Local Government Use

BUSHFIRE PRONE PLANNING

Bushfire Attack Level Assessment Report

Produced Applying AS 3959:2018 Bushfire Attack Level Determination Methodology

Lot 385 (64) Posa Road, Moorine Rock

Shire of Yilgarn

Report Date: **2 September 2024**

Job Reference No: **240701**

COMPANY AND BUSHFIRE CONSULTANT DETAILS

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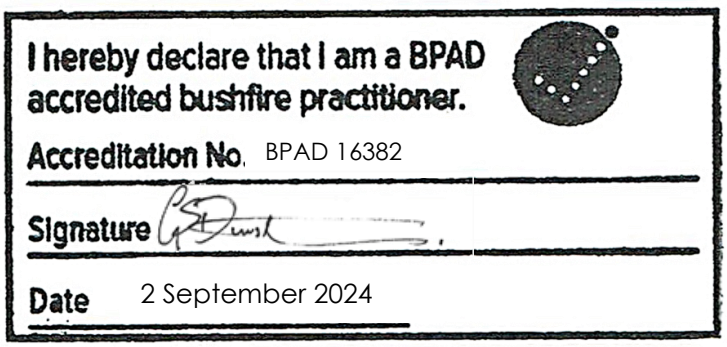

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ASSESSMENT AND REPORT DETAILS

Version	Details	Site Assessment Date	Report Date
1.0	Original	28 August 2024	2 September 2024
-	-		

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 PROPOSED BUILDING WORKS OR USE

Planning Stage	Development Application - Addition to Land Use
Subject Lot/Site Total Area	500.0932 ha
Primary Building Work and/or Use	N/A - An existing habitable building not subject to bushfire performance requirements
Associated Building	N/A
Main Class of Building - Building Code of Australia (NCC)	Class 1
Description of Proposed Development/Use	
A Bushfire Attack Level Assessment of an existing dwelling within proposed Plantation site.	

Figure 1

Site Assessment

Lot 385 on Plan 203769, Area : 500.0931 ha
64 Posa Road,
MOORINE ROCK 6425
SHIRE OF YILGARN

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

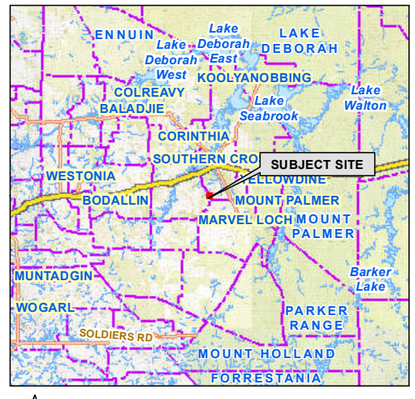
- Subject Site

Existing

- Dwelling
- Other Building
- Water Tank
- Driveway

0 20 40 60 80
Metres

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



Aerial Imagery : Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 4/09/2024
Map updated by: Ian Ross 4/09/2024
A3 Scale 1:1,250

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2024\240701 - PenAgri (SoYilgarn) (BMP)\Mapping\MXD\240701_Fig1_SAM_L385_PenAgri.mxd

2 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.

2.1 BAL Assessment Summary (Table Format)

2.1.1 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 2.1.2 Section 2.1.5 Table B1
Method 2 (Detailed)	No	N/A	N/A	N/A	-
Reasons for the Application of the Method 2 Procedure					
1.	N/A				

2.1.2 BAL Results

ASSESSMENT RESULT - THE BUSHFIRE ATTACK LEVEL (BAL)			
The Bushfire Attack Level (the highest assessed BAL) for the site (being the part of the allotment of land on which a building stands or is to be erected) / proposed development, has been determined in accordance with AS 3959:2018 clause 2.2.6 for the Method 1 procedure and/or AS 3959:2018 Appendix B for the Method 2 procedure (as relevant). The applicable site data applied to calculations is presented in the next section of this report.			
Existing Building	A Bushfire Attack Level Assessment of an existing dwelling within the proposed Plantation site.	**DETERMINED BUSHFIRE ATTACK LEVEL**	**BAL-12.5**

2.1.3 Identification of Shielded Elevations

IDENTIFICATION OF SHIELDED ELEVATION(S) – REDUCTION IN CONSTRUCTION REQUIREMENTS		
In accordance with AS 3959:2018 Clause 3.5, where an elevation is not exposed to the source of bushfire attack, the construction requirements for that elevation can reduce to the next lower BAL, but not below BAL-12.5. This shall apply to all elements of the wall, including openings, but shall not apply to subfloors or roofs. When applicable, the shielded elevation(s) are identified on the site plan when practical, otherwise a separate diagram is provided as an addendum.		
Existing Building Works	A Bushfire Attack Level Assessment of an existing dwelling within the proposed Plantation site.	The shielding provisions are not applied.

Figure 2

BAL Assessment Map

Lot 385 on Plan 203769, Area : 500.0931 ha
64 Posa Road,
MOORINE ROCK 6425
SHIRE OF YILGARN

Shed
Shed
Shed
Lot 385
Excluded
Dwelling
20 m
392 m
390 m
AREA : 1
Class (G) Grassland
Effective slope: 0°
1
2
3
4
5
6

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

- Subject Site
- Photo & Direction

Asset Protection
- Inidcative 20m APZ

Existing Building
- Dwelling
- Other Building
- Water Tank
- Driveway

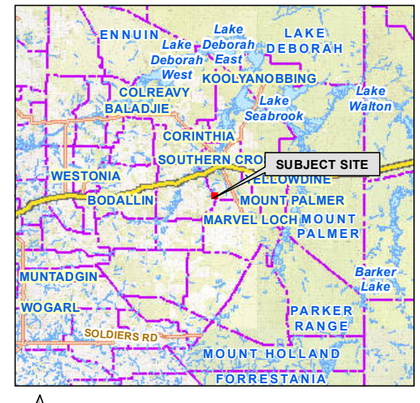
150m Vegetation Assessment
- 150m from Subject Site

100m Vegetation Assessment
- 100m from Subject Site

Classified Vegetation
- Class (G) Grassland
- Excluded 2.2.3.2
- Vegetation Distance

0 20 40 60 80
Metres

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



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BUSHFIRE PRONE PLANNING

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2.1.5 Site Assessment Data

Table 1: Summary of calculation input variables applied to deriving the BAL rating for the relevant element at risk.

DATA APPLIED TO THE CALCULATION OF THE BUSHFIRE ATTACK LEVELS (BAL) [1]							
BAL Determination Method	METHOD 1 - AS 3959:2018 CLAUSE 2.2 - SIMPLIFIED PROCEDURE				Applied Fire Danger Index		FDI 80
The Element at Risk Relevant Building/Structure	Vegetation Classification		Effective Slope		Separation Distance		Bushfire Attack Level (BAL)
			Measured	Applied Range	Total	Included Building Setback [2]	
	Area	Class	degrees		metres		
An existing habitable dwelling	1	(G) Grassland	flat 0	Upslope or flat 0	20m	N/A	BAL-12.5
	2	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A	N/A	N/A
						Select.	BAL-12.5

Note 1: All data and information supporting the determination of the classifications and values stated in this table is presented in Appendix A.

Note 2: This minimum distance (that establishes the closest distance to the lot boundary that a building/structure can legally exist) will only be identified as a component of the total vegetation separation distance if a BAL rating exceeding BAL-29 would apply if the building works was to be positioned closer to the lot boundary than the required statutory setback. The statutory setback is established by either the applicable R-code setback or another mechanism such as a restricted covenant. For all other scenarios, the building setback is not applicable and only the total separation distance will be stated.

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 the classification of vegetation within 100 metres of the subject site.

VEGETATION AREA 1						
Classification	**G. GRASSLAND**					
Types Identified	Sown pasture G-26		Sparse open tussock G-24		-	
Exclusion Clause	N/A					
Effective Slope	Measured	flat 0 degrees	Applied Range (Method 1)		Upslope or flat 0 degrees	
Foliage Cover (all layers)	<10%	Shrub/Heath Height	N/A	Tree Height	Up to 30m	
Dominant & Sub-Dominant Layers	Pasture and Cropland area					
Understorey	N/A					
Justification Comments:	Predominantly areas of grasses/planted crop, with less than 10% tree overstorey foliage cover.					
Post Development Assumptions:	N/A					

PHOTO ID: 1

PHOTO ID: 2

PHOTO ID: 3

PHOTO ID: 4

PHOTO ID: 6	PHOTO ID: -

EXCLUDED						
Classification	**N/A**					
Types Identified	-		-		-	
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	
Dominant & Sub-Dominant Layers	N/A					
Understorey	N/A					
Justification Comments:	Building, water tank, driveway, cleared section and low-threat vegetation, low-cropped grass less than 100mm in height. Weed Spray/Herbicide used to control grasses with APZ.					
Post Development Assumptions:	The immediate area around the existing dwelling identified as an Asset Protection Zone (APZ) can reasonably be expected to be maintained to low threat minimum fuel load conditions in perpetuity to AS 3959:2018 exclusion criteria/standards.					

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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

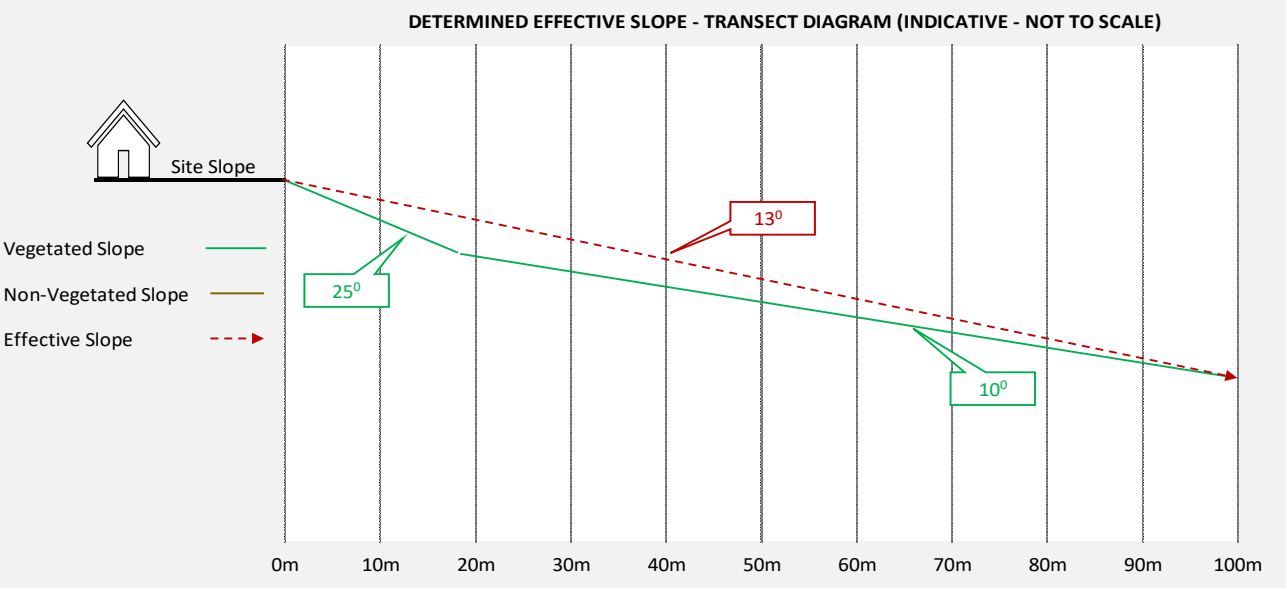
- "In identifying the effective slope - it may be found that there are a variety of slopes covering different distances within the vegetation. The effective slope is considered to be the slope under the vegetation which will most significantly influence the bushfire behaviour for each aspect. This is 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 Report.

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

For the subject site additional information is not required.



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 (Section 2.1.5) of this report and illustrated in Figure 2 (Section 2.1.4).

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: ADVICE - ONSITE VEGETATION MANAGEMENT - THE APZ

THE ASSET PROTECTION ZONE (APZ) – EXPLANATORY INFORMATION

The APZ is an area surrounding a building/structure in which fire fuels are intensively managed (reducing sources and quantities) to provide localised protection. Any retained or planted vegetation must be able to be considered low threat (due to a range of characteristics) or as being continuously maintained in a minimal fuel condition. The primary objectives of establishing an APZ are:

- 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 the bushfire prone vegetation. The required APZ dimensions will be dependent on site specific conditions and the use of the site;
- Ensure 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.

The *Guidelines for planning in bushfire prone areas* (WAPC 2021 v1.4) Appendix 4, Element 2 Explanatory Notes and Schedule 1: Standards for APZ, provide an example of how the objectives might be met.

B1: The Asset Protection Zone (APZ) - Dimension and Location Requirements

PLANNING APPLICATION REQUIREMENTS VERSUS LANDOWNER IMPLEMENTATION REQUIREMENTS

ONE IDENTIFIES THE ABILITYOF DEVELOPMENT TO ACHIEVE A MAXIMUM LEVEL OF EXPOSURE TO CERTAIN BUSHFIRE THREATS AND THE OTHER ESTABLISHES WHAT IS TO BE PHYSICALLY IMPLEMENTED SURROUNDING BUILDINGS/STRUCTURES

THE 'PLANNING BAL-29 APZ'

For planning approval purposes, an assessment against the Bushfire Protection Criteria in the *Guidelines for planning in bushfire prone areas* (WAPC 2021, v1.4), is conducted. Element 2 of the criteria (Siting and Design) establishes the acceptable solution (A2.1: APZ) requiring proposed development to depict on submitted plans that every habitable building can be surrounded by an APZ that can be reasonably expected to comply with the maintenance requirements (APZ standards) in perpetuity, and meets the following dimension and location requirements:

Dimensions: The minimum dimensions of the 'Planning BAL-29 APZ' are those that will ensure the potential radiant heat impact on the relevant buildings does not exceed 29 kW/m^2. These dimensions will vary dependent on the site specific conditions.

Location: The 'Planning BAL-29 APZ' dimensions must not extend past lot boundaries onto land the landowner has no responsibility for or control over. Limited exceptions include:

- When adjoining land is not vegetated (e.g., built out, roads, carparks, drainage systems, rock, water body etc.);
- When adjoining land does or will contain low threat vegetation (refer to Appendix B) and it can be justified that enforceable mechanisms are in place to ensure the APZ status of this land will exist in perpetuity. Such areas of land include:
    - Publicly managed areas of vegetation (e.g., public open space, recreation grounds/areas and services installed in a common section of land). For certain situations, evidence of an entity's

enforceable requirement to manage these areas to the required standard would be included in either the BAL Assessment Report or Bushfire Management Plan;

- Land on a neighbouring lot that is/will be part of the required APZ surrounding buildings/structures on that lot, and/or required firebreak, and for which the owner of that lot has a recognised responsibility to implement and maintain.

- Adjoining land for which a formalised and enforceable authority and responsibility is created for the owner of the lot on which development is proposed, or another third party, to manage vegetation in perpetuity, on land they do not own. This is not common, and the necessary evidence of the responsibility would be included in the BAL Assessment Report or Bushfire Management Plan.

If the proposed development can potentially satisfy these dimension and location requirements, then planning approval can be considered for this requirement, and then be subject to all other planning requirements being met.

KEY POINT

The 'Planning BAL-29 APZ' dimensions are not necessarily those that must be physically implemented and maintained by a landowner. Implementation requirements may be different (see 'Determined BAL Rating APZ' below).

The purpose of identifying the ability of proposed development to apply the 'Planning BAL-29 APZ' dimensions is solely to inform decision makers as to the ability of the proposed building works to limit exposure to certain bushfire threats (flame contact, radiant heat transfer and ember attack), to the extent represented by a BAL-29 rating.

Note 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 29kW/m^2 at 1090 K.

THE 'DETERMINED BAL RATING APZ'

The dimensions associated with the 'Determined BAL Rating APZ' are derived for the specific site conditions and are to be physically implemented and maintained by the landowner. The rating also establishes the bushfire construction requirements for any new building works which results in the built resilience to bushfire threats corresponding to their distance from the bushfire hazard. Variations of these dimensions 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 an alternative solution, and which is subsequently approved by the decision maker; or

- A directive of the relevant Local Government through their annual Firebreak/Hazard Reduction Notice (see below) that results in a larger dimension.

The applicable 'determined' BAL rating is stated in the BAL Assessment Data section of the BAL Assessment Report or Bushfire Management Plan.

If an 'indicative' or 'conditional' rather than a 'determined' BAL rating is stated, the corresponding separation distances (dimensions) are just informative. Confirmation that the stated BAL rating (or a different rating) will apply, is still subject to either certain physical requirements being met or approval from relevant authorities for native vegetation removal is obtained (refer to explanatory information in Section 3).

Dimensions: The minimum dimensions of the 'BAL Rating APZ' will be those associated with the 'determined' BAL rating for the relevant buildings/structures and stated in the following Table B1.

Note for certain vulnerable land uses and relevant buildings/areas, the 'BAL Rating APZ' dimensions may be replaced with dimensions corresponding to the specific radiant heat impact levels of 10 kW/m^2 and 2 kW/m^2 and calculated using a flame temperature of 1200K– rather than 29kW/m^2 at 1090 K.

Location: As for the 'Planning BAL-29 APZ'.

THE 'LOCAL GOVERNMENT APZ'

Certain Local Government's state the dimensions of the APZ that must be established surrounding buildings in their annual Firebreak/Hazard Reduction Notice. For certain vegetation/sites, based on environmental considerations, they may also establish a maximum allowable dimension, typically that corresponding to a BAL-29 rating.

THE 'REQUIRED APZ'

The dimensions associated with the 'Required APZ' are to be established and maintained by the landowner within the subject lot and surrounding the subject buildings/structures. The 'Required APZ' will be appropriately depicted in Reports and Plans on the Property Bushfire Management Statement when it is required to be included.

Dimensions: The 'Required APZ' dimensions are the minimum distances away from the subject building/structure that the APZ must extend towards each relevant area of classified vegetation (note: a distance may also be a maximum distance when relevant as an environmental constraint). These distances are stated in the following Table B1.

The dimensions to implement are determined by:

A. Those associated with the 'Determined BAL APZ' for the subject building(s) when distances are greater than 'B' below (except when 'B' has established a maximum distance); or

B. The 'Local Government' APZ' derived from their Firebreak/Hazard Reduction Notice when distances are greater than 'A' above, other than when a maximum distance is established, in which case this will apply; or

C. A combination of 'A' and 'B' as they may apply to different areas of classified vegetation.

Location: As for the 'Planning BAL-29 APZ'.

Table B1: The APZ dimensions required to be implemented and maintained by the landowner.

ESTABLISHING THE 'REQUIRED APZ' DIMENSIONS TO BE IMPLEMENTED AND MAINTAINED BY LANDOWNER WITHIN THEIR LOT										
Relevant Buildings(s)	Vegetation Classification		MINIMUM REQUIRED SEPARATION DISTANCES BETWEEN BUILDING/STRUCTURE AND BUSHFIRE PRONE VEGETATION [1]							
			Dimensions Associated with the 'BAL Rating APZ'				Dimensions Associated with the 'Local Government APZ'		The 'Required APZ' Dimensions [3]	Existing Separation Distances
			Potential Bushfire Impact [2]			Separation Distance	Firebreak / Hazard Reduction Notice	Maximum Allowed		
								N/A		
	Area	Class	Stated As	Value	Status	metres	metres	metres	metres	metres
An existing habitable dwelling	1	(G) Grassland	BAL Rating	BAL-12.5	Determined	17	3	-	17	20
	2	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A	-		-	-	-

Note 1: Refer to all explanatory information on the preceding pages.
Note 2: Considers only the bushfire direct attack mechanisms of flame contact, radiant heat transfer and, to some extent, ember attack.
Note 3: These are minimum distances unless a maximum is being applied by a local government.

Comments: Guidelines for Plantation Fire Protection 2011- Plantation separation distance must reflect potential fire behaviour driven by local variations in topography, aspect and slope. The hazard separation zone between the plantation and an existing or approved habitable building must be a minimum of 100 metres, unless the building has been constructed to an appropriate higher standard.

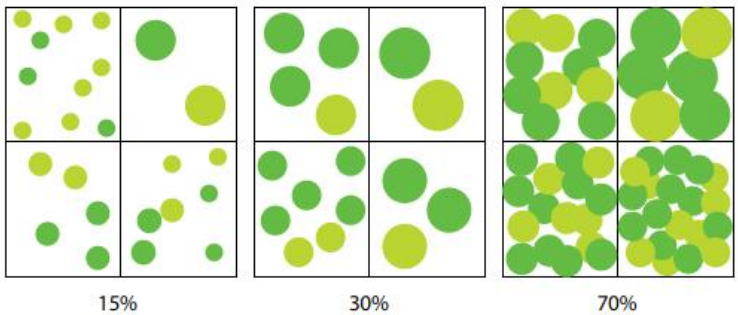
B2: The Standards for the APZ as Established by the Guidelines (DPLH, v1.4)

Within the Guidelines (source: https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas), the management Standards are established by:

- Schedule 1: Standards for Asset Protection Zones (see extract below) established by the Guidelines; and
- The associated explanatory notes (Guidelines E2) that address (a) managing an asset protection zone (APZ) to a low threat state (b) landscaping and design of an asset protection zone and (c) plant flammability.

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. **Figure 19:** Tree canopy cover – ranging from 15 to 70 per cent at maturity  15% 30% 70%

Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

B3: The Standards for the APZ as Established by the Local Government

Refer to the firebreak / hazard reduction notice issued annually (under s33 of the Bushfires Act 1954) by the relevant local government. It may state Standards that vary from those established by the Guidelines and that have been endorsed by the WAPC and DFES as per Section 4.5.3 of the Guidelines.

A copy of the relevant annual notice is not included here as they are subject to being reviewed and modified prior to issuing each year. Refer to ratepayers' notices and/or the local government's website for the current version.

B4: Vegetation Excluded from Classification - Ensure Continued Low Threat Status

EXPLANATORY NOTES

When applying AS 3959:2018 BAL determination methodology, vegetation adjoining or adjacent to the subject site can be excluded from classification based on being 'low 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 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
- High 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, written evidence that the land manager e.g., local government or State Government Department, agrees to maintain the public open space 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.

APPENDIX C: ADVICE - 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 a 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."*