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Bushfire Attack Level Assessment Report

777 Welshpool Road East, Wattle Grove

Shire of Kalamunda

Project Number: 170336

Assessment Date: 29 June 2017

Report Date: 4 July 2017

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1. Report and BPAD Accredited Practitioner Details

BAL Template v8.0	©2017 BPP Group Pty Ltd
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Report Version	Submitted to	Submitted Date
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v1.0	Proponent	4-Jul-17
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Report Version	Amendment Record	Submitted Date
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v1.1	Updated plans with kitchen & toilets	28-Aug-17
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Assessor & Author	Bushfire Planning and Design (BPAD) Accreditation	Signature
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Alex Aitken	Level 2 Bushfire Planning Practitioner	BPAD37739 
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BPP Group Pty Ltd t/a Bushfire Prone Planning ACN: 39 166 551 784

Reviewed and Approved	Bushfire Planning and Design (BPAD) Accreditation	Signature
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Ian Macleod	Level 1 BAL Assessor	BPAD39131 
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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 issued.

Disclaimer *The measures contained in this Bushfire Risk Assessment/Management Report are considered to be minimum standards and they do not guarantee that a building will not be damaged in a bushfire. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions. Additionally, the achievement of and level of implementation of bushfire management measures will depend, among other things, on the actions of the landowners or occupiers over which Bushfire Prone Planning has no control.*

All surveys, forecasts, projections and recommendations made in this report associated with the project are made in good faith on the basis of 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.

2. Subject Site and Proposed Building or Works

Is the development site in an area identified on the current 'Map of Bushfire Prone Areas' (DFES) as being subject to bushfire?

No - but the area is considered as bushfire prone by the relevant local government and required to be assessed as bushfire prone

Subject Lot size (m²)

10,000 m²

Building Class (BCA)

Class 9 and Class 10a

Description of Primary Building or Works

Existing building - renovation

Description of Associated Structure (Class 10a building or deck)

Construction of a Class 10a building - Verandah

Attached or Adjacent Structure?

Attached and/or shares common roof space

Determination of the Requirement for the Proposed Associated Structure to be Subject to the Bushfire Construction Standards of AS3959-2009

The proposed associated structure will be assessed as per the specifications set out in AS3959-2009 s3.2.1 and s3.2.3 to determine its 'separation' status with respect to the primary building (a Class 1, 2 or 3 building) or another Class 10a building or deck that is required to comply with AS3959-2009.

The associated structure will be assessed as being 'separated' if the separation is provided by either a fire-resistant wall or a distance not less than 6 metres;

Assessed Separation Status:

The proposed structure is assessed as not being 'separated'.

Is a BAL Assessment Required?

Yes (assessed as not separated)

Are the Associated Building and Primary Building to be Assessed as a Single Building?

No (assessed as separated)

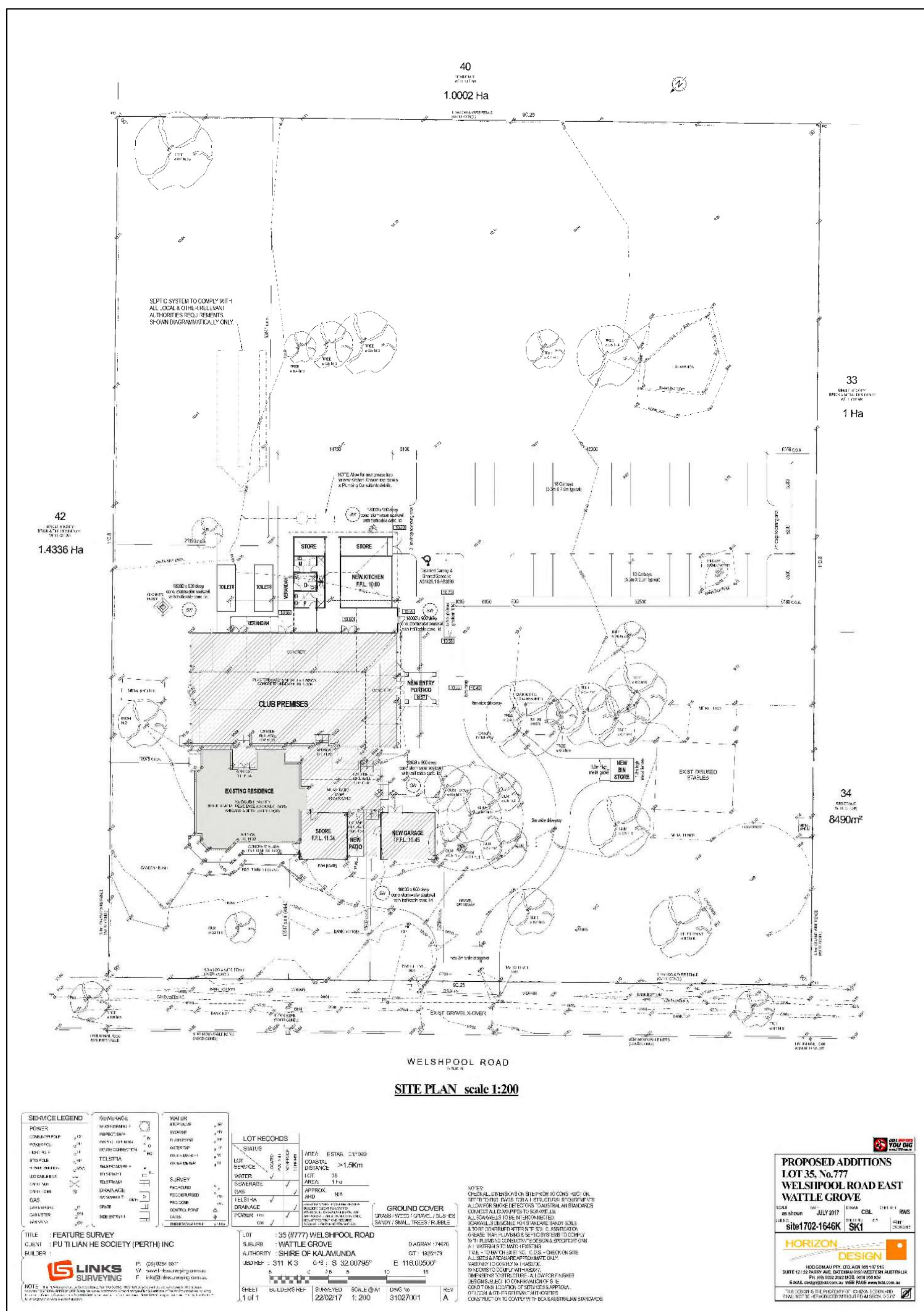
Are the Bushfire Construction Standards of AS3959-2009 to Apply?

-

Local Government Requirement: Irrespective of meeting the AS3959-2009 definition of 'separation', the relevant local government can require the proposed associated structure to have a BAL assessment and the application of bushfire construction standards. Does this apply?

N/A

Site Plan - (plans/drawings relied upon to determine the bushfire attack level)



Site Assessment Map

777 Welshpool Road
Wattle Grove

Legend

- Photo_Locations
 - Vege Distances
 - Proposed Building Works
 - Proposed Building
 - Proposed Garage
 - 100m Radius
 - classified_vegetation
 - Woodland
 - Grassland
 - Roads
 - Site Lot
 - Cadastral
 - Hydrants
 - Elevation (m)
- Metro Central Feb 2017 Mosaic

Assessment Date: 20 June 2017
Prepared by: Alex Aitken

0 10 20 30 40 50 m

Meters (A4)



Coordinate System:
GDA 94 : MGA 50 Map Projection



3. Vegetation Classification and Ground Slope Determination

The vegetation identification and classification has been conducted in accordance with AS 3959-2009 s2.2.3 and the Visual Guide for Bushfire Risk Assessment in WA (DoP February 2016).

The vegetation structure has been assessed as it will be in its mature state (rather than what might be observed on the day). Areas of modified vegetation are assessed as they will be in their natural unmodified state (unless maintained in a permanently low threat, minimal fuel condition, satisfying AS 3959 s2.2.3.2(f). Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its revegetated mature state.

When more than one vegetation type is present each type is identified separately with the worst-case scenario being applied as the classification. The predominant vegetation is not necessarily the worst-case scenario.

Representative photos of each vegetation area and associated descriptions and comments are included. The areas of classified vegetation with the potential to determine the Bushfire Attack Level are defined on the site assessment map.

All Vegetation Within 100 metres of the Proposed Development			
Vegetation Area	Identified Types (AS3959) or Description if 'Excluded'	Applied Classification	Effective Slope Under Classified Vegetation (degrees)
1	Open Woodland B-06	Class B Woodland	0
2	Sown Pasture G-25	Class G Grassland	0.5
3	Sown Pasture G-25	Class G Grassland	0
4	Sown Pasture G-25	Class G Grassland	0.5
-	Managed & cultivated gardens	Excluded AS3959-2009 2.2.3.2 (f)	-

Vegetation Area 1

Classification Applied: Class B Woodland

Assessment Comment: planted eucalypt, grass understorey, tree height ~12m, minor exotic species



Photo ID: 1a



Photo ID: 1b

Vegetation Area 2

Classification Applied: Class G Grassland

Assessment Comment: offsite open woodland, classified as grassland, horse paddocks, tree height ~15m, partly managed



Photo ID: 2a

Vegetation Area 3

Classification Applied: Class G Grassland

Assessment Comment: offsite unmanaged grassland



Photo ID: 3a



Photo ID: 3b

Vegetation Area 4

Classification Applied: Class G Grassland

Assessment Comment: onsite grassland, partly managed,



Photo ID: 4a



Photo ID: 4b

Vegetation Area

Classification Applied: Excluded AS3959-2009 2.2.3.2 (f)

Assessment Comment: cultivated gardens, mowed lawns



Photo ID: 5



Photo ID: 6

Vegetation Area

Classification Applied: Excluded AS3959-2009 2.2.3.2 (f)

Assessment Comment: managed areas, sheep grazing, very short cropped grass



Photo ID: 7



Photo ID: 8

4. Potential Bushfire Impacts (Bushfire Attack Level)

Separation Distance: Is the distance from a subject site (or building) to the area of classified vegetation. This distance is measured from the building (building wall or verandah/patio column/post) to a point considered the “edge of the classified vegetation” as per AS 3959 -2009 s2.2.4 and considering the “base of the bushfire prone vegetation (not the canopy)” as per the BAL Assessment [Basic] Factsheet (WAPC 2015 v1.0). The exact point of measurement determined by the assessor based on the fuel structure and expected fire behaviour. If a precautionary approach is considered appropriate to a given situation the measurement will be taken at the canopy line.

Bushfire Attack Level (BAL): The potential bushfire impact to the site/proposed development (measured as radiant heat flux) that is presented by each of the classified vegetation areas. Each of the identified vegetation areas is presented below. The determined BAL is the highest BAL to which the site/proposed development is exposed to.

BAL - Analysis and Determination- Club Premises

Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80
BAL Determination Method		Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)		
Vegetation Area	Applied Vegetation Classification	Effective Slope Under the Classified Vegetation (degrees)	Separation Distance to the Classified Vegetation (metres)	Bushfire Attack Level
1	Class B Woodland	0	53	BAL-12.5
2	Class G Grassland	0.5	65	BAL-LOW
3	Class G Grassland	0	73	BAL-LOW
4	Class G Grassland	0.5	37	BAL-12.5
-	Excluded AS3959-2009 2.2.3.2 (f)			BAL-LOW
Determined Bushfire Attack Level				BAL-12.5
<i>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 issued.</i>				

BAL - Analysis and Determination- Store & New Garage

Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80
BAL Determination Method		Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)		
Vegetation Area	Applied Vegetation Classification	Effective Slope Under the Classified Vegetation (degrees)	Separation Distance to the Classified Vegetation (metres)	Bushfire Attack Level
1	Class B Woodland	0	57	BAL-12.5
2	Class G Grassland	0.5	96	BAL-LOW
3	Class G Grassland	0	60	BAL-LOW
4	Class G Grassland	0.5	60	BAL-LOW
-	Excluded AS3959-2009 2.2.3.2 (f)			BAL-LOW
Determined Bushfire Attack Level				BAL-12.5
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 issued.				

BAL - Analysis and Determination- New Entry Portico

Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80
BAL Determination Method		Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)		
Vegetation Area	Applied Vegetation Classification	Effective Slope Under the Classified Vegetation (degrees)	Separation Distance to the Classified Vegetation (metres)	Bushfire Attack Level
1	Class B Woodland	0	49	BAL-12.5
2	Class G Grassland	0.5	86	BAL-LOW
3	Class G Grassland	0	82	BAL-LOW
4	Class G Grassland	0.5	41	BAL-12.5
-	Excluded AS3959-2009 2.2.3.2 (f)			BAL-LOW
Determined Bushfire Attack Level				BAL-12.5
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 issued.				

BAL - Analysis and Determination- Kitchen				
Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80
BAL Determination Method		Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)		
Vegetation Area	Applied Vegetation Classification	Effective Slope Under the Classified Vegetation (degrees)	Separation Distance to the Classified Vegetation (metres)	Bushfire Attack Level
1	Class B Woodland	0	53	BAL-12.5
2	Class G Grassland	0.5	50	BAL-12.5
3	Class G Grassland	0	>50	BAL-LOW
4	Class G Grassland	0.5	22	BAL-12.5
-	Excluded AS3959-2009 2.2.3.2 (f)			BAL-LOW
Determined Bushfire Attack Level				BAL-12.5
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 issued.				

BAL - Analysis and Determination- Toilet 1 & Toilet 2				
Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80
BAL Determination Method		Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)		
Vegetation Area	Applied Vegetation Classification	Effective Slope Under the Classified Vegetation (degrees)	Separation Distance to the Classified Vegetation (metres)	Bushfire Attack Level
1	Class B Woodland	0	68	BAL-12.5
2	Class G Grassland	0.5	50	BAL-12.5
3	Class G Grassland	0	>50	BAL-LOW
4	Class G Grassland	0.5	24	BAL-12.5
-	Excluded AS3959-2009 2.2.3.2 (f)			BAL-LOW
Determined Bushfire Attack Level				BAL-12.5
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 issued.				

Shielding Provisions – Reduction in Construction Requirements

If any elevations of the proposed building work are not exposed to the source of bushfire attack, the construction requirements for one BAL lower than the determined BAL may be applied to those elevations (to a minimum of BAL-12.5). If applicable, the relevant elevations are identified on the Site Plan.

Are shielding provisions (AS3959-2009 s3.5) to be applied?	No
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5. Appendices – Advisory Information Only

Appendix 1

Explaining Asset Protection Zones (APZ)

Description: An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation. For planning applications, the minimum sized acceptable APZ is that which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29). It will be site specific.

(For subdivision planning, hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot).

Defendable Space: The APZ includes a defendable space which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure. Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defendable space is dependent on the space which is available on the property, but as a minimum should be 3 metres.

Establishment: The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

Native Vegetation: APZ's can adversely affect the retention of native vegetation. Where the loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, such as waterway foreshore areas and wetland buffers, reducing lot yield may be necessary to minimise the removal and modification of remnant vegetation.

Responsibility: It is the responsibility of the landowner/proponent to maintain their APZ in accordance with the 'Guidelines' Appendix 4 Schedule 1 'Standards for Asset Protection Zones' (WAPC 2017). It is likely that this requirement is also contained in the firebreak notice issued by the relevant local government under s33 of the Bushfire Act 1954 along with any additional requirements.

Source: Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.1) Appendix 4 Element 2

Standards for Asset Protection Zones

(‘Guidelines’ WAPC 2017 v1.1 Appendix 4 Schedule 1)

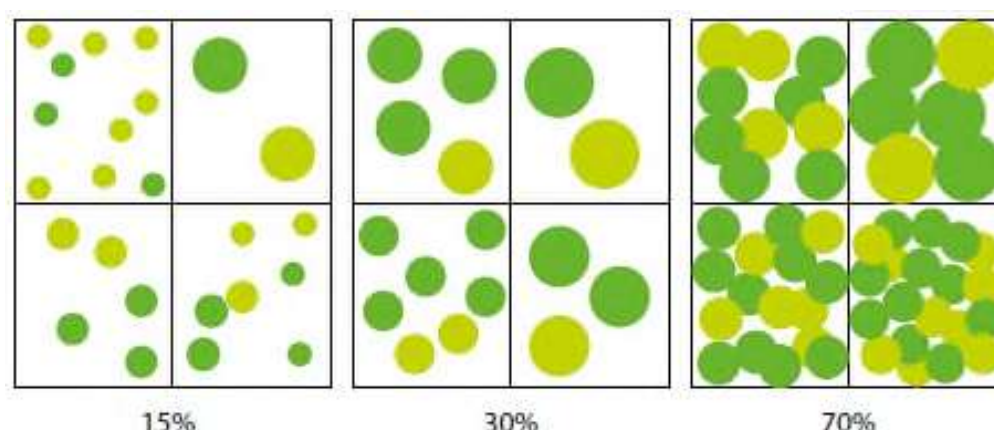
Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel Load: combustible dead vegetation matter less than 6 mm in thickness reduced to and maintained at an average of two tonnes per hectare. The visual guide below shows a fuel load that equates to approximately 2t/ha (source: Shire of Augusta Margaret River’s Firebreak and Fuel Reduction Hazard Notice).



Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. Diagram below represents tree canopy cover at maturity.



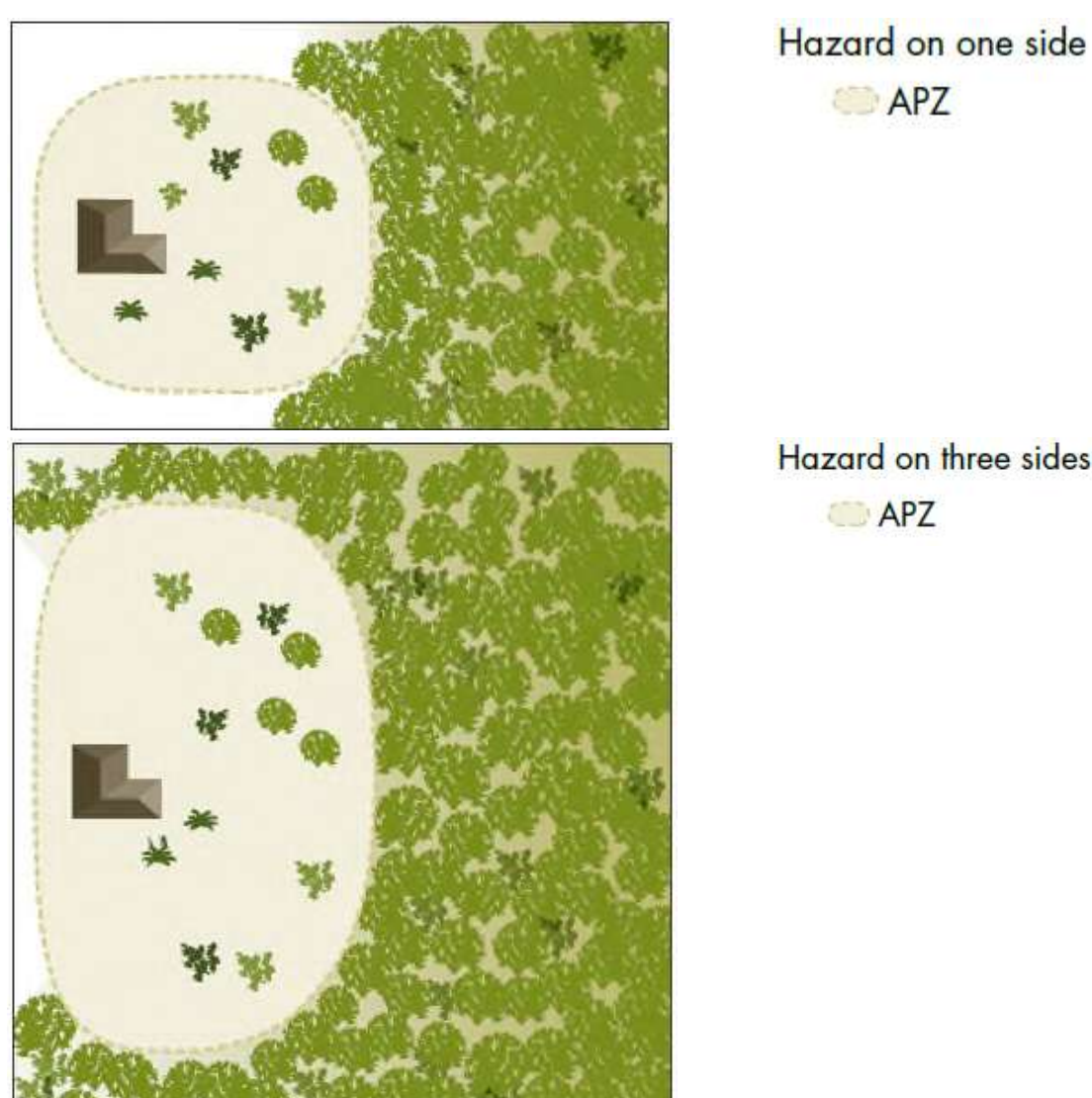
Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m² in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 mm in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 mm or less.

Note that individual local governments may set their APZ standards with additional requirements compared to the standard set in the 'Guidelines'. These will be contained in their annual firebreak notice issued under s33 of the Bushfires Act 1954 and are to be complied with.

The example diagrams below illustrate how the required dimensions of the APZ will be determined by the type and location of the vegetation



Additional DFES Guidance

- Store firewood at least 20 metres away from the building.
- Keep gutters free of leaves and other combustible material.
- Roof mounted evaporative coolers to be fitted with ember screens.
- Gas cylinders to vent away from a building and be tethered to prevent falling over.
- Driveways and access ways must allow for safe passage of a fire appliance to all buildings on the land.
- Land owners/occupiers must maintain compliance with the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, it should be noted that fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation is unsafe.

Appendix 2

Managing the Asset Protection Zone

It is the responsibility of the landowner to maintain the established bushfire protection measures on their property. This includes maintaining an asset protection zone (APZ) of the required dimensions, as a non-vegetated area or as low threat vegetation managed to a minimal fuel condition, as defined in the APZ standard (refer to Appendix 1) and AS 3959-2009 s2.2.3.2 part (f) (see below).

The required dimensions of the APZ will vary dependent upon the purpose for which the APZ has been defined (which is determined by the purpose of this assessment). There are effectively three APZ dimensions that can apply:

1. An application for planning approval will be required to show that an APZ can be created which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29); and
2. If the assessment has determined a BAL rating for an existing or future building is less than BAL-29, the APZ must be of a size such that the vegetation separation distances correspond to the lower BAL rating to maintain that BAL rating; or
3. Complying with the relevant local governments annual firebreak notice can result in an APZ of greater size than that defined by the two previous parameters.

The dimensions (vegetation separation distances) that are to apply to the APZ for this Proposal are presented in the tables below.

'Determined BAL' APZ - Minimum Dimensions for this Site					
Relevant Fire Danger Index (AS3959-2009 Table 2.1)					80
BAL Determination Method		Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)			
Vegetation Area	Applied Vegetation Classification	Effective Slope (degrees)	Determined Bushfire Attack Level	Minimum Separation Distance Required (metres)	Current Separation Distance (metres)
1	Class B Woodland	0	BAL-12.5	29	53
2	Class G Grassland	0.5		20	65
3	Class G Grassland	0		17	73
4	Class G Grassland	0.5		20	37
-	Excluded AS3959-2009	-		-	-

‘Local Government Firebreak Notice APZ’ - Minimum Dimensions	
Requirement Set By:	Shire of Kalamunda
Minimum Dimensions:	20m
Other Conditions:	The APZ must be maintained as per the APZ requirements set out in Appendix 1.
This requirement has been established through the local governments annual fire break notice issued under the Bushfires Act 1954 s33.	

Extract from AS 3959-2009 Section 2.2.3.2 – low threat vegetation definition

The Bushfire Attack Level shall be classified BAL-LOW where the vegetation is one or a combination of the following:

- a), b), c), d), e) – not relevant to vegetation management within the APZ.
- f) low threat vegetation, including grassland managed in a **minimal fuel condition** (i.e. insufficient fuel available to significantly increase the severity of a bushfire attack – recognisable as short cropped grass to a nominal height of 100mm for example), maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.

Appendix 3

Explaining Bushfire Attack Levels and Radiant Heat

Definition: A Bushfire Attack Level (BAL) is 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 kilowatts per metre squared, and is the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire.” AS 3959-2009 Construction of Buildings in Bushfire Prone Areas.

AS 3959-2009 defines six categories of Bushfire Attack Level (AS 3959-2009 Appendix G) and provides the assessment methodology (AS 3959-2009 s2 and Appendix B) to calculate Bushfire Attack Levels. Two methods are provided, Method 1 is the simplified procedure but is subject to some limitations in the circumstances in which it can be used. Method 2 is a detailed procedure and is to be used where a more specific result is sought or site conditions are outside the scope of Method 1. The standard then specifies the construction requirements that correspond to each BAL rating (AS 3959 s3 Table 3.1 and s5 to s9).

Bushfire Attack Level	Description of Predicted Bushfire Attack and Levels of Heat Flux Exposure (Source: AS 3959-2009, Appendix G and Table 3.1)
BAL - LOW	There is insufficient risk to warrant specific construction requirements but there is still some risk.
BAL - 12.5	There is risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m ²
BAL - 19	There is a risk of ember attack and burning debris ignited by wind borne 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
BAL - 29	There is an increased risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m ²
BAL - 40	There is a much-increased risk of ember attack and burning debris ignited by wind borne 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 40 kW/m ²
BAL - FZ	There is an extremely high risk of ember attack and burning debris ignited by wind borne embers, 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



Radiant Heat – Explanation and Perspective

Radiant heat is the heat that you feel from a fire (campfire or heater). Radiant heat is the biggest killer in a fire. The human body cannot absorb large amounts of radiant heat without its cooling system failing, leading to heat exhaustion and heart failure.

Radiant heat is invisible, travels in straight lines, radiates out from a bushfire ahead of the flames and will bounce off solid objects, although it will travel through glass.

Radiant heat can be blocked by a solid object or barrier such as a brick/concrete wall or building and suitable clothing – but this partial protection from radiant heat may still not save your life. Radiant heat can crack or break windows, allowing embers to enter a building and can ignite exposed surfaces without direct flame contact.

The best protection from radiant heat is distance. If the distance from the fire is doubled, the radiant heat load can be reduced by four times. You can greatly reduce potential radiant heat and direct flame contact around dwellings by carefully managing the vegetation.

Typical Radiant Heat Flux (kW/m ²)	Likely Effects ⁽¹⁾ The radiant heat flux levels are indicative values and the likely effects are an aggregation of various research. Extended duration of exposure can result in the effect occurring at lower radiant heat flux level.	Approx. Vegetation Separation Distance ⁽²⁾ (m)
1	The average radiant heat flux from the sun at midday on a summer's day. 1.6 kW/m ² acceptable limit for prolonged exposure.	180
2	Pain to unprotected humans after 1 minute.	125
3	Hazardous conditions. Firefighter in protective clothing expected to operate for a short period (<10 minutes).	100
4	Pain to unprotected humans after 20 seconds. No lethality, 2 nd degree burns probable.	61
5	Extreme conditions. Firefighter in protective clothing will feel pain after one minute of exposure.	75
7	Likely fatal to unprotected humans after exposure for several minutes.	61
10	Firefighters not expected to operate in these conditions although they may be encountered. Considered to be life threatening < 1 minute in protective equipment. Piloted (e.g. embers) ignition of textile fabrics in enclosed spaces may occur.	49
13	Standard float glass may crack and with longer exposure may fail. Piloted (e.g. embers) ignition of lightweight textile furnishings may occur. Piloted ignition of timber may occur with long exposure. Lethality to humans 1% in 1 min, 1 st degree burns in 10 sec.	40
19	Screened float glass could fail.	31
25	Piloted (e.g. embers) ignition of timber may occur (spontaneous if long exposure). Lethality to humans 100% in 1 min, significant injury in 10 sec.	24
29	Toughened glass could fail. Spontaneous ignition of most timbers with >3 minutes exposure.	21
38	Spontaneous ignition of lightweight textile furnishings can occur (short exposure). Lethality to humans 100% in 1 min, 1% in 10 sec.	17
45	Spontaneous ignition of timbers can occur in 20 seconds.	15
>29 - 100	Within the Flame Zone (BAL-40 and BAL-FZ). During a high-intensity head fire, radiant heat fluxes in excess of 150 kW/m ² have been measured.	0-21

(1) Sources: AS 1530.4 – 2005, CSIRO, RFS NSW, Warrington Fire Research (literature review on bushfire construction), Assael and Kakosimos, 2010, Fires, explosions, and toxic gas dispersions: effects calculation and risk, CRC Press, Florida

(2) Modelled using AS 3959-2009 methodology for a forest fire on flat ground with FDI 80 and default fuel loads.

Appendix 4

Building Applications (Building Permit) and the Requirement for a Bushfire Attack Level (BAL) Assessment

Most development in WA requires the submission of a building application in order to obtain a building permit before construction can commence. The proposed construction must comply with the Building Code of Australia (BCA).

In a designated bushfire prone area, construction, renovation, alteration, extension, improvement or repair of residential buildings (Classes 1, 2, 3 and associated Class 10a buildings or decks), must comply with the bushfire construction requirements of the BCA.

The BCA references AS 3959-2009 'Construction of buildings in bushfire prone areas' and the NASH Standard 'Steel Framed Construction in Bushfire Areas', as providing deemed to satisfy solutions that achieve compliance with the BCA bushfire performance requirements.

A Bushfire Attack Level (BAL) assessment (using the methodology set out in AS 3959-2009) is required to determine the BAL rating of the proposed building work. The corresponding design and construction requirements are then able to be determined.

Class 4 to Class 9 buildings will also require a BAL assessment but are not required (by the BCA for WA) to comply with the bushfire construction requirements. However, the requirement to comply may be established by the responsible authority or the requirements might also be voluntarily adopted. For these class of buildings, the bushfire provisions use the planning process to focus on location, siting and design, vehicular access and firefighting water supply to mitigate the bushfire risk.

In certain situations, if the determined BAL is BAL-40 or BAL-FZ and/or for certain types of building, the State and/or local government bushfire provisions for planning are triggered and this will require the submission of a development application and the provision of additional assessments against the Bushfire Protection Criteria as set out in State Planning Policy 3.7 Planning in Bushfire Prone Areas and the Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.1).