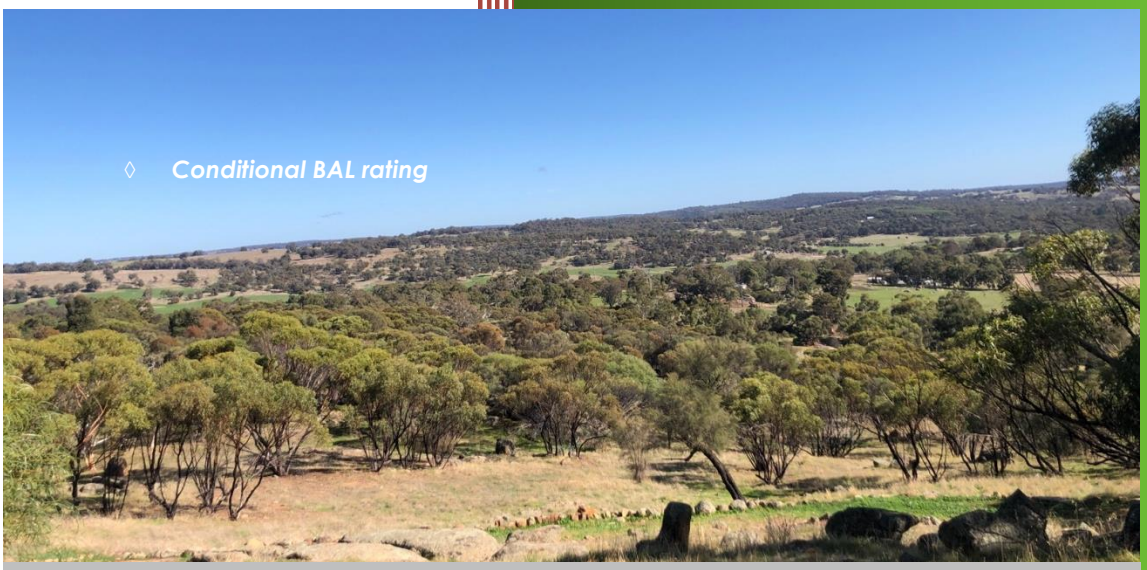
Local Government Use

BUSHFIRE PRONE PLANNING

Bushfire Attack Level & Planning Report



Produced Applying AS 3959:2018 Bushfire Attack Level Determination Methodology

46 Harvey Road, Mokine

Shire of Northam

Report Date: **29 May 2023**

Job Reference No: **230344**

COMPANY AND BUSHFIRE CONSULTANT DETAILS

BPP GROUP PTY LTD

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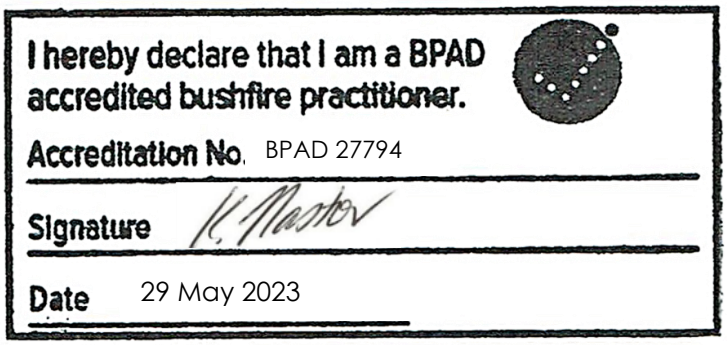

Authorised Practitioner Stamp

Author:	Oliver Bent
Reviewed:	Kathy Nastov (BPAD Level 3 No. 27794)

ASSESSMENT AND REPORT DETAILS

Version	Details	Site Assessment Date	Report Date
1.0	Original	19 May 2023	29 May 2023
-			

BAL (Master) Template v14.9

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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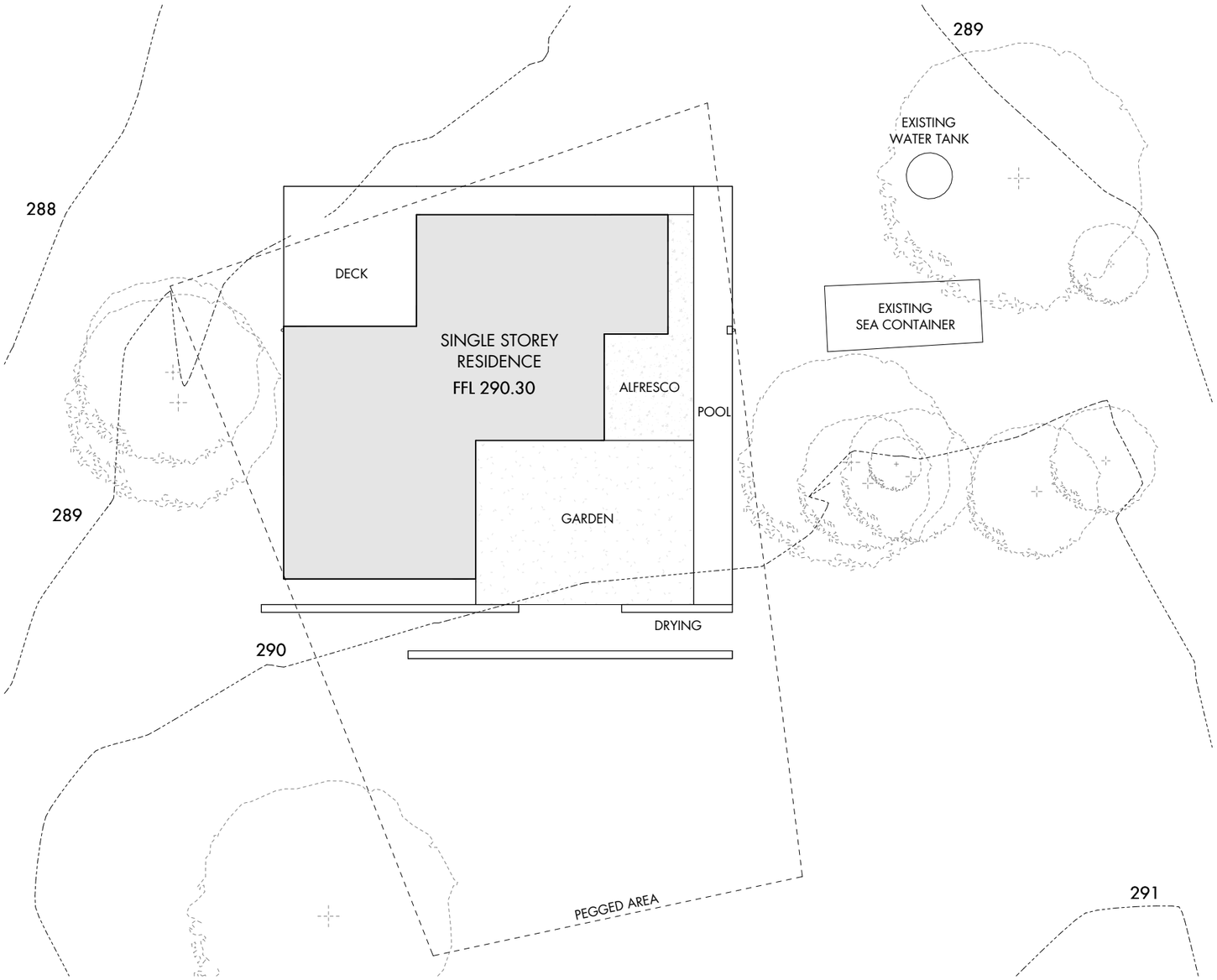
LIST OF FIGURES

1 PROPOSED BUILDING WORKS OR USE

Planning Stage:	Development Application
Subject lot/site total area:	7.3702 ha
Primary Building Work and/or Use	Construction of a new single house or ancillary dwelling
Associated Building	N/A
Main Class of Building - Building Code of Australia (NCC)	Class 1
Description of the proposed development/use:	
Proposed new dwelling.	



PRELIMINARY ISSUE

WHEATBELT HOUSE

EUAN & KATIE DE KOCK
46 HARVEY RD, MOKINE
11.04.2023
PROJECT 2022.02

SITE PLAN A003

0 2 4 10
1:200

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 Detailed 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	Table 1

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.			
Future Building on Lot No.26	Proposed dwelling	**DETERMINED BUSHFIRE ATTACK LEVEL**	**BAL-FZ**
		INDICATIVE BUSHFIRE ATTACK LEVEL	**BAL-29**

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.		
Proposed Building Works	Proposed new dwelling	The shielding provisions cannot be applied.

Figure 2.1

Existing Classified Vegetation

Lot 26 on Plan 14705
46 Harvey Road
MOKINE
Shire of Northam

AREA 3
Class (B) Woodland
Effective Slope >5-10°

AREA 2
Class (B) Woodland
Effective Slope >10-15°

AREA 7
Class (G) Grassland
Effective Slope >5-10°

AREA 3
Class (B) Woodland
Effective Slope >5-10°

AREA 2
Class (B) Woodland
Effective Slope >10-15°

Lot 26

AREA 2
Class (B) Woodland
Effective Slope >10-15°

AREA 6
Class (G) Grassland
Effective Slope >10-15°

AREA 1
Class (B) Woodland
Effective Slope >15-20°

AREA 4
Class (B) Woodland
Effective Slope 0°

AREA 3
Class (B) Woodland
Effective Slope >5-10°

Excluded

AREA 3
Class (B) Woodland
Effective Slope >5-10°

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

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

- Subject Site
- Proposed Dwelling
- 100m Assessment Area
- 150m Assessment Area

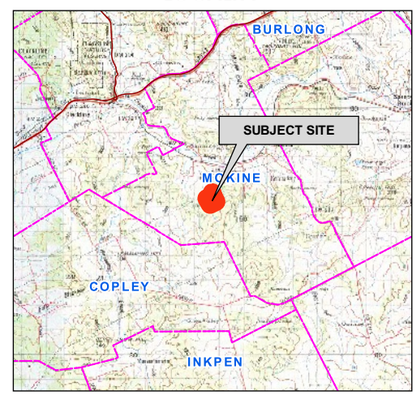
Classified Vegetation

- Class B - Woodland
- Class G - Grassland
- Exclusion 2.2.3.2
- Photos

0 10 20 30 40 50

Metres

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



AERIAL IMAGERY: Landgate/SLIP

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BUSHFIRE PRONE PLANNING

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 07-06-2023
SCALE (A3): 1 : 780

230344_46_Harvey_Rd_Mokine(BAL) simplified veg.qgz

Figure 2.2

Existing Topography & Classified Vegetation

Lot 26 on Plan 14705
46 Harvey Road
MOKINE
Shire of Northam

AREA 3
Class (B) Woodland
Effective Slope >5-10°

AREA 3
Class (B) Woodland
Effective Slope >5-10°

AREA 2
Class (B) Woodland
Effective Slope >10-15°

AREA 2
Class (B) Woodland
Effective Slope >10-15°

AREA 7
Class (G) Grassland
Effective Slope >5-10°

Lot 26

AREA 2
Class (B) Woodland
Effective Slope >10-15°

AREA 6
Class (G) Grassland
Effective Slope >10-15°

AREA 4
Class (B) Woodland
Effective Slope 0°

AREA 5
Class (G) Grassland
Effective Slope >15-20°

AREA 6
Class (G) Grassland
Effective Slope >10-15°

AREA 1
Class (B) Woodland
Effective Slope >15-20°

Proposed Dwelling

18 m
18 m
17 m
18 m
15 m
32 m
17 m
27 m
18 m
31 m

AREA 8
Class (G) Grassland
Effective Slope 0°

AREA 4
Class (B) Woodland
Effective Slope 0°

AREA 2
Class (B) Woodland
Effective Slope >10-15°

AREA 3
Class (B) Woodland
Effective Slope >5-10°

Excluded

AREA 3
Class (B) Woodland
Effective Slope >5-10°

262 264 266 268 270 272 274 276 278 280 282 284 286 288 290 292

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

- Subject Site
- Vegetation Distance (m)
- Proposed Dwelling
- 100m Assessment Area
- 150m Assessment Area

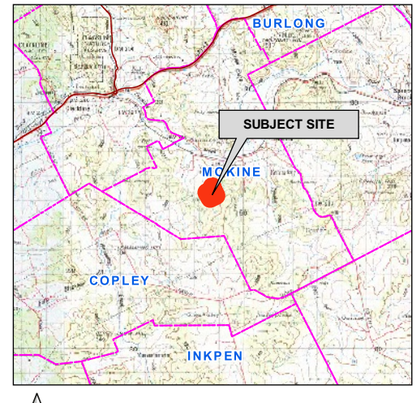
Classified Vegetation

- Class B - Woodland
- Class G - Grassland
- Exclusion 2.2.3.2

10 20 30 40 50

Metres

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



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 07-06-2023
SCALE (A3): 1 : 600

BUSHFIRE PRONE PLANNING

2.1.6 Site Assessment Data

Table 1: Summary of applied calculation input variables applied to deriving the BAL rating for the identified exposed element (the relevant building/structure).

DATA APPLIED TO THE DERIVATION 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 Receiver of Radiant Heat Relevant Building(s) / Structure(s)	Vegetation Classification		Effective Slope		Separation Distance		Bushfire Attack Level (AS 3959:2018 Table 2.5)
			Measured	Applied Range	Minimum Allowed Building Setback from Lot Boundary [2]	Total	
	Area	Class	degrees	degree range	metres		
Proposed dwelling	1	(B) Woodland	d/slope 16	Downslope >15-20	n/a	19m	BAL-FZ
	2	(B) Woodland	d/slope 11	Downslope >10-15		15m	BAL-FZ
	3	(B) Woodland	d/slope 6	Downslope >5-10		18m	BAL-40
	4	(B) Woodland	flat 0	Upslope or flat 0		3m	BAL-FZ
	5	(G) Grassland	d/slope 16	Downslope >15-20		18m	BAL-29
	6	(G) Grassland	d/slope 11	Downslope >10-15		17m	BAL-29
	7	(G) Grassland	d/slope 6	Downslope >5-10		18m	BAL-19
	8	(G) Grassland	flat 0	Upslope or flat 0		0m	BAL-FZ
	Determined Bushfire Attack Level						**BAL-FZ**

[1] All data and information supporting the determination of the classifications and values stated in this table and any associated justification, is presented in Appendix A.

[2] This is the minimum building setback (i.e., the distance from a proposed building to the lot boundary) that is established by either the applicable R-code setback or another mechanism (e.g., restricted covenant), that is to apply to the proposed building/structure on the relevant lot. It is identified as a fixed component of the total separation distance from vegetation when its application is important to be identified because it establishes the closest distance to the lot boundary that a building/structure can legally exist. In other words, it identifies the part of the lot on which development cannot occur. When it is not critical for this distance to be identified, just the total separation distance is stated.

2.2 Provision of a Conditional Bushfire Attack Level

CONDITIONS TO BE MET

The assessments conducted to produce this report have determined it is possible to achieve a lower Bushfire Attack Level for the proposed development/use. The conditions to be met are:

1. The identified areas(s) of classified vegetation are modified to enable justifiable reclassification to a lower threat classification
2. Establish increased separation distances between the subject building works and identified areas of classified vegetation by either changing the design or location on the lot of any proposed building works and/or modification/removal of existing bushfire prone vegetation;
3. Ensure the APZ is established within the boundaries of the lot on which the proposed building works or use is situated. It can only include land outside the lot where that land is non-vegetated and/or any existing vegetation is low threat, or managed in a minimal fuel condition and it can be justified that it will be maintained in this state in perpetuity; and
4. **Where native vegetation modification/removal is required, that environmental approval from the local government (or other relevant authority) has been received prior to modifying / removing native vegetation.**

THE PROCESS AND INFORMATION PROVIDED BY BUSHFIRE PRONE PLANNING (BPP)

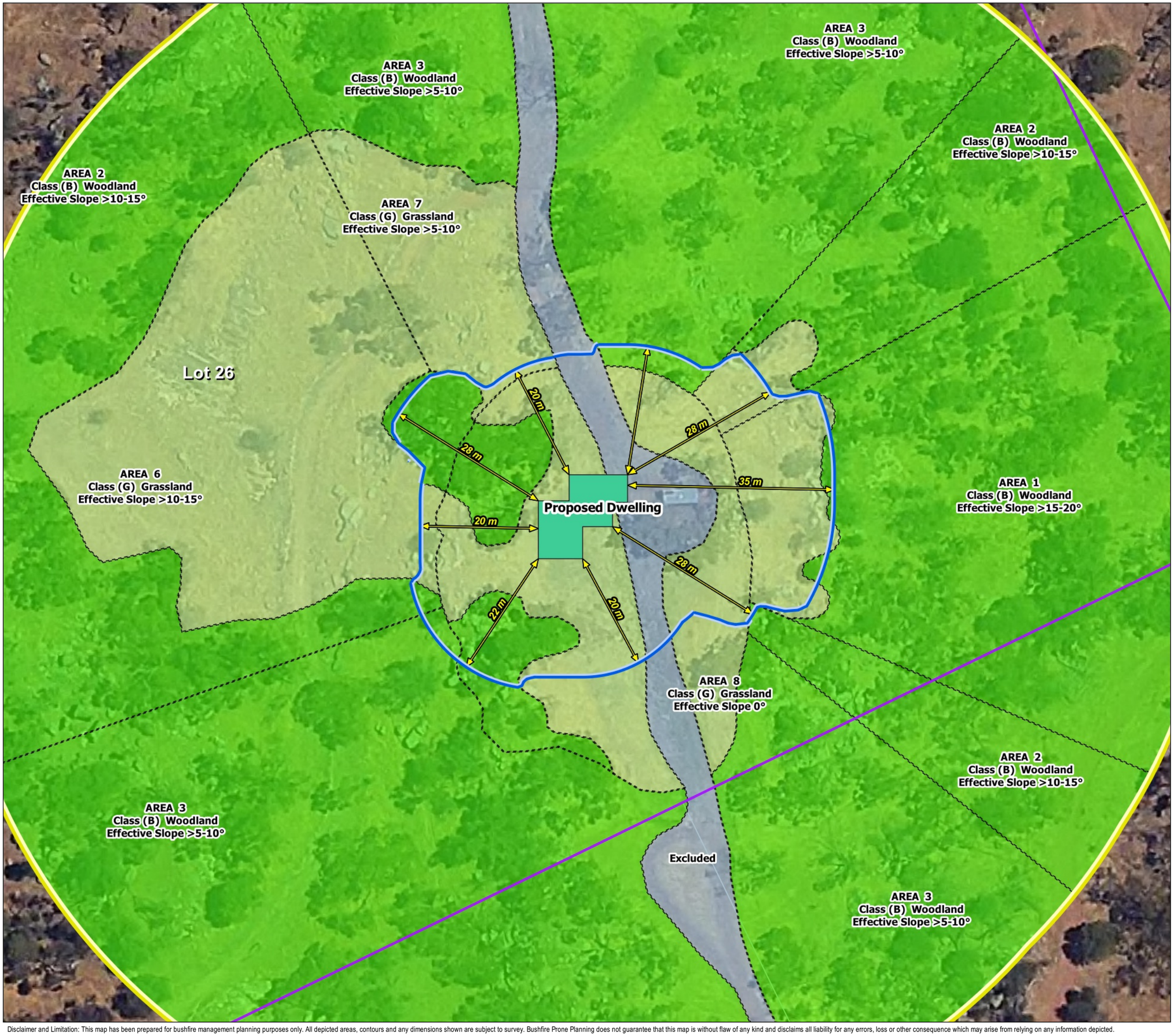
1. When modification/removal of native vegetation is required, BPP will not provide a conditional BAL lower than BAL-29. A lower BAL requires a larger APZ for which approval should be sought from the local government. An exception to this approach may exist if a justification statement identifies that the native vegetation to be modified/removed is minor;
2. When modification/removal of non- native vegetation is proposed, BPP will state the lowest BAL that can be achieved. Due consideration is given to the resultant APZ size and how realistic it will be to maintain; and
3. Once the required conditions are met, a compliance report will be produced, and the BAL Certificate can be issued. If vegetation is modified/removed, a site re-visit will be required to confirm the achievement of the vegetation separation distances or any change to the classification of vegetation.

MINIMUM VEGETATION SEPARATION DISTANCES REQUIRED TO ACHIEVE THE CONDITIONAL BAL						
The Receiver of Radiant Heat Relevant Building(s)/Structure(s)	Vegetation Classification		Conditional Bushfire Attack Level	Vegetation Separation Distance		
	Area	Class		Required (m)	Current (m)	Minimum Additional Required (m)
Proposed dwelling	1	(B) Woodland	BAL-29	35	19	16
	2	(B) Woodland		28	15	13
	3	(B) Woodland		22	18	4
	4	(B) Woodland		14	3	11
	5	(G) Grassland		14	18	-
	6	(G) Grassland		12	17	-
	7	(G) Grassland		10	18	-
	8	(G) Grassland		8	0	8
Comments: Due to site complexity, multiple areas of vegetation have been grouped according to slope and vegetation type. For example 'Area 2' consists of 4 sections of vegetation. 'Current' separation distances listed here only identify the closest section of relevant vegetation. It is important that this table be read in conjunction with Fig 3 for guidance in establishing correct separation distances on site. Areas of woodland will not necessarily require clearing however areas of continuous canopy will need modifying See appendix B2 for guidance on establishing APZ.						

Figure 3

Asset Protection Zone (APZ)

Lot 26 on Plan 14705
46 Harvey Road
MOKINE
Shire of Northam



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

- Subject Site
- Proposed Dwelling
- APZ Distance (m)
- APZ
- 100m Assessment Area
- 150m Assessment Area

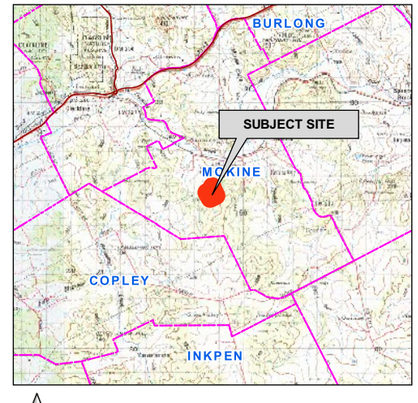
Classified Vegetation

- Class B - Woodland
- Class G - Grassland
- Exclusion 2.2.3.2

0 10 20 30 40

Metres

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



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 07-06-2023
SCALE (A3): 1 : 600

BUSHFIRE PRONE PLANNING

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

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 or vegetation managed in a minimal fuel condition, satisfying AS 3959:2018 s2.2.3.2(f), and there is sufficient justification to reasonable expect that this modified state will exist in perpetuity.

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:	N/A
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.

<table>
<tr><th colspan="8">VEGETATION AREA 1</th></tr>
<tr><td>Classification</td><td colspan="7">B. WOODLAND</td></tr>
<tr><td>Types Identified</td><td colspan="7">Low woodland B-07 Open scrub D-14</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">d/slope 16 degrees</td><td colspan="2">Applied Range (Method 1)</td><td colspan="2">Downslope >15-20 degrees</td></tr>
<tr><td colspan="2">Foliage Cover (all layers)</td><td>>90%</td><td>Shrub/Heath Height</td><td>Up to 6m</td><td>Tree Height</td><td colspan="2">Up to 30m</td></tr>
<tr><td colspan="2">Dominant & Sub-Dominant Layers (species as relevant)</td><td colspan="6">Eucalypt, casuarina and acacia present to approximately 6m.</td></tr>
<tr><td colspan="2">Understorey:</td><td colspan="6">Low occurrence of shrubs and juvenile tree species. Annual grasses as unmanaged pasture</td></tr>
<tr><td colspan="2">Additional Justification:</td><td colspan="6">Steep western slopes of subject lot consisting of significant rocky outcrops resulting in discontinuous ground fuels and limiting mature tree heights.
Classified woodland as tree heights variable with occasional examples >6m.
Patches of acacia and casuarina present as thickets with >30% canopy cover suiting scrub classification.
Vegetation density and height increase at the furthest edges of Area 1 where slope decreases.</td></tr>
<tr><td colspan="2">Post Development Assumptions:</td><td colspan="6">N/A</td></tr>
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<tr><td colspan="4">PHOTO ID: 26</td><td colspan="4">PHOTO ID: 27</td></tr>
</table>

VEGETATION AREA 2						
Classification	Select.					
Types Identified	Low woodland B-07		Sown pasture G-26		Open scrub D-14	
Exclusion Clause	N/A					
Effective Slope	Measured	d/slope 11 degrees	Applied Range (Method 1)		Downslope >10-15 degrees	
Foliage Cover (all layers)	>90%	Shrub/Heath Height	Up to 6m	Tree Height	Up to 30m	
Dominant & Sub-Dominant Layers (species as relevant)	Eucalypt, casuarina and acacia limited to approximately 6m.					
Understorey:	Low occurrence of shrubs and juvenile tree species. Annual grasses as unmanaged pasture					
Additional Justification:	Variable slopes consisting of significant rocky outcrops with grassland/woodland ground fuels and limited mature tree heights. Conservatively classified as woodland as tree heights variable with occasional examples >6m. Patches of acacia and casuarina present as thickets with >30% canopy cover suiting scrub classification. Regarding slopes, Area 1,2 and 3 are a simplified representation using maximum slopes measured in field and available topographic information. Slopes are variable within the area and tend to decrease with distance from proposed building.					
Post Development Assumptions:	N/A					

PHOTO ID: 19

PHOTO ID: 20

PHOTO ID: 28

PHOTO ID: 30

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<tr><th colspan="8">VEGETATION AREA 3</th></tr>
<tr><td>Classification</td><td colspan="7">B. WOODLAND</td></tr>
<tr><td>Types Identified</td><td colspan="7">Low woodland B-07 Sown pasture G-26</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">d/slope 6 degrees</td><td>Applied Range (Method 1)</td><td colspan="3">Downslope >5-10 degrees</td></tr>
<tr><td colspan="2">Foliage Cover (all layers)</td><td>>90%</td><td>Shrub/Heath Height</td><td>N/A</td><td>Tree Height</td><td colspan="2">Up to 30m</td></tr>
<tr><td colspan="2">Dominant & Sub-Dominant Layers (species as relevant)</td><td colspan="6">Eucalypt present to approximately <10m</td></tr>
<tr><td colspan="2">Understorey:</td><td colspan="6">Annual grasses as unmanaged pasture</td></tr>
<tr><td colspan="2">Additional Justification:</td><td colspan="6">Variable slopes consisting of significant rocky outcrops with grassland/woodland ground fuels and limited mature tree heights.
Classified woodland as tree heights variable with occasional examples >6m.
Moderate slopes opening to grassland.
Regarding slopes, Area 1,2 and 3 are a simplified representation using maximum slopes measured in field and available topographic information. Slopes are variable within the area and tend to decrease with distance from proposed building.</td></tr>
<tr><td colspan="2">Post Development Assumptions:</td><td colspan="6">N/A</td></tr>
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</table>

	
PHOTO ID: 15	PHOTO ID: 29

VEGETATION AREA 4						
Classification	**B. WOODLAND**					
Types Identified	Woodland B-05		Low open woodland G-08			
Exclusion Clause	N/A					
Effective Slope	Measured	flat 0 degrees	Applied Range (Method 1)		Upslope or flat 0 degrees	
Foliage Cover (all layers)	>90%	Shrub/Heath Height	N/A	Tree Height	Up to 30m	
Dominant & Sub-Dominant Layers (species as relevant)	Eucalypt present to approximately <10m					
Understorey:	Annual grasses as unmanaged pasture					
Additional Justification:	N/A					
Post Development Assumptions:	N/A					

PHOTO ID: 7

PHOTO ID: 9

VEGETATION AREA 5						
Classification	**G. GRASSLAND**					
Types Identified	Sown pasture G-26 Low open woodland G-08					
Exclusion Clause	N/A					
Effective Slope	Measured	d/slope 16 degrees	Applied Range (Method 1)	Downslope >15-20 degrees		
Foliage Cover (all layers)	>90%	Shrub/Heath Height	N/A	Tree Height	Up to 30m	
Dominant & Sub-Dominant Layers (species as relevant)	Annual pasture grasses <500mm					
Understorey:	N/A					
Additional Justification:	Rocky outcrop limiting height and occurrence of mature trees. Large areas of discontinuous fuels.					
Post Development Assumptions:	N/A					

PHOTO ID: 31

PHOTO ID: 32

<table>
<tr><th colspan="8">VEGETATION AREA 6</th></tr>
<tr><td>Classification</td><td colspan="7">G. GRASSLAND</td></tr>
<tr><td>Types Identified</td><td colspan="7">Sown pasture G-26 Low open woodland G-08</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">d/slope 11 degrees</td><td colspan="2">Applied Range (Method 1)</td><td colspan="2">Downslope >10-15 degrees</td></tr>
<tr><td colspan="2">Foliage Cover (all layers)</td><td>>90%</td><td>Shrub/Heath Height</td><td>N/A</td><td>Tree Height</td><td colspan="2">Up to 30m</td></tr>
<tr><td colspan="2">Dominant & Sub-Dominant Layers (species as relevant)</td><td colspan="6">Annual pasture grasses <500mm</td></tr>
<tr><td colspan="2">Understorey:</td><td colspan="6">N/A</td></tr>
<tr><td colspan="2">Additional Justification:</td><td colspan="6">Area 6 and 7 on Fig 2 are a simplified representation using maximum slopes measured in field and available topographic information. Slopes relative to site decrease with distance from proposed building.</td></tr>
<tr><td colspan="2">Post Development Assumptions:</td><td colspan="6">N/A</td></tr>
<tr><td colspan="4"> 
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</td></tr>
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<tr><th colspan="7">VEGETATION AREA 7</th></tr>
<tr><td>Classification</td><td colspan="6">G. GRASSLAND</td></tr>
<tr><td>Types Identified</td><td colspan="6">Sown pasture G-26 Low open woodland G-08</td></tr>
<tr><td>Exclusion Clause</td><td colspan="6">N/A</td></tr>
<tr><td>Effective Slope</td><td>Measured</td><td colspan="2">d/slope 6 degrees</td><td>Applied Range (Method 1)</td><td colspan="2">Downslope >5-10 degrees</td></tr>
<tr><td>Foliage Cover (all layers)</td><td>>90%</td><td>Shrub/Heath Height</td><td>N/A</td><td>Tree Height</td><td colspan="2">Up to 30m</td></tr>
<tr><td>Dominant & Sub-Dominant Layers (species as relevant)</td><td colspan="6">Annual pasture grasses <500mm</td></tr>
<tr><td>Understorey:</td><td colspan="6">N/A</td></tr>
<tr><td>Additional Justification:</td><td colspan="6">Area 6 and 7 on Fig 2 are a simplified representation using maximum slopes measured in field and available topographic information. Slopes relative to site decrease with distance from proposed building.</td></tr>
<tr><td>Post Development Assumptions:</td><td colspan="6">N/A</td></tr>
<tr><td colspan="7"> 
</td></tr>
<tr><td colspan="4">PHOTO ID: 4</td><td colspan="3"></td></tr>
</table>

VEGETATION AREA 8						
Classification	**G. GRASSLAND**					
Types Identified	Sown pasture G-26 Low open woodland G-08					
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	N/A	Tree Height	Up to 30m	
Dominant & Sub-Dominant Layers (species as relevant)	Annual pasture grasses <500mm					
Understorey:	N/A					
Additional Justification:	N/A					
Post Development Assumptions:	N/A					

PHOTO ID: 8

PHOTO ID: 24

PHOTO ID: 22

PHOTO ID: 13

	
PHOTO ID: 16	

EXCLUDED AREA	
Classification	**N/A**
Exclusion Clause	2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - minimal fuel condition.
Additional Justification:	Areas associated with driveways and access tracks, turnaround areas and areas marked out for development.
Post Development Assumptions:	N/A

PHOTO ID: 25

PHOTO ID: 12

PHOTO ID: 11

PHOTO ID: 12

A1.3: EFFECTIVE SLOPE

Measuring

Effective slope refers to the slope "under the classified vegetation which most significantly influences bushfire behaviour (AS 3959:2018, clause B4, CB4). It is not the average slope.

It is described as upslope, flat or downslope when viewed from the exposed element (e.g., building) looking towards the vegetation – and measured in degrees. Ground slope has a direct and significant influence on a bushfire's rate of spread and intensity, which increases when travelling up a slope.

The slope under the vegetation in closest proximity to the exposed element(s), over the distance that will most likely carry the entire depth of the flaming front, will be a significant consideration in the determination of the effective slope. This distance is determined as a function of the potential quasi-steady rate of spread and expected residence time (i.e., the flaming combustion period at a single point on the ground), of a bushfire in the specific vegetation type/landscape scenario.

Slope Variation Within Areas of Vegetation

Where a 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.

Slope Variation Due to Multiple Development Sites

When the effective slope, under a given 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).

Differences in Application of Effective Slope - AS 3959:2018 Method 1 versus Method 2 Procedures

The Method 1 procedure provides five different slope ranges from flat (including all upslopes) to 20 degrees downslope to define the effective slope and bushfire behaviour model calculations apply the highest value in each range (i.e., 0^0, 5^0, 10^0, 15^0 or 20^0).

The Method 2 procedure requires an actual slope (up or down in degrees) to be determined. AS 3959:2018, clause B1 limits the effective slope that can be applied to 30 degrees downslope and 15 degrees upslope. Where any upslope is greater than 15 degrees, then 15 degrees is to be used.

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.

APPENDIX B: ADVICE - ONSITE VEGETATION MANAGEMENT - THE APZ

THE ASSET PROTECTION ZONE (APZ) - DESCRIPTION

This is an area surrounding a habitable building containing low threat fire fuel fuels (including vegetation), or vegetation managed in a minimal fuel condition, no fire fuels or any combination. The primary objectives include:

- To ensure the building is sufficiently separated from the bushfire hazard to limit the impact of its direct attack mechanisms. That is, the dimensions of the APZ will, for most site scenarios, remove the potential for direct flame contact on the building, reduce the level of radiant heat to which the building is exposed and, dependent on the types of vegetation present, potentially provide some reduction in exposure to ember attack,);
- To ensure any vegetation retained within the APZ is low threat and prevents surface fire spreading to the building;
- To ensure other combustible materials that can result in consequential fire (typically ignited by embers) within both the APZ and parts of the building, are eliminated, minimised and/or appropriately located or protected.

  Note: The explanatory notes in the Guidelines for Planning in Bushfire Prone Areas DPLH v1.4 (Guidelines) provide some guidance for achieving this objective and other sources are available. Research shows that consequential fire, ignited by embers, is the primary cause of building loss in past bushfire events; and
- To provide a defendable space for firefighting activities.

B1: Asset Protection Zone (APZ) Dimensions

APZ DIMENSIONS – DIFFERENCES IN REQUIREMENTS FOR PLANNING ASSESSMENTS COMPARED TO IMPLEMENTATION

THE 'PLANNING BAL-29' APZ DIMENSIONS

The 'Planning BAL-29' APZ is not necessarily the size of the APZ that must be physically implemented and maintained by a landowner. Rather, its purpose is to identify if an acceptable solution for planning approval can be met i.e., can a specified minimum separation distance from bushfire prone vegetation exist.

An assessment against the Bushfire Protection Criteria is conducted for planning approval purposes. To satisfy 'A2.1: Asset Protection Zone', it must be demonstrated that certain minimum separation distances between the relevant building/structure and different classes of bushfire prone vegetation, either exist or can be created and will remain in perpetuity. These minimum separation distances determine the 'Planning BAL-29' APZ dimensions.

Dimensions: The minimum dimensions are those that will ensure the potential radiant heat impact on subject buildings does not exceed 29 kW/m^2. These dimensions will vary dependent on the vegetation classification, the slope of the land they are growing on and certain other factors specific to the subject site.

Note: For certain purposes associated with vulnerable land uses, the 'Planning BAL-29' APZ may be replaced with dimensions corresponding to radiant heat impact levels of 10 kW/m^2 and 2 kW/m^2 and calculated using 1200K flame temperature.

Location: The identified 'Planning BAL-29' APZ must not extend past lot boundaries onto land the landowner has no control over either now or potentially at some point in the future. Limited exceptions include:

- When adjoining land is not vegetated (e.g., built out, roads, carparks, drainage, rock, water body etc.);
- When adjoining land currently or, will in the short term, contain low threat vegetation and or vegetation managed in a minimal fuel condition as per AS 3959:2018 cl. 2.2.3.2. It must be reasonable (justifiable) to expect this low threat vegetation and/or level of management will continue to exist or be conducted in perpetuity and require no action from the owner of the subject lot.

  Such areas of land include formally managed areas of vegetation (e.g., public open space / recreation areas / services installed in a common section of land). For specific scenarios, evidence of the formal

commitment to manage these areas to a certain standard may be required and would be included in the BMP.

These areas of land can also be part of the required APZ on a neighbouring lot for which the owner of that lot has a recognised responsibility to establish and maintain; and

- When there is a formalised and enforceable capability and responsibility created for the subject lot owner, or any other third party, to manage vegetation on land they do not own in perpetuity. This would be rare, and evidence of the formal authority would be included in the BMP.

The bushfire consultant's 'Supporting Assessment Detail', that is presented in the assessment against the acceptable solution A2.1, will identify and justify how any adjoining land within the 'Planning BAL-29 APZ will meet the APZ standards. Or otherwise, explain how this condition cannot be met.

THE 'BAL RATING' APZ DIMENSIONS

The applicable BAL rating will have been stated in the BAL Assessment Data section of the BAL Assessment Report or BMP (as relevant). The BAL rating can be assessed as 'determined' or 'indicative' or be 'conditional', dependent of the specific conditions associated with the site and the stage of assessment or planning. It is the eventual assessment of the 'Determined' BAL that will establish both the BAL rating that is to apply and its corresponding 'BAL Rating' APZ dimensions.

Dimensions: The minimum dimensions of the 'BAL Rating' APZ to be established and maintained will be those that correspond to the determined BAL rating for the subject building/structure that has accounted for surrounding vegetation types, the slope of the land they are growing on and certain other factors specific to the subject site and surrounding land.

Establishing the 'BAL Rating' APZ will ensure that the potential radiant heat exposure of the building/structure will be limited to the level that the applied construction requirements are designed to resist when that building/structure is required to be constructed to the standard corresponding to the Determined BAL.

> *Note: For certain purposes associated with vulnerable land uses, 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 1200K flame temperature.*

Location: The same conditions will apply as for the 'Planning BAL-29' APZ.

THE 'LOCAL GOVERNMENT' APZ DIMENSIONS

Some Local Government's establish the dimensions of the APZ that must be established surrounding buildings in their annual Firebreak/Hazard Reduction Notice. Or for a specific site they may establish a maximum allowable dimension (typically that corresponding to BAL-29). When established, the landowner will need to be comply with these.

THE 'REQUIRED' APZ DIMENSIONS

This is the APZ that is to be established and maintained by the landowner within the subject lot and surrounding the subject building(s). It will be identified on the Property Bushfire Management Statement when it is required to be included in this Report/Plan.

Dimensions: The 'Required APZ' dimensions are the minimum (or maximum when relevant) distances away from the subject building(s) that the APZ must extend. These distances will not necessarily be the same all around the building(s). They can vary and are dependent on the different vegetation types (and their associated ground slope) that can exist around the building(s), and specific local government requirements. The dimensions to implement are determined by:

A. The 'BAL Rating APZ' of the subject building(s) when distances are greater than 'B' below (except when 'B' establishes a maximum distance); or

B. The 'Local Government' APZ' derived from the 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'.

Location: The same conditions will apply as for the 'Planning BAL-29' APZ.

B1.1: THE APZ DIMENSIONS REQUIRED TO BE IMPLEMENTED BY THE LANDOWNER

DETERMINATION OF THE 'REQUIRED' APZ DIMENSIONS TO BE IMPLEMENTED AND MAINTAINED BY LANDOWNER WITHIN THEIR LOT										
Relevant Buildings(s)	Vegetation Classification [Refer to Figure 2/3]		Minimum Required Separation Distances from Building to Vegetation (metres)							
			Established by the 'BAL Rating' APZ Dimension					Established by the "Local Government' APZ Dimension		The 'Required' APZ Dimensions [see note]
			Determined Radiant Heat Impact	Stated 'Indicative' or 'Conditional' BAL				Firebreak / Hazard Reduction Notice	Maximum Allowed	
	Area	Class		BAL-29	BAL-19	BAL-12.5	BAL-LOW		N/A	
Proposed dwelling	1	(B) Woodland	N/A	35	48	64	>100	36		36
	2	(B) Woodland		28	39	53		31		31
	3	(B) Woodland		22	31	43		26		26
	4	(B) Woodland		14	20	29		20		20
	5	(G) Grassland		14	21	30	>50	36		36
	6	(G) Grassland		12	18	26		31		31
	7	(G) Grassland		10	16	23		26		26
	8	(G) Grassland		8	12	17		20		20

Note: The 'Required' APZ Dimension corresponding to each area of vegetation is the greater of the 'BAL Rating' or the 'Firebreak/Hazard Reduction Notice' APZ dimensions - unless a local government maximum distance is to apply (as a consequence of their environmental considerations). The area of the APZ will also be limited to the subject lot boundary unless otherwise justified in this Report/Plan. Final determination of the dimensions will require that any indicative or conditional BAL becomes a 'Determined' BAL.

Comments: Shire of Northam Fire Breaks Notice currently requires 20m APZ + 1m per degree of (down) slope.

Note: BAL calculations (Table 1) and 'planning' APZ (Fig 3) are based on slope in 5 degree increments and in this case should not be used as a guide for ongoing APZ management as shire requirements exceed the corresponding separation distances.

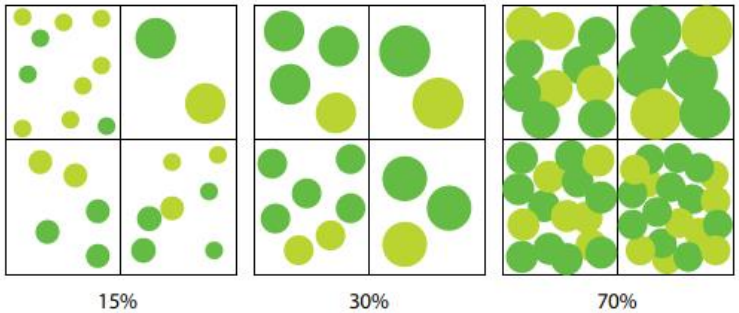
B2: The Standards for the APZ as Established by the Guidelines (DPLH, v1.4)

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 and Areas Excluded from Classification - Ensure Continued Exclusion

AS 3959:2018 establishes the methodology for determining a bushfire attack level (BAL). The methodology includes the classification of the subject site's surrounding vegetation according to their 'type' and the application of the corresponding relevant bushfire behaviour models to determine the BAL.

Certain vegetation can be considered as low threat and be excluded from classification. Where this has occurred in assessing the site, the extract from AS3959:2018 below states the requirements that must continue to exist for the vegetation on those areas of land to be excluded from classification (including the size of the vegetation area if relevant to the assessment).

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 E: 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."*