to the subject site / small areas of vegetation / low flammability / higher moisture content / low fuel load.

Aside from a naturally occurring low fuel load, vegetation maintained in a minimal fuel condition through active management can be excluded. The associated key requisite is that the active management can be expected to continue in perpetuity, and this can be adequately justified.

Acceptable forms of justification typically involve supportable evidence or the existence of an enforceable mechanism. Examples of enforceable mechanisms include:

- Requirements established by a Section 33 (Bush Fires Act 1954) notice issued by a local government;
- An appropriate and enforceable agreement between relevant parties (which may involve additions to land titles); and
- For public open space or crown land, written evidence that the land manager e.g. local government or a State Government department, agrees to maintain the designated area of land in a low threat state in perpetuity.

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

B3: BAL Ratings – Corresponding Threats and Construction References

BAL [1]	DESCRIPTION OF PREDICTED BUSHFIRE DIRECT ATTACK MECHANISMS (THREATS) AND LEVELS OF EXPOSURE	REFERENCES FOR CONSTRUCTION REQUIREMENTS	
		AS 3959:2018 Construction of Buildings in Bushfire Prone Areas	**The NASH Standard (2021) – Steel Framed Construction in Bushfire Areas**
		Referenced by the Building Code of Australia for Building Classes 1, 2, 3 & 10a	Referenced by the Building Code of Australia for Building Classes 1 & 10a
BAL – LOW	There is insufficient risk to warrant specific construction requirements but there is still some risk. *(Note: DFES recommend that ember attack protection features be incorporated into the design where practicable).*	Section 4. No Requirements	No Requirements
BAL – 12.5	There is a risk of ember attack. Construction elements are expected to be exposed to heat flux not greater than 12.5 kW/m^2	Sections 3 & 5.	All construction requirements for BAL-12.5 to BAL-40 are the same except for windows and external doors, which must comply with AS 3959. The construction requirements are set out as essentially non-combustible construction systems for each of the following building elements: Section 1.4: General Requirements Section 2: Roof and Ceiling System Section 3: External Wall System Section 4: Floor System Section 5: Carports Verandahs and Decks.
BAL – 19	There is a risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2.	Sections 3 & 6	
BAL – 29	There is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level radiant heat. The construction elements are expected to be exposed to heat flux not greater than 29 kW/m^2.	Sections 3 & 7.	
BAL – 40	There is a much-increased risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40kW/m^2.	Sections 3 & 8.	
BAL – FZ (Flame Zone)	There is an extremely high risk of ember attack and burning debris ignited by windborne embers, and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2.	Sections 3 & 9.	The construction requirements are set out in Sections 1-5 and differ from the requirements for all other BAL ratings.

[1] AS 3959:2018 *Construction of buildings in bushfire prone areas,* defines a Bushfire Attack Level (BAL) as a *"means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat flux expressed in kW/m^2, and is the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire."*

B4: BAL Contour Map Interpretation

THE BAL CONTOUR MAP

Caution! *Future building works require a 'determined' BAL rating for building permit applications. When a BAL contour map is being used for planning assessment purposes, (as opposed to a building assessment purpose), the required 'determined' BAL rating typically is not able to be derived from the map (there are only limited scenarios where this is possible).*

The BAL ratings identified from the map will more likely be only 'indicative' of what can be achieved – with planning compliance for this factor being achieved when BAL-29 is indicated.

Otherwise, an additional assessment of the site data for building application purposes is required, and potentially approval will need to be obtained for native vegetation modification and/or removal from the relevant authority.

The Bushfire Attack Level (BAL) contour map, when used, is a diagrammatic representation of the results of the bushfire attack level assessment that has been conducted. It presents different coloured contours extending out from the different areas of classified vegetation.

Each contour represents a set range of radiant heat, corresponding to the BAL rating as defined by the AS 3959:2018 BAL determination methodology. When an exposed element (building, person or other defined element), is fully or partly located within a specific contour, it is potentially subject to the corresponding level of radiant heat transfer.

The width of each coloured BAL contour is dependent on both the BAL rating it represents, and the relevant site specific calculation inputs and will vary. It represents the minimum and maximum vegetation separation distances that correspond to each BAL rating for that site.

For post development BAL contour maps, the areas of classified vegetation applied to the production of the BAL contours, are those that will remain at the intended end state of the subject development once earthworks, clearing and/or landscaping and/or re-vegetation have been completed.