



Complete Fire Design

BUSHFIRE MANAGEMENT PLAN

Hope Springs Farm, Lot 25, 30 Roe Close, MountHill WA 6528

Prepared For:

4D Projects



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Document No. 1701093BMP
5 May 2017

PREPARED BY:

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DOCUMENT CONTROL

This section provides version history and related document references relevant to this document.

Current Version

Our Reference	Comments		
1701093BMP 5 May 2017	For Comments		
	Prepared by:	Checked by:	Approved by:
	Daniel Wong	Walther Groenewald	Walther Groenewald

Relevant Documents

Our Reference	Comments
23 January 2017	Bushfire Attack Level (BAL) Assessment – Hope Springs Farm – Proposed Residential Bunkhouses

EXECUTIVE SUMMARY

Complete Fire Design (CFD) has been appointed by 4D Projects to provide a Bushfire Management Plan (BMP) for Hope Springs Farm located at Lot 25, 30 Roe Close, Mount Hill WA 6528.

The site is located in a rural farming area of Geraldton and is approximately 237,315 m² or 23.73 hectares in size. There are currently two residential buildings and three sheds with bush areas of high conservation value on the site. An administration office, four residential bunkhouses, and ancillary use toilets, laundry and kitchen blocks, and activity building are currently proposed to be built on the site.

The Bushfire Management Plan is based on the State Planning Policy (SPP) 3.7 (WAPC, 2015) and the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) (or the Guidelines).

The site has been identified as a vulnerable use land as defined in SPP 3.7 and designated as a Bushfire Prone Area in the DFES Map of Bushfire Prone Areas.

Based on the Bushfire Hazard Level assessment methodology described in the Guidelines, the Bushfire Fire Hazard level for the site and 100 m zone beyond the site is classified as MODERATE to EXTREME.

A BAL assessment for the proposed residential bunkhouses on site determined that the BAL for these buildings is BAL-12.5 whilst the BAL for the proposed non-residential buildings was between considered to be BAL-29 to BAL-FZ due to the proximity to the surrounding vegetation. However, the bushfire risk can be mitigated through bushfire management measures outlined in Section 8.1 of this report to meet the bushfire protection criteria specified in the Guidelines.

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1 ASSUMPTIONS AND LIMITATIONS

1.1 Assumptions

- The assessment contained in this Bushfire Management Plan assumes that the buildings will comply with the BCA except as addressed in Performance Solutions prepared by suitably qualified persons.
- All fire safety measures required by this Bushfire Management Plan are designed, installed or constructed, and commissioned in accordance with respective manufacturers' recommendations, guidelines and instructions.
- All fire safety measures required by this Bushfire Management Plan are assumed to be maintained to ensure that they function as intended during a bushfire event.
- All codes, standards and guidelines referred in this report are assumed to be the current version at the time of design and installation.

1.2 Exclusions and Qualifications

- Any changes on the site, surrounding areas, building, occupant or fuel conditions outside of those considered in this report, or any deviation in the implementation of the fire safety strategy outlined in this report, may result in outcomes not anticipated by the strategy, and should be reviewed by a suitably qualified person.
- The assessment contained in this Bushfire Management Plan does not consider acts of malicious intent, arson, terrorism or 'Force Majeure' events.
- The assessment contained in this Bushfire Management Plan is based on the version of the documentation as referenced in this report. It is the responsibility of the Client to inform CFD of any version changes to the documentation.
- Survivability of the building on every bushfire event, total property protection, business interruption, environmental protection and insurance requirements are not specifically considered in the assessment.
- The fire safety concepts outlined in this report assumes a complete and operational building, and do not address protection of the building during construction, renovation or demolition.
- The protection of the property and its contents is not considered and is a matter for the owner and their insurer.
- The assessment contained in this Bushfire Management Plan is applicable to the site based on the extent, types and conditions of vegetation observed at the time of the assessment only. In the event that the extent, types and conditions of vegetation change significantly, the assessment may need to be revised.
- Construction of a building or structure in accordance with the recommended materials, elements or systems under AS 3959-2009 for a nominated BAL classification does not guarantee or ensure that a building or structure will 'survive' or remain structurally sound in, or following, a bushfire event on every, or any occasion.
- The calculations and application of Method 1 assessment are based on 'models' and may not address or acknowledge the degree of vegetation management, specific regional climatic conditions, specific vegetation species present, the unpredictable nature and behaviour of fire, or extreme weather conditions that may or may not be associated with a specific site or specific set of circumstances associated with a particular fire event.
- Fire is destructive and therefore although building elements may appear to survive a fire, these fire-affected elements will be compromised and may require removal and replacement to ensure correct operation or integrity in a future fire event. Following a fire event it is critical that an inspection of the building or structure is undertaken by a suitably

qualified person to determine the integrity and structural soundness of all building elements and its associated structure.

- It is also important to understand that specific fire events or periods of ember attack associated with a specific fire may exceed those modelled or nominated under AS 3959-2009 and may result in a building/structure being exposed to radiant heat flux and ember attack higher and for a longer period than calculated within the models or determined utilising Method 1 of AS 3959-2009.
- Sections 3 to 9 of AS3959-2009 outline acceptable construction methods, systems and building elements for each corresponding BAL classification with recommendations based on the deemed to comply provisions within the code.
- It is the property owner(s) responsibility to manage vegetation and fuel loads on their property, as well as maintaining asset protection zones adequately and prepare themselves, their property, and assets for a fire event.

2 INTRODUCTION

2.1 General

This document presents the BUSHFIRE MANAGEMENT PLAN for the Hope Springs Farm located at Lot 25, 30 Roe Close, Mount Hill WA 6528.

2.2 Purpose of this Document

The purpose of this BUSHFIRE MANAGEMENT PLAN is to provide guidance for the planning and management of the potential bushfire threat for the Hope Springs Farm located at Lot 25, 30 Roe Close, Mount Hill WA 6528.

2.3 Referenced Documents and Drawings

This document is based on the following documents and drawings listed in Table 1.

Table 1: Reference Documents and Drawings

Document/ Drawing No.	Description	Organization	Date	Revision
-	Aerial Lot 25 Full Site	4D Projects	Via Email dated 9 Jan 2017	-
-	Land Use Concept Plan	Yilgarn Consulting	15 May 2014	-
15552FS01-1	Feature Survey & Aerial	Quantum Surveyors	31 Mar 2017	2
-	Site Plan	Quantum Surveyors	20 Oct 2016	-

3 AIM AND OBJECTIVES

3.1 Aim

The purpose of this Bushfire Management Plan is to reduce the occurrence of, and minimise the impact of bushfires thereby reducing the threat to life, property and the environment, and document fire prevention requirements for the site.

This Bushfire Management Plan also documents the fire prevention requirements for the proposed and existing buildings on the site.

3.2 Objectives

The objectives of this Bushfire Management Plan are to:

- Define and rank fire hazard areas within the site, which relates to the different fuel types and loadings and to flammability of fuels.
- Nominate individuals and organisations responsible for fire management and associated works within the site.
- Propose fire management strategies for the site with due regard for life, property and the environment.
- Define an assessment procedure that will evaluate the effectiveness and impact of proposed fire prevention strategies.
- Provide performance criteria and acceptable solutions for all fire management works, which may include performance criteria and acceptable solutions for fire breaks or low fuel areas; building construction standards; maximum compartment size in a plantation; or minimum equipment levels during harvesting or burning off operations. Minimum standards may be included in the Appendix and should not compromise those accepted by DFES.

4 DESCRIPTION OF THE SITE

4.1 General

The site is located in a rural farming area of Geraldton and is approximately 237,315 m² or 23.73 hectares in size. The proposed land use concept plan for the site is shown in Figure 1.



Figure 1 – Proposed land use concept plan

The site currently consists of natural bushland with many varieties of Banksia and Acacia trees, and other native plants. The site also consists of a wetland area with two large ponds of natural spring water and open arable land with dry grasses and lupins. The ponds may be filled or empty depending on the season.

4.2 Climate

The growing season for the region is from May through to November with rainfall average 450 mm annually based on statistical data between 1877 and 2017 (Bureau of Meteorology). The fire season is between 5 October and up to 1 May each year based on the annual firebreak notice issued by the City of Greater Geraldton.

The mean monthly rainfall shown in Figure 2 based on the data collected at the Geraldton Town weather station (Bureau of Meteorology) located approximately 44 km from the site shows that the lowest rainfall typically occurs between October and April. These months as shown in Figure 3 also recorded low number of days of rainfall. The warmest months (i.e. above 35 °C) are typically September and April as shown in Figure 4.

Typically, a threshold wind speed of greater than 15 km/h will make a significant difference in the behaviour of bushfires in the open. The months where these mean wind speeds occur are generally found in September to March as shown in Figure 5.

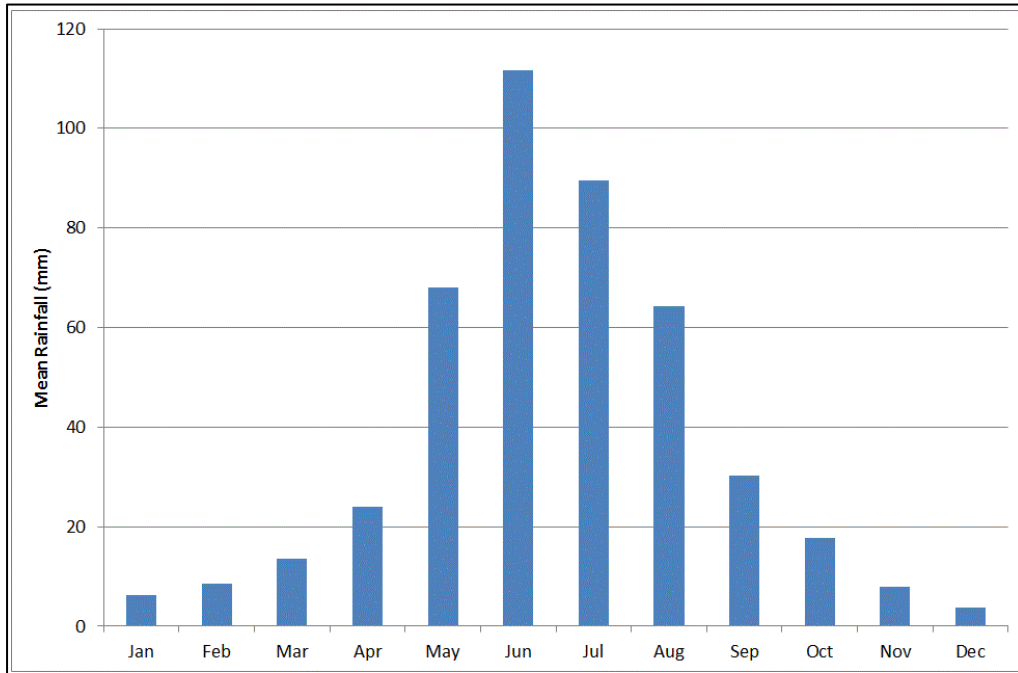


Figure 2 – Mean monthly rainfall (Bureau of Meteorology)

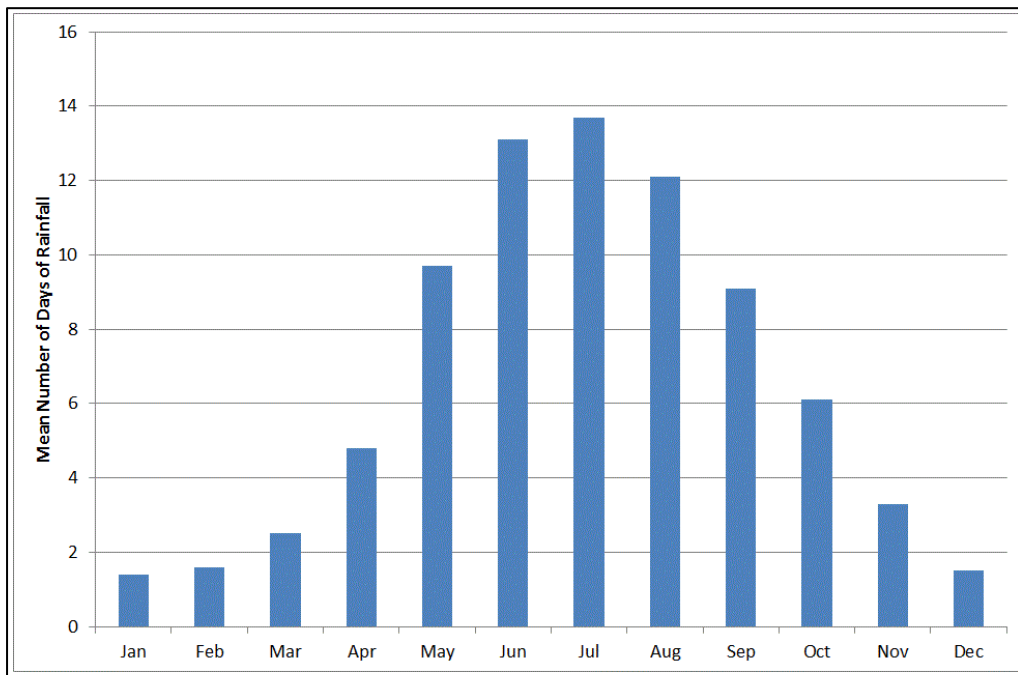


Figure 3 – Mean number of days in a month of rain (Bureau of Meteorology)

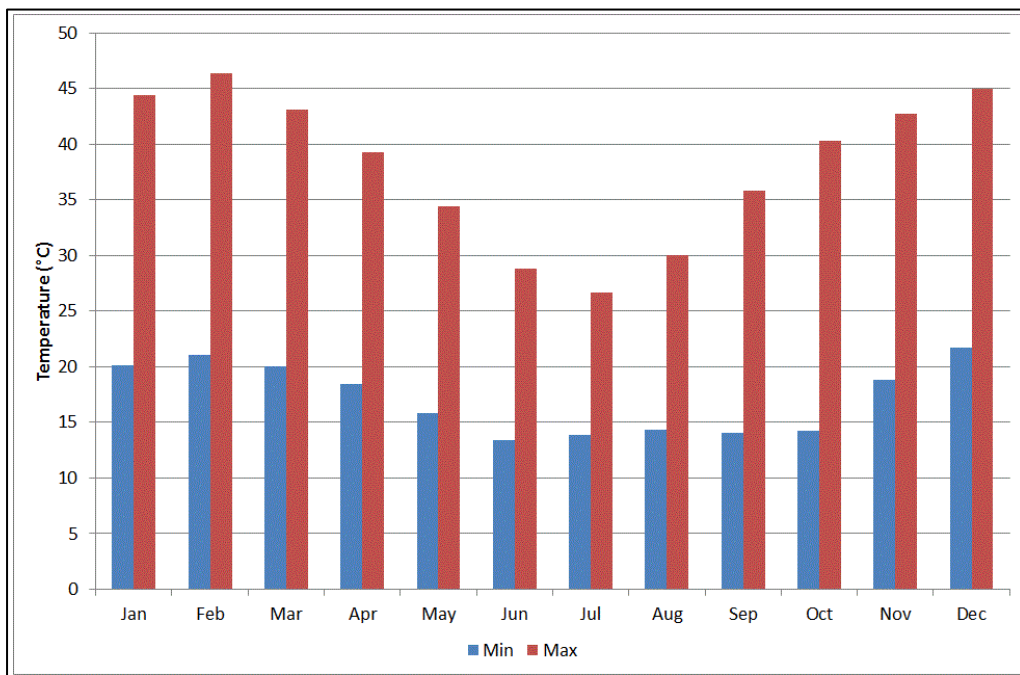


Figure 4 – Minimum and maximum monthly ambient temperatures (Bureau of Meteorology)

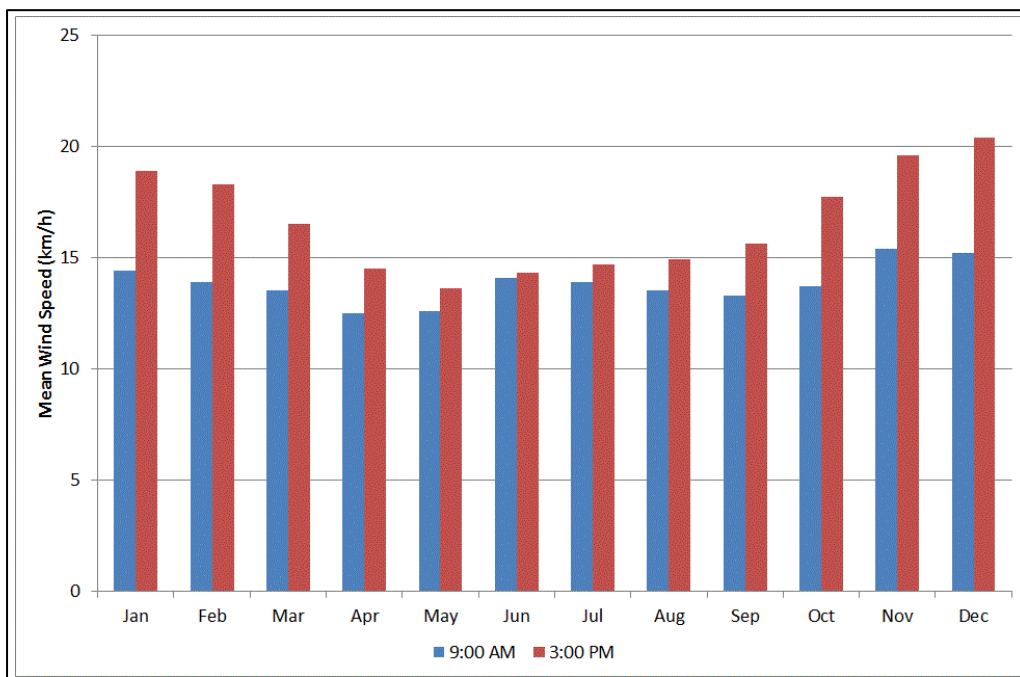


Figure 5 – Mean monthly wind speed (Bureau of Meteorology)

4.3 Topography

The site is sloping down from the southern boundary right through to the northern and western boundaries. The west side of the site consists of wetlands that has natural ponds – this then joins the bushland area which joins the arable paddock area which gently slopes up to the existing residential buildings and the southern boundary.

4.4 Bushfire Fuels

Fuel types include bushland heavily populated with Banksia and wattle trees with thick undergrowth. Grass paddocks with lupins growing in them and tall closely panted eucalyptus trees bordering the driveway and around the residential buildings.

4.5 Land Use

The site will be used mainly for agriculture with residential bunkhouses and buildings, ancillary residential use buildings administration office and sheds on site.

4.6 Assets

There are currently two residential buildings and three sheds with bush areas of high conservation value on the site. An administration office, four residential bunkhouses, and ancillary residential use toilets, laundry and kitchen blocks, and activity building are currently proposed to be built on the site.

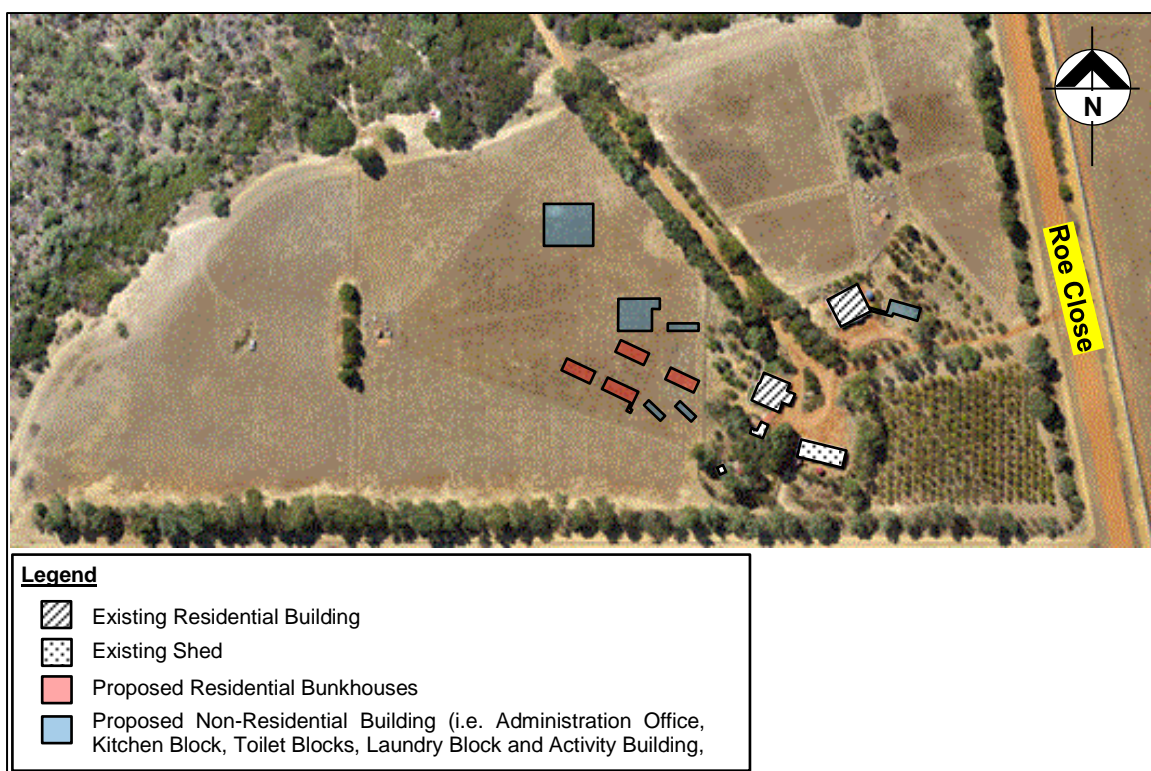


Figure 6 – Existing and proposed buildings on site

4.7 Access

There are two entrances to the site of good quality gravel road suitable for all vehicles. Access to the perimeter of the site and the fence line is via fire breaks for most vehicles.

4.8 Water Supply

Domestic irrigation is provided via a bore which pumps 5,000 litres/hour to a water point at the road (overhead standpipe). If necessary, water could be drawn from the two ponds in the wetlands if not empty. Water could also be drawn from the three rainwater tanks off the shed and residential buildings.

5 LEGISLATION

The following legislation is applicable to this Bushfire Management Plan:

- Planning and Development Act 2005.
- Planning and Development (Local Planning Schemes) Amendment Regulations 2015.

Other applicable associated legislation to this Bushfire Management Plan are as the following:

- Fire and Emergency Services Act 1998.
- Environmental Protection Act 1986.
- Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act).

The Fire and Emergency Services Commissioner has designated part of the site as a bushfire prone area and as such being subject or likely to be subject to bushfire attack under the Fire and Emergency Services Act 1998. Designation of an area as being bushfire prone reflects the potential of bushfire to affect the site. The designation acts as a mechanism for initiating further assessment in the planning and building processes.

The application process for buildings in designated bushfire prone areas are summarised in Figure 7 and Figure 8.

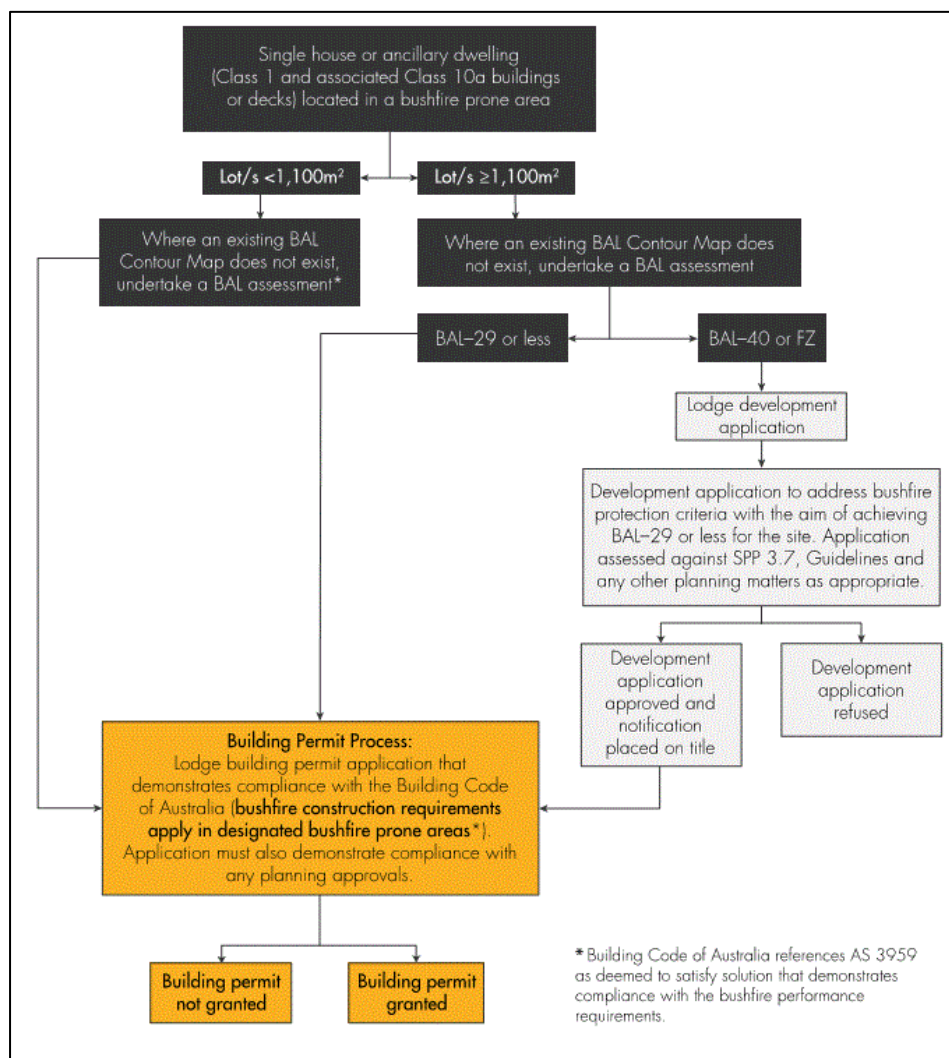


Figure 7 – Application process for single houses and ancillary dwellings, in designated bushfire prone areas

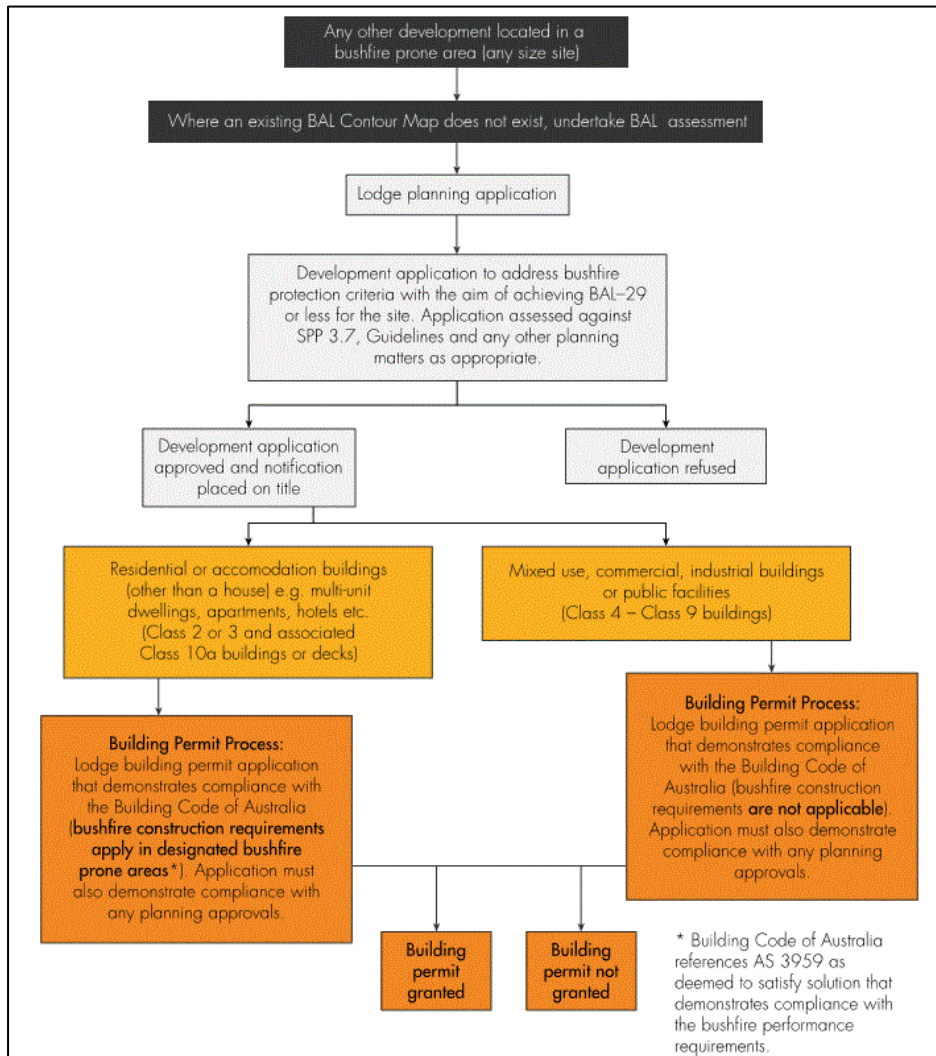


Figure 8 – Application process for buildings, which are not single houses and ancillary dwellings, in designated bushfire prone areas

6 BUSHFIRE

6.1 Bushfire History

Bushfires in the area have occurred in the past from discarded cigarette butts, machinery operating during ban periods and lighting strikes. These fires were extinguished due to fire-fighting effects along the low fuel buffer and grading done in front of the fire to help stop it.

Bushfires for the site may be caused by lightning strikes, improper disposal of cigarette butts, lighting of fires during total fire ban days, operation of equipment during harvest and vehicle movement bans, vehicle accidents and arson.

6.2 Bushfire Hazard

The bushfire hazard on a site can be assessed using a Bushfire Hazard Level (BHL) assessment, Bushfire Attack Level (BAL) contour map or Bushfire Attack Level (BAL) assessment.

Table 2: Description of Assessment Methods to Assess Bushfire Hazard

Assessment Method	Description	Applicability to Stage of Planning Process
BHL Assessment	A broad three tier categorisation of vegetation into hazard levels on fuel characteristics.	Strategic Planning Proposals
BAL Contour Map	A scale map of the subdivision illustrating the potential radiant heat impacts and associated indicative BAL ratings in reference to classified vegetation for each subject lot/s.	Strategic Planning Proposals, Subdivisions, Development Applications
BAL Assessment	A measure of the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact using increments of radiant heat expressed in kW/m ² .	Subdivisions, Development Applications

The BHL assessment and BAL assessment will be used to determine the bushfire hazard on the site as this will provide an overall picture of the bushfire hazard for the different stages of the planning process.

6.2.1 Vegetation Classification

The vegetation on site is classified in accordance with AS 3959 and includes the following vegetation shown in Figure 9:

- Class B – Woodland
- Class D – Closed Scrub
- Class G – Grassland



6.2.2 BHL Assessment

The Bushfire Hazard Level assessment methodology can be found in Appendix Two of the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017). The Bushfire Hazard Level assessment rates bushfire hazards using vegetation type, classifying the results into three potential categories: low, moderate or extreme. The characteristics associated with low, moderate or extreme hazard level are summarised in Table 3.

Table 3: Hazard Levels and Characteristics

Hazard Level	Characteristics
Low	<ul style="list-style-type: none"> • Devoid of standing vegetation (less than 0.25 ha cumulative area); • Areas which, due to climatic conditions or vegetation (e.g. rainforest) do not experience bushfires; • Inner urban or suburban areas with maintained gardens and very limited standing vegetation (less than 0.25 ha cumulative area);

Hazard Level	Characteristics
	<ul style="list-style-type: none"> • Low threat vegetation, including grassland managed in a minimal fuel condition (i.e. to a nominal height of 100 mm), maintained lawns, vineyard and orchards; and • Pasture or cropping areas with very limited standing vegetation that is shrubland, woodland or forest with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres.
Moderate	<ul style="list-style-type: none"> • Areas containing pasture or cropping with an effective down slope* in excess of 10 degrees for a distance greater than 100 metres; • Unmanaged grassland; • Open woodlands; • Open shrublands; • Low shrubs on areas with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres or flat land; • Suburban areas with some tree cover; and • Forest and woodlands with a permanent grass understorey or at most, a scrub understorey structure consisting of multiple areas of < 0.25 ha and not within 20 metres of each other or single areas of < 1 ha and not within 100 metres of other scrub areas.
Extreme	<ul style="list-style-type: none"> • Forests with a scrub understorey which is multi-tiered; • Woodlands with a scrub understorey which is multi-tiered; • Tall scrubs; and • Any area of vegetation not otherwise categorised as low or moderate.
<p>*Note – Effective slope refers to slope under the classified vegetation in relation to the subject site. Distances less than 100 metres will be deemed to be undulating land, rather than a nominated slope.</p>	

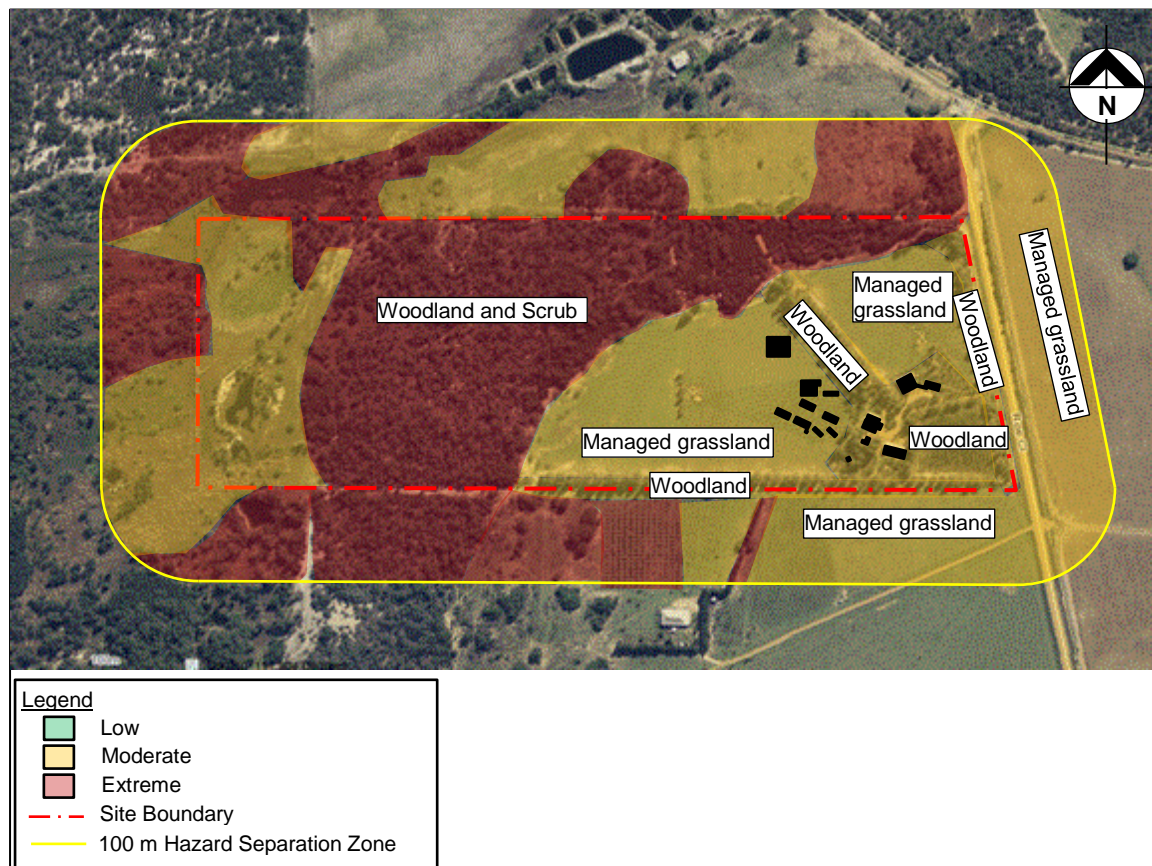


Figure 10 – Bushfire Hazard Level assessment map

As shown in Figure 10, the Bushfire Hazard Level for the site is classified as MODERATE to EXTREME. The Bushfire Hazard Level for the 100 mm zone beyond the site is also classified as MODERATE to EXTREME.

6.2.3 BAL Assessment

The Bushfire Attack Level (BAL) assessment methodology can be found in AS 3959. Table 4 shows the corresponding descriptions of the predicted levels of exposure and heat flux exposure thresholds for various BAL ratings. The BAL construction levels in context are shown in Figure 11.

Table 4: BAL and Corresponding Descriptions of the Predicted Levels of Exposure and Heat Flux Exposure Tresholds

BAL	Description (Source: AS 3959-2009, Appendix G)
BAL-LOW	The risk is considered to be VERY LOW. There is insufficient risk to warrant any specific construction requirements but there is still some risk.
BAL-12.5	The risk is considered be LOW. There is a 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	The risk is considered to be MODERATE. 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	The risk is considered to be HIGH. 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.

BAL	Description (Source: AS 3959-2009, Appendix G)
	The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m ² .
BAL-40	The risk is considered to be VERY HIGH. 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-Flame Zone (FZ)	The risk is considered to be EXTREME. There is an extremely high risk of ember attack and burning debris ignited by wind-borne 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 .

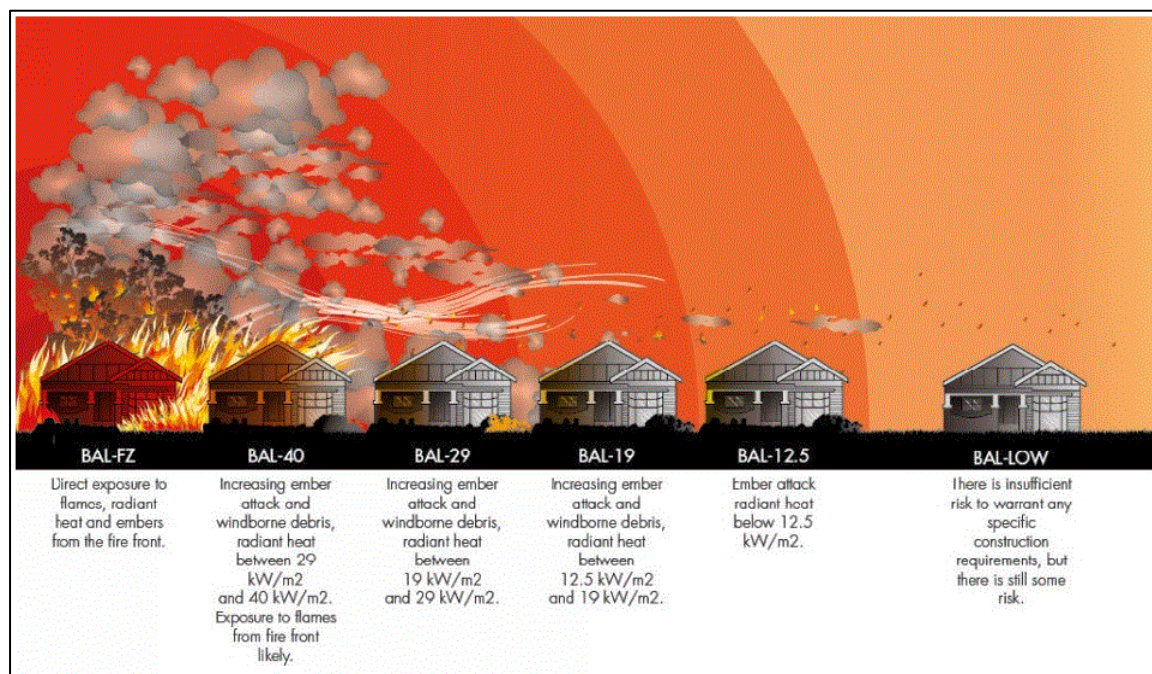


Figure 11 – BAL construction levels in context

A BAL assessment was previously carried out for the proposed residential bunkhouses (Refer to Appendix A). Based on the BAL assessment, the BAL for the proposed residential bunkhouses was determined to be BAL-12.5.

The other non-residential buildings were not assessed as part of the original BAL assessment. However, based on the locations of the proposed non-residential buildings (i.e. administration office, activity building, toilet blocks, laundry block and kitchen block), a BAL of between BAL-29 to BAL-FZ could apply to these blocks.

6.3 Summary of Bushfire Potential Issues

Based on the bushfire hazard assessment for the site, the Bushfire Hazard Level for the site is classified as MODERATE to EXTREME and the proposed buildings will be exposed to BAL of up to BAL-FZ due to the proximity of the buildings to the surrounding vegetation.

7 FIRE MITIGATION STRATEGIES

7.1 Bushfire Risk Management

The State Planning Policy (SPP) 3.7 (WAPC, 2015) provides the foundation for land use planning to address bushfire risk management in Western Australia. The policy is to be used to inform and guide decision makers, referral agencies and landowner/proponents to help achieve acceptable bushfire protection outcomes.

The policy applies to all higher order strategic planning documents, strategic planning proposals, subdivision and development applications located in designated bushfire prone areas. This policy also applies where an area is not yet designated as bushfire prone but it is proposed to be developed in a way that introduces a bushfire hazard, outline in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017).

SPP 3.7 (WAPC, 2015) is to be read in conjunction with the Deemed Provisions contain in the Planning and Development (Local Planning Schemes) Amendment Regulations 2015, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017) and AS 3959.

The bushfire protection criteria based on the Appendix Four in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017) are provided to assist in the assessment of the proposed bushfire risk management measures required for strategic planning proposals, subdivision or development applications in bushfire prone areas. The criteria are divided into four elements – location, sitting and design, vehicular access and water. The performance principle allows for ‘alternative solutions’ to be developed where the acceptable solutions cannot be achieved.

The site has been identified as vulnerable land use in a bushfire prone area and therefore SPP 3.7 Clause 6.6 would apply. According to SPP 3.7, vulnerable uses are those that are considered to have occupants with a lesser capacity to respond in the event of a bushfire and that may present evacuation challenges. Such uses include hospital, nursing homes and retirement villages, tourist accommodation including camping grounds and eco-tourism, childcare centres, educational establishments, places of worship and corrective institutions. This definition may also encompass places of assembly, retail and office premises as well as subsidiary uses of residential development, such as family day care centres or home businesses, and essential infrastructure such as energy, transport, telecommunications and other utilities.

Vulnerable land use is required by SPP 3.7 to be assessed against the bushfire protection criteria as well as the creation of a Bushfire Management Plan, which includes an emergency evacuation plan for residents.

7.1.1 Element 1: Location

Table 5: Bushfire Protection Criteria for Element 1: Location

Item	Description
Intent	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.
Performance Principle P1	The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be made moderate or low, or a BAL-29 or below, and the risk can be managed. For unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of the Department of Fire and Emergency Services (DFES) and the decision-maker.
Acceptable Solution A1.1 – Development Location	
The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL-29 or below.	
Explanatory Note	

Item	Description
	Land is most suitable for land use intensification where hazard levels are low. Where there is an extreme bushfire hazard or requirement for use of BAL-40 or BAL-FZ construction standards, the land is not considered suitable for development unless it meets the definition of minor or unavoidable development.
Compliance	
Not Applicable <input type="checkbox"/>	Comply <input checked="" type="checkbox"/>
Does Not Comply <input type="checkbox"/>	
Comment	
<p>The area on site to be developed is located where the bushfire hazard assessment on completion will be MODERATE or LOW. However, the proposed administration office, activity building, toilet blocks, laundry block and kitchen blocks are subject to BAL between BAL-29 to BAL-FZ due to proximity to the surrounding vegetation. Notwithstanding, the bushfire risk for these new blocks can be managed through maintaining the required separation from the surrounding vegetation and asset protection zones to reduce the BAL for the proposed buildings from BAL-FZ to BAL-29.</p> <p>Construction of the proposed residential bunkhouses to meet AS 3959 for the appropriate BAL. Whilst AS 3959 only applies to residential Class 1, 2 and 3 buildings or Class 10 buildings or decks associated with Class 1, 2 or 3 buildings in designated bushfire prone areas, the adoption of the construction requirements for the proposed non-residential buildings up to the discretion of the owner.</p>	

7.1.2 Element 2: Siting and Design of Development

Table 6: Bushfire Protection Criteria for Element 2: Siting and Design of Development

Item	Description
Intent	To ensure that the siting and design of development minimizes the level of bushfire impact.
Performance Principle P2	The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. That is incorporates a defensible space and significantly reduces intensities at the building surface thereby minimising the bushfire risk to people property and infrastructure, including compliance with AS 3959 if appropriate.
Acceptable Solution A2.1 – Asset Protection Zone (APZ)	
<p>Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:</p> <ul style="list-style-type: none"> • Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29 kW/m² (BAL-29) in all circumstances. • Location: 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 (see explanatory notes). • Management: the APZ is managed in accordance with the requirements of ‘Standards for Asset Protection Zones’. (see Schedule 1). 	
Explanatory Notes	
<u>E2 Subdivision and Development Design</u>	
<p>Identification and consideration of bushfire risks in decision-making should occur at all stages of the planning and development process and should influence siting and design of subdivision and development. Once a subdivision and related development has been designed or established, experience has shown that incorporating bushfire protection measures is generally harder to</p>	

Item	Description	
	<p>achieve.</p> <p>Land is most suitable for new subdivisions and related development where hazard levels are low. Where residents and buildings cannot be protected from a bushfire hazard the land may not be suitable for development.</p> <p>The design and layout of subdivision and development can reduce the vulnerability of dwellings and residents from impact of a bushfire. Appropriate design will greatly assist with bushfire prevention and suppression operations. Hazard separations should be considered and integrated during initial planning states. Public roads, including footpaths and verges, can be combined to increase separation between the buildings and bushfire prone vegetation.</p> <p>Separation may also be needed where a bushfire hazard exists within a subdivision area. The hazard may be a wetland and the wetland buffer, gullies, waterways and their foreshore areas, public open space with remnant vegetation or where revegetation is proposed.</p> <p>Undeveloped future stages of the subdivision, containing bushfire prone vegetation, will also need to be taken into consideration. Even if the hazard will be cleared at a subsequent state.</p> <p><u>E2.1 Asset Protection Zones (APZ)</u></p> <p>An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level. The width of the required APZ varies with slope and vegetation. The APZ should at a minimum be of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29 kW/m² (BAL-29). It should be lot specific. Hazard separation in the form of using subdivision design elements (refer to E2) or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot.</p> <p>The APZ includes a defensible space which is an area adjoining the asset within which fire-fighting operations can be undertaken to defend the structure. Vegetation within the defensible space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defensible space is dependent on the space which is available on the property, but as a minimum should be 3 metres.</p> <p>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.</p> <p>APZs can adversely affect the retention of native vegetation. Where 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 in order to minimise the removal and modification of remnant vegetation.</p> <p>It is the responsibility of the landowner/proponent to maintain their APZ in accordance with Schedule 1 'Standards for Asset Protection Zones'. It is further recommended that maintenance of the APZs is addressed through the local government firebreak notice, issued under s33 of the <i>Bushfire Act 1954</i>, and preferable included in a Bushfire Management Plan specifically as a how-to guide for the landowner.</p>	
Compliance		
Not Applicable <input type="checkbox"/>	Comply <input checked="" type="checkbox"/>	Does Not Comply <input type="checkbox"/>
Comment		
<p>The proposed buildings will be designed to meet the Acceptable Solution by maintaining the required separation from the surrounding vegetation to achieve a BAL no higher than BAL-29. The APZ is to be provided in accordance with Schedule 1 of the Guidelines for Planning in Bushfire Prone Areas. A BAL assessment needs to be undertaken to determine the required APZ width</p>		

7.1.3 Element 3: Vehicular Access

Table 7: Bushfire Protection Criteria for Element 3: Vehicular Access

Item	Description
Intent	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.
Performance Principle P3	The internal layout, design and construction of public and private vehicular access and egress in the subdivision/development allow emergency and other vehicles to move through it easily and safely at all times.
Acceptable Solution A3.1 – Two Access Routes	
Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.	
Explanatory Note E3.1 – Two Access Routes	
<p>It is essential that residents and the community, as well as emergency services, have safe access and egress from both the subdivision and individual houses/development. It is the developer's responsibility, as part of the Bushfire Hazard Level assessment, to ensure that subdivision and development design allow for bushfire protection criteria to be met regarding driveways and turnaround areas at house sites.</p> <p>It is also necessary that the public have two safe access options leading to two different destinations that can withstand all weather conditions. This applies to access routes leading into a subdivision, as well as those within a subdivision. This acceptable solution allows for the situation if a vehicular access/ egress route to a subdivision or lot becomes blocked during a fire then there is an alternative vehicular access/egress route which provides access to a different destination. Accordingly, road widening in lieu of providing two different access routes should not be supported. All access should be suitable to accommodate type 3.4 fire appliances (i.e. fire trucks with a four-wheel-drive 7-tonne chassis).</p> <p>Two-way access should be provided as a public road; however, where a public road cannot be provided, (this will need to be demonstrated by the proponent providing justification for why this cannot be achieved) an emergency access way may be considered.</p>	
Compliance	
Not Applicable	<input type="checkbox"/>
Comply	<input checked="" type="checkbox"/>
Does Not Comply	<input type="checkbox"/>
Comment	
There are currently two access roads (shown in Figure 12) from Roe Close which provide access and egress from the site. These access roads will be maintained as part of the proposed land development.	



Figure 12 – Two access points into site from Roe Close

Acceptable Solution A3.2 – Public Road

- A public road is to meet the requirements in Table 4, Column 1 (Refer to table below).

Technical Requirements	1 Public Road
Minimum trafficable surface (m)	6*
Horizontal clearance (m)	6
Vertical clearance (m)	4.5
Maximum grade < 50 metres	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5
*Refer to E3.2 Public roads: Trafficable surface	

Explanatory Note E3.2 – Public Road

Trafficable Surface

Widths quoted for access routes refer to the width of the trafficable surface. A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metre wide paving one metre wide constructed road shoulders.

In special circumstances, where eight lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of 90 metres may be provided subject to the approval of both the local government and Department of Fire and Emergency Services (DFES).

Public Road Design

All roads should allow for two-way traffic to allow conventional two-wheel drive vehicles and fire appliances to travel safely on them.

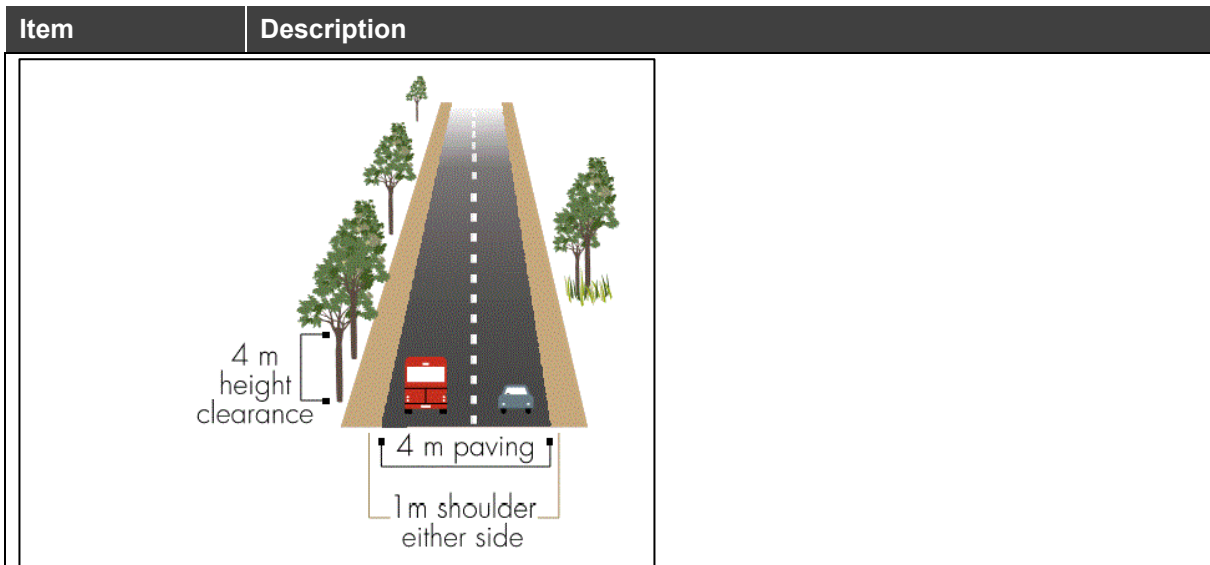


Figure 13 – Minimum design requirements for a public road

Compliance

Not Applicable Comply Does Not Comply

Comment

Existing Roe Close is a two-way traffic road with a trafficable surface of more than 6 m.

Acceptable Solution A3.3 – Cul-de-sac (including a dead-end road)

A cul-de-sac and/or a dead-end road should be avoided in bushfire prone areas.

Where no alternative exits (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), the following requirements are to be achieved:

- Requirements in Table 4, Column 2 (Refer to below);

Technical Requirements	2 Cul-de-sac
Minimum trafficable surface (m)	6
Horizontal clearance (m)	6
Vertical clearance (m)	N/A
Maximum grade < 50 metres	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5

- Maximum length: 200 metres (if public emergency access is provided between cul-de-sac heads maximum length can be increased to 600 metres provided no more than eight lots are serviced and the emergency access way is no more than 600 metres; and
- Turn-around area requirements, including a minimum 17.5 metre diameter head.

Explanatory Note E3.3 – Cul-de-sac

In bushfire prone areas, a cul-de-sac subdivision layout is not favoured because they do not provide access in different directions for residents. In some instances it may be possible to provide an emergency access way between cul-de-sac heads to a maximum distance of 600 metres, so as to

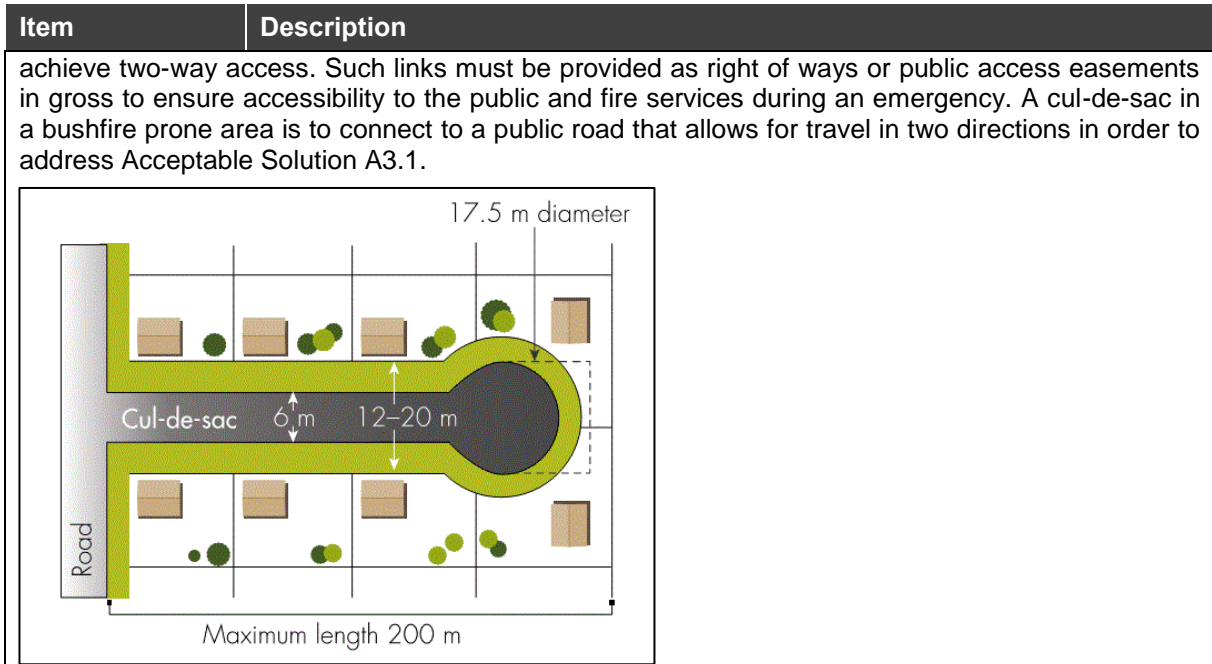


Figure 14 – Minimum design requirements for a cul-de-sac

Compliance

Not Applicable	<input checked="" type="checkbox"/>	Comply	<input type="checkbox"/>	Does Not Comply	<input type="checkbox"/>
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Comment

Not Applicable

Acceptable Solution A3.4 – Battle-Axe

Battle-axe access leg should be avoided in bushfire prone areas. Where no alternative exits, (this will need to be demonstrated by the proponent) all of the following requirements are to be achieved:

- Requirements in Table 4, Column 3 (Refer to below);

Technical Requirements	3 Private driveway
Minimum trafficable surface (m)	4
Horizontal clearance (m)	6
Vertical clearance (m)	4.5
Maximum grade < 50 metres	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5

- Maximum length: 600 metres; and
- Minimum width: six metres

Explanatory Note

In bushfire prone areas, lots with battle-axe access legs should be avoided because they often do not provide two-way access and egress for residents and may be easily blocked by falling trees or

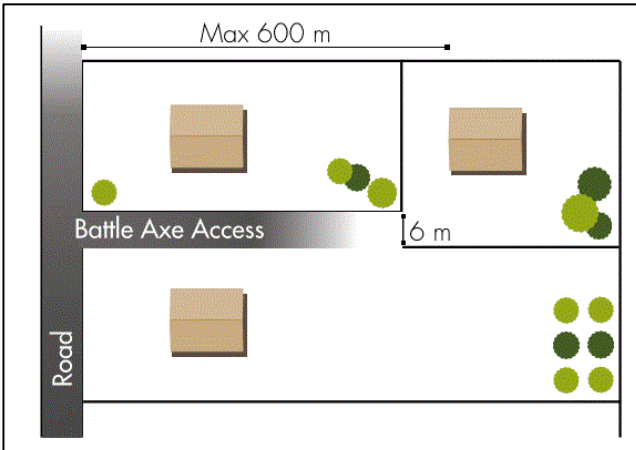
Item	Description
	<p>debris. In some instances, however; it may be appropriate for battle-axe access to be used to overcome specific site constraints. Where used, they should comply with the minimum standards for private driveways.</p> <p>Passing bays should be provided at 200 metre intervals along battle-axe access legs to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres.</p> <p>Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at house sites and at 500 metre intervals along the access leg.</p> 

Figure 15 – Minimum design requirements for a battle-axe

Compliance

Not Applicable	<input checked="" type="checkbox"/>	Comply	<input type="checkbox"/>	Does Not Comply	<input type="checkbox"/>
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Comment

Not Applicable

Acceptable Solution A3.5 – Private Driveway Longer than 50 metres

A private driveway is to meet all of the following requirements:

- Requirements in Table 4, Column 3 (Refer to below);

Technical Requirements	3 Private driveway
Minimum trafficable surface (m)	4
Horizontal clearance (m)	6
Vertical clearance (m)	4.5
Maximum grade < 50 metres	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5

- Required where a house site is more than 50 metres from a public road;
- Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of

Item	Description
	<p>two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres);</p> <ul style="list-style-type: none"> • Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 m) and within 50 metres of a house; and • Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes. • All-weather surface (i.e. compacted gravel, limestone or sealed).

Explanatory Note

For a driveway shorter than 50 metre, fire appliances typically operate from the street frontage however where the distance exceeds 50 metres, then fire appliances will need to gain access along the driveway in order to defend the property during a bushfire. Where house sites are more than 50 metres from a public road, access to individual houses and turn-around areas should be available for both conventional two-wheel drive vehicles of residents and type 3.4 fire appliances.

Turn-around areas should be provided at 200 metres intervals along private driveways to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres.

Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at the house sites and at 500 metre intervals along the driveway.

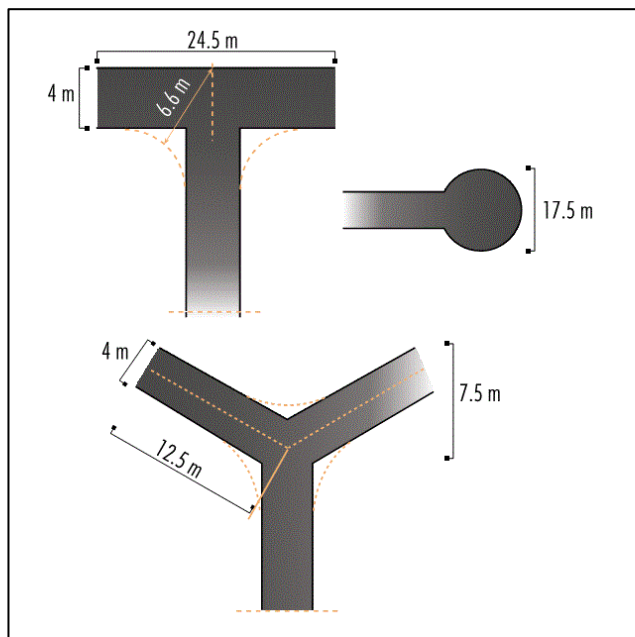


Figure 16 – Design requirements for a private driveway longer than 50 metres

Compliance

Not Applicable	<input type="checkbox"/>	Comply	<input checked="" type="checkbox"/>	Does Not Comply	<input type="checkbox"/>
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Comment

The existing development is accessible from Roe Close via gravel roads. The proposed development will also be accessible via the existing and new gravel roads.

Acceptable Solution A3.6 – Emergency Access Way

An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an

Item	Description
<p>emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet all the following requirements:</p> <ul style="list-style-type: none"> Requirements in Table 4, Column 4; 	
<p>Technical Requirements</p>	<p>4 Emergency access way</p>
<p>Minimum trafficable surface (m)</p>	<p>6*</p>
<p>Horizontal clearance (m)</p>	<p>6</p>
<p>Vertical clearance (m)</p>	<p>4.5</p>
<p>Maximum grade < 50 metres</p>	<p>1 in 10</p>
<p>Minimum weight capacity (t)</p>	<p>15</p>
<p>Maximum crossfall</p>	<p>1 in 33</p>
<p>Curves minimum inner radius (m)</p>	<p>8.5</p>
<p>*Refer to E3.2 Public roads: Trafficable surface</p>	
<ul style="list-style-type: none"> No further 600 metres from a public road; Provided as right of way or public access easement in gross to ensure accessibility to the public and fire services during an emergency; and Must be signposted. 	
<p>Explanatory Note E3.6 – Emergency Access Way</p>	
<p>An emergency access way is not a preferred option however may be used to link up roads to allow alternative access and egress during emergencies where traffic flow designs do not allow for two-way access. Such access should be provided as a right-of-way or easement in gross to ensure accessibility to the public and fire emergency services during an emergency.</p>	
<p>The access should comply with minimum standards for a public road and should be signposted. Where gates are used to control traffic flow during non-emergency periods, these must not be locked. Emergency access ways are to be no longer than 600 metres and must be adequately signposted where they adjoin public roads.</p>	
<p>Where an emergency access way is constructed on private land, a right of way or easement in gross is to be established.</p>	

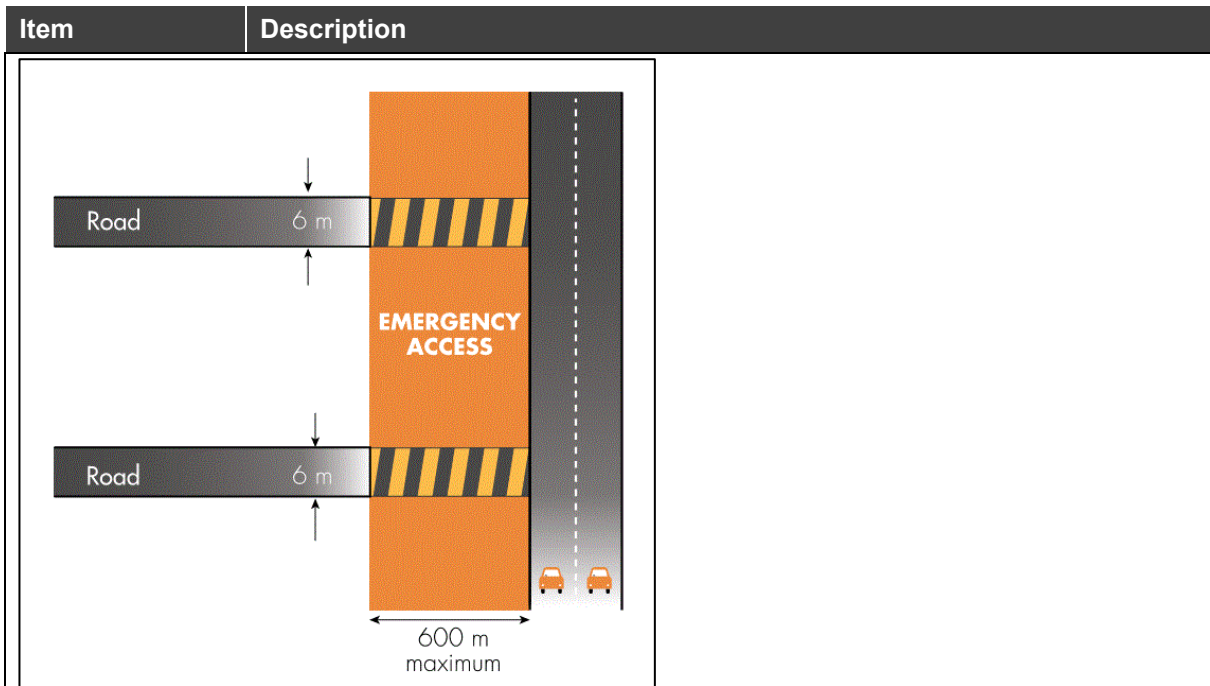


Figure 17 – Minimum design requirements for an emergency access way

Compliance

Not Applicable Comply Does Not Comply

Comment

Not Applicable

Acceptable Solution A3.7 – Fire Service Access Routes (Perimeter Roads)

Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire-fighters and link between public road networks for fire-fighting purposes. Fire service access routes are to meet the following requirements:

- Requirements Table 4, Column 5;

Technical Requirements	5 Fire service access routes
Minimum trafficable surface (m)	6*
Horizontal clearance (m)	6
Vertical clearance (m)	4.5
Maximum grade < 50 metres	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5
*Refer to E3.2 Public roads: Trafficable surface	

- Provided as right of ways or public access easements in gross to ensure accessibility to the

Item	Description
	<p>public and fire services during an emergency;</p> <ul style="list-style-type: none"> • Surface: all-weather (i.e. compacted gravel, limestone or sealed) • Dead end roads are not permitted; • Turn-around areas designated to accommodate type 3.4 appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres); • No further than 600 metres from a public road; • Allow for two-way traffic and; • Must be signposted.
<p>Explanatory Note E3.7 – Fire Service Access Routes (Perimeter Roads)</p>	
<p>Fire service access routes should be established to separate bushfire prone areas from developed areas, and to provide access within and around the edge of subdivisions and related development. Fire service access is used during bushfire suppression operations but can also be used for fire prevention work.</p> <p>Fire service access routes should:</p> <ul style="list-style-type: none"> • Link up with the road network at regular intervals – the development and road network forms part of the fire service access system; • Be adequately signposted; • Allow for two-way traffic – that is, two fire appliances must be able to safely pass each other; • Have an all-weather surface (i.e. compacted gravel, limestone or sealed); and • Have erosion control measures in place. <p>Driveways may be used as part of the designated fire service access system, provided they meet the minimum standard for fire service access routes. It is beneficial to link the fire service access routes with individual driveways to allow quick access to properties and houses during fire emergencies.</p> <p>Where gates are used, these should be wide enough to accommodate type 3.4 fire appliances (minimum width of 3.6 m) with the design and construction to be approved by the relevant local government. Gates on fire service access routes may be locked to restrict access provided that a common key system is used and such keys are made available for fire appliances and designated fire officers within the local government area and/or surrounding district. Gates should be installed where fences cross fire service access routes.</p> <p>Management and access arrangements should be in place to ensure that the maintenance of fire service access routes will occur in the long term after an area has been subdivided. A number of options can be used to achieve this, including but not limited to:</p> <ul style="list-style-type: none"> • Individual property owners being responsible for maintaining fire service access routes where these fall on their property; • Providing such access as a right-of-way or easement in gross to ensure accessibility to fire services during an emergency and/or • A levy system administered by local government to cover the cost of maintaining fire service access routes. • Such arrangement should be documented in the relevant planning application (such as a structure plan, subdivision plan or development plan) and should be agreed to by local government. 	
<p>Compliance</p>	
<p>Not Applicable <input checked="" type="checkbox"/></p>	<p>Comply <input type="checkbox"/></p>
<p>Does Not Comply <input type="checkbox"/></p>	
<p>Comment</p>	
<p>Not Applicable</p>	
<p>Acceptable Solution A3.8 – Firebreak Width</p>	
<p>Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of</p>	

Item	Description
	three metres or to the level as prescribed in the local firebreak notice issued by the local government.
Compliance	
Not Applicable <input type="checkbox"/>	Comply <input checked="" type="checkbox"/>
	Does Not Comply <input type="checkbox"/>
Comment	
The existing and proposed development will comply with the annual firebreak notice of the City of Greater Geraldton.	

7.1.4 Element 4: Water

Table 8: Bushfire Protection Criteria for Element 4: Water

Item	Description
Intent	To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.
Performance Principle P4	The subdivision, development or land use is provided with a permanent and secure water supply that is sufficient for fire-fighting purposes.
Acceptable Solution A4.1 – Reticulated Areas	
The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services (DFES).	
Compliance	
Not Applicable <input checked="" type="checkbox"/>	Comply <input type="checkbox"/>
	Does Not Comply <input type="checkbox"/>
Explanatory Note E4.1 – Reticulated Areas	
Water supply authorities in Western Australia include the Water Corporation, Aqwest and the Busselton Water Board. The Water Corporation’s ‘No. 63 Water Reticulation Standard’ is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities’ conditions apply.	
Comment	
Not Applicable	
Acceptable Solution A4.2 – Non-Reticulated Areas	
Water tanks for fire-fighting purposes with a hydrant or standpipe area provided and meet the following requirements: <ul style="list-style-type: none"> • Volume: minimum 50,000 litres per tank; • Ratio of tanks to lots: minimum one tank per 25 lots (or part thereof); • Tank location: no more than two kilometres to the further most house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turn-around time at legal road speeds; • Hardstands and turn-around areas suitable for a type 3.4 fire appliance (i.e. kerb to kerb 17.5 metres) are provided within three metres of each water tank; and • Water tanks and associated facilities are vested in the relevant local government. 	
Explanatory Note E4.2 – Non-Reticulated Areas	
A procedure must be in place to ensure that water tanks are maintained at or above the designated capacity, including home tanks on single lots, at all times. This could be in the form of an agreement	

Item	Description				
with the local government and the fire service.					
Compliance					
Not Applicable	<input type="checkbox"/>	Comply	<input checked="" type="checkbox"/>	Does Not Comply	<input type="checkbox"/>
Comment					
Water supply on site is to meet the acceptable solution in the form of a water tank with a minimum full capacity of 50,000 litres for fire-fighting.					
Acceptable Solution A4.3 – Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)					
<ul style="list-style-type: none"> Single lots above 500 m² need a dedicated static water supply on the lot that has the effective capacity of 10,000 litres. 					
Compliance					
Not Applicable	<input checked="" type="checkbox"/>	Comply	<input type="checkbox"/>	Does Not Comply	<input type="checkbox"/>
Comment					
Not Applicable					

7.2 Environmental Conservation

According to Clause 2.3 in the Guideline for Planning in Bushfire Prone Areas, many bushfire prone areas also have high biodiversity values. Objective 5.4 of SPP 3.7 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values. Such areas according to SPP 3.7 Clause 2.3 may include wetlands, foreshores, Bush Forever sites, remnant vegetation, threatened species and ecological communities, nature reserves and coastal reserves.

The planning assessments should consider where applicable but not limited to the following in implementing SPP 3.7 objective 5.4 where applicable:

- SPP 2: Environmental and Natural Resources Policy (WAPC, 2003);
- SPP 2.6: State Coastal Planning Policy (WAPC, 2013);
- SPP 2.8: Bushland Policy for the Perth Metropolitan Region (WAPC, 2010);
- SPP 2.9: Water Resources (WAPC, 2006);
- Visual Landscape Planning in Western Australia (WAPC, 2007);
- And City of Greater Geraldton Local Biodiversity Strategy 2013.

8 BUSHFIRE MANAGEMENT AND PLAN CHECKLIST

8.1 Bushfire Management Measures Implementation and Enforcement

Table 9: Bushfire Management Measures and Responsible Parties

Bushfire Management Measures and Environmental Conservation	Responsible Party for Compliance
<ul style="list-style-type: none"> • Ensure anyone listed as having a responsibility under the Plan has endorsed it and is provided with a copy for their information including future landowners/proponents where the Bushfire Management Plan was prepared as part of a subdivision application. This would typically include landowners/proponents, local government and any other relevant authorities and referral agencies. • Ensure that the Bushfire Management Plan is jointly endorsed by the City of Geraldton and DFES prior to implementation. • Develop an emergency evacuation plan for residents. Evacuation Planning Handbook 4, 3rd Edition 2013) produced by the Australian Emergency Management Institute of the Commonwealth Attorney General's Department may be used. • Ensure that proposed buildings (i.e. residential and non-residential) on the site are not constructed within areas of the site that are identified as having EXTREME Bushfire Hazard Level or BAL rating of BAL-40 or BAL-FZ unless vegetation clearing is possible to reduce the bushfire hazard. • Locate proposed buildings within LOW or MODERATE Bushfire Hazard Level areas on site and maintaining required separation (APZ) from the surrounding vegetation to achieve a BAL no higher than BAL-29. • Ensure that the construction of the proposed residential bunkhouses meets AS 3959 for the appropriate BAL. • Consider adopting construction requirements of AS 3959 for proposed non-residential buildings on site for the appropriate BAL. Adoption of AS 3959 for non-residential buildings is up to the discretion of the owner. Note that if AS 3959 is to be adopted for the proposed non-residential buildings, a BAL assessment to be carried out for these proposed-non-residential buildings. • Maintain the Asset Protection Zone (APZ) as determined by a BAL assessment is to be provided in accordance with Schedule 1 of the Guidelines for Planning in Bushfire Prone Areas. • Maintain two access routes from Roe Close into the site. • Improve (if required) and maintain existing gravel road to comply with Acceptable Solution A3.5. • Ensure construction of new roads on the site for the proposed buildings comply with Acceptable Solution A3.5. • Create and maintain fire break of minimum width of 3 m or to the level as prescribed in the local firebreak notice issued by the City of Greater of Geraldton. • Installation of 50,000 litre full capacity water tank for fire-fighting. Consultation with DFES may be required. • Any vegetation clearing is to be carried out in accordance with the City of Greater Geraldton Local Biodiversity Strategy 2013 and other applicable legislation. • Ongoing review and implementation of the Bushfire Management Plan to ensure that the Bushfire Management Measures remain effective. This also includes implementing the relevant separation distances and ensuring adequate access is provided prior to the clearance of subdivision conditions. 	Owner
<ul style="list-style-type: none"> • Review, comment and endorse Bushfire Management Plan. • Provide advice to fire-fighting issues relating to bushfires including access and water supply. 	DFES

Bushfire Management Measures and Environmental Conservation	Responsible Party for Compliance
<ul style="list-style-type: none"> Review, comment and endorse Bushfire Management Plan. Ensure ongoing compliance of bushfire management measures. Provide guidance and advice for vegetation clearing on site if required. Keep a register or record of this site having a Bushfire Management Plan to identify servicing and infrastructure gaps, and help inform district-level bushfire risk management planning. Ensure annual Fire Break Notices reference the need for owners to comply with any existing endorsed Bushfire Management Plan. 	<p>City of Greater Geraldton</p>

8.2 Proposal Compliance and Justification

The SPP 3.7 objectives are summarised in Table 10.

Table 10: Policy Objectives of SPP 3.7

SPP 3.7 Objective	Description of Objective
5.1	Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.
5.2	Reduce vulnerability to bushfire through the identification and consideration of bush fire risk in decision-making at all stages of the planning and development process.
5.3	Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.
5.4	Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity with consideration of potential impacts of climate change.

Objectives 5.1, 5.2 and 5.3 are met through the Bushfire Management Plan which considers SPP 3.7, the Guidelines for Planning in Bushfire Prone Areas, and AS 3959.

Objective 5.4 will be met subject to meeting the relevant legislation associated with land use and vegetation clearing for the site.

9 REFERENCE

AEMI. (n.d.). *Evacuation Planning, Handbook 4, 3rd Edition*. Australia: Australian Emergency Management Institute.

AS 3959. (2009). *Construction of Buildings in Bushfire-Prone Areas (incorporating Amendment Nos. 1, 2 and 3)*. NSW, Australia: Standards Australia.

Bureau of Meteorology. (n.d.). *Climate Statistics for Australian Locations*. Retrieved May 5, 2017, from Bureau of Meteorology: http://www.bom.gov.au/climate/averages/tables/cw_008050_All.shtml

Bush Fire Act 1954. (n.d.). Western Australia: Department of Fire and Emergency Services.

Environmental Protection Act 1986. (n.d.). Australia: Australian Government.

Fire and Emergency Services Act 1998. (n.d.). Western Australia: Department of Fire and Emergency Services.

Local Biodiversity Strategy, 22 October 2013. (n.d.). City of Greater Geraldton.

Planning and Development (Local Planning Schemes) Regulations 2015. (n.d.). Western Australia: Department of Planning.

Planning and Development Act 2005. (n.d.). Western Australia : Department of Planning .

State Planning Policy No. 2.8, Bushland Policy for the Perth Metropolitan Region. (2010). Perth, WA, Australia: Western Australian Planning Commission.

WA Department of Commerce. (2011). *WA Building Act 2011*. Western Australia: WA Department of Commerce.

WA Department of Commerce. (2012). *Building Regulations 2012*. Western Australia: WA Department of Commerce.

WAPC. (2006). *State Planning Policy No. 2.9, Water Resources*. Perth, WA, Australia: Western Australian Planning Commission.

WAPC. (2007). *Visual Landscape Planning in Western Australia*. Perth, WA, Australia: Western Australian Planning Commission.

WAPC. (2013). *State Planning Policy No. 2.6, State Coastal Planning Policy*. Perth, WA, Australia: Western Australian Planning Commission.

WAPC. (2015). *State Planning Policy No. 3.7, Planning in Bushfire Prone Areas (December 2015)*. Perth, WA, Australia: Western Australia Planning Commission.

WAPC. (2017). *Guidelines for Planning in Bushfire Prone Areas, Version 1.1 (February 2017)*. Perth, WA, Australia: Western Australia Planning Commission.

WAPC. (n.d.). *Statement of Planning Policy No. 2, Environment and Natural Resources Policy*. Perth, WA, Australia: Western Australia Planning Commission.

APPENDIX A BUSHFIRE ATTACK LEVEL (BAL) ASSESSMENT FOR PROPOSED RESIDENTIAL BUNKHOUSES



Complete Fire Design

BUSHFIRE ATTACK LEVEL ASSESSMENT REPORT

Lot 25, 30 Roe Close, Mount Hill WA 6528

Prepared For:

4D PROJECTS



BUSHFIRE ATTACK LEVEL ASSESSMENT REPORT

Hope Springs Farm – Proposed Residential Bunkhouses
Lot 25, 30 Roe Close, Mount Hill WA 6528

Prepared For:
4D Projects

Document No. 1701093BAL
23 January 2017

PREPARED BY:

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Engineering Manager
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DOCUMENT CONTROL

This section provides version history and related document references relevant to this document.

Current Version

Our Reference	Comments		
1701093BAL 17 January 2017			
	Prepared by:	Checked by:	Approved by:
	Chadwick Barron BPA36543	Daniel Wong	Walther Groenewald

EXECUTIVE SUMMARY

Complete Fire Design (CFD) has been appointed by 4D Projects to undertake a Bushfire Attack Level (BAL) assessment for the proposed residential bunkhouses located at Lot 25, 30 Roe Close, Mount Hill WA 6528. The site detail is presented in Table 1.

Table 1: Site Details

Site Details					
Street	30 Roe Close				
Suburb:	Mount Hill	State	WA	Postcode	6528
Local Government Area:	City of Greater Geraldton				
Description of Building Works	New Residential Bunkhouses				

The proposed development has been determined in accordance with Clause 2.2.6 of AS 3959-2009 to have a BAL rating of BAL – 12.5.

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1 INTRODUCTION

1.1 General

This document presents the Bushfire Attack Level (BAL) assessment for the proposed residential bunkhouses at 30 Roe Close, Mount Hill WA 6528.

1.2 Purpose of this Document

The purpose of this BAL assessment report is to document the site measurements and BAL assessment for the site.

1.3 Referenced Documents and Drawings

The following documents and drawings listed in Table 2.

Table 2: Reference Documents and Drawings

Document/ Drawing No.	Description	Organization	Date	Revision
-	Aerial Lot 25 Full Site	4D Projects	Via Email dated 9 Jan 2017	-
-	Land Use Concept Plan	Yilgarn Consulting	15 May 2014	-
15552FS01-1	Feature Survey & Aerial	Quantum Surveyors	12 Nov 2014	-
-	Site Plan	Quantum Surveyors	20 Oct 2016	-

2 ASSUMPTIONS AND LIMITATIONS

2.1 Assumptions

- The Bushfire Attack Level (BAL) assessment contained in this document assumes that the buildings will comply with the BCA except as addressed in Performance Solutions prepared by suitably qualified persons.
- All fire safety measures required by the BCA and forming part of BAL assessment in this report are designed, installed or constructed, and commissioned in accordance with respective manufacturers' recommendations, guidelines and instructions.
- All fire safety measures required by the BCA and forming part of the BAL assessment in this report are assumed to be maintained to ensure that they operate as intended during a fire event.
- All codes and standards referred in this report are assumed to be the current version at the time of design and installation as referenced by the relevant version of the Building Code of Australia, or as nominated in this report.

2.2 Exclusions and Qualifications

- Any changes on the site, surrounding areas, building, occupant or fuel conditions outside of those considered in this report, or any deviation in the implementation of the fire safety strategy outlined in this report, may result in outcomes not anticipated by the strategy, and should be reviewed by a suitably qualified person.
- The BAL assessment contained in this document does not consider acts of malicious intent, arson, terrorism or 'Force Majeure' events.
- The BAL assessment contained in this report is based on the version of the documentation as referenced in this report. It is the responsibility of the Client to inform CFD of any version changes to the documentation.
- Survivability of the building on every bushfire event, total property protection, business interruption, environmental protection and insurance requirements are not specifically considered in the assessment.
- The fire safety concepts outlined in this report assumes a complete and operational building, and do not address protection of the building during construction, renovation or demolition.
- It is assumed that only compliance with the Building Code of Australia is required. It is noted that the objectives of the Building Code of Australia are to provide an adequate level of life safety, fire brigade intervention and the prevention of fire spread or damage to other buildings. The protection of the property and its contents is not considered and is a matter for the owner and their insurer.
- This BAL assessment is applicable to the site based on the extent, types and conditions of vegetation observed at the time of the assessment only. In the event that the extent, types and conditions of vegetation change, a new BAL assessment will be required.
- Construction of a building or structure in accordance with the recommended materials, elements or systems under AS3959-2009 for a nominated BAL classification does not guarantee or ensure that a building or structure will 'survive' or remain structurally sound in, or following, a bushfire event on every, or any occasion.
- The calculations and application of Method 1 assessment are based on 'models' and may not address or acknowledge the degree of vegetation management, specific regional climatic conditions, specific vegetation species present, the unpredictable nature and behaviour of fire, or extreme weather conditions that may or may not be associated with a specific site or specific set of circumstances associated with a particular fire event.

- Fire is destructive and therefore although building elements may appear to survive a fire, these fire-affected elements will be compromised and may require removal and replacement to ensure correct operation or integrity in a future fire event. Following a fire event it is critical that an inspection of the building or structure is undertaken by a suitably qualified person to determine the integrity and structural soundness of all building elements and its associated structure.
- It is also important to understand that specific fire events or periods of ember attack associated with a specific fire may exceed those modelled or nominated under AS3959-2009 and may result in a building/structure being exposed to radiant heat flux and ember attack higher and for a longer period than calculated within the models or determined utilising Method One of AS3959-2009.
- Sections 3 to 9 inclusive of AS3959-2009 outline acceptable construction methods, systems and building elements for each corresponding BAL classification with recommendations based on the deemed to comply provisions within the code.

It is the property owner(s) responsibility to manage vegetation and fuel loads on their property, as well as maintaining asset protection zones adequately and prepare themselves, their property, and assets for a fire event.

3 SITE ASSESSMENT AND SITE PLAN

3.1 Description of Site

The site is located at 30 Roe Close, Mount Hill WA 6528. The site plan showing the development in relation to the surrounding allotments and roads is provided in Figure 1.

The assessment of this development was undertaken for the purpose of determining the Bushfire Attack Level (BAL) in accordance with AS 3959 – 2009 Simplified Procedure (Method 1). The assessment was carried out on 20 January 2017.

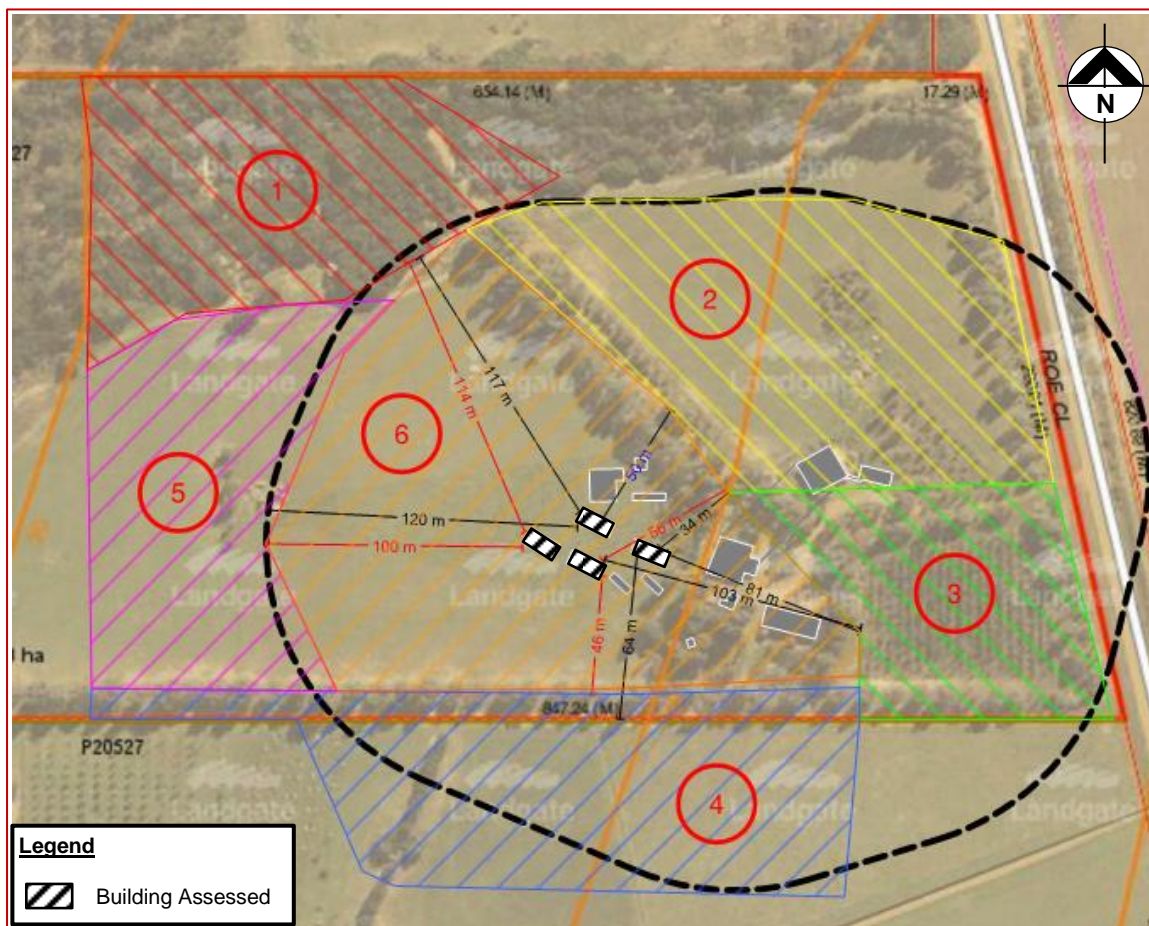














Figure 1 – Layout of site




3.2 Vegetation Classification




All vegetation within 100 m of the proposed development has been classified in accordance with Clause 2.2.3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following tables.

Plot	1	Classification or Exclusion Clause	Clause 2.2.3.2 (a)
Effective Slope	2.2°(↓)	Separation Distance	114 m
Additional Information/Justification	Closed shrub 2 to 10 m acacia trees with closed understorey.		
			
<i>Photo ID: Appendix 2</i>		<i>Photo ID: Appendix 3</i>	
			
<i>Photo ID: Appendix 4</i>			
Note: (↓) – Downslope, (↑) - Upslope			

Plot	2	Classification or Exclusion Clause	B and G
Effective Slope	2.4°(↑)	Separation Distance	56 m
Additional Information/Justification	Driveway 18 m vegetation strip adjoining grassland with low maintained paddock. Distance to another classified vegetation 130 m to 160 m.		
			
<i>Photo ID: Appendix 7</i>		<i>Photo ID: Appendix 9</i>	
			
<i>Photo ID: Appendix 10</i>		<i>Photo ID: Appendix 11</i>	
Note: (↓) – Downslope, (↑) - Upslope			

Plot	3	Classification or Exclusion Clause	D and G
Effective Slope	2.0°(↑)	Separation Distance	15 m to managed landscaping, 81 m to open shrub area and 34 m to driveway
Additional Information/Justification	Area of vegetation that will cause risk is located at front of property. Closed vegetation with no understorey.		
			
<i>Photo ID: Appendix 14</i>		<i>Photo ID: Appendix 15</i>	
			
<i>Photo ID: Appendix 18</i>		<i>Photo ID: Appendix 19</i>	
			
<i>Photo ID: Appendix 20</i>			
Note: (↓) – Downslope, (↑) - Upslope			

Plot	4	Classification or Exclusion Clause	B and G
Effective Slope	1.6° (↓)	Separation Distance	46 m
Additional Information/Justification	Line of gum trees open understorey adjoining grassland and another thin section of trees.		
			
<i>Photo ID: Appendix 22</i>		<i>Photo ID: Appendix 24</i>	
			
<i>Photo ID: Appendix 25</i>			
Note: (↓) – Downslope, (↑) - Upslope			

Plot	5	Classification or Exclusion Clause	D and G (Exclusion not applicable due to location of small cluster of trees within 100 m.
Effective Slope	2.6°(↓)	Separation Distance	100 m
Additional Information/Justification	Small cluster of trees 7 off adjoining unmanaged grassland.		
			
Photo ID: Appendix 27		Photo ID: Appendix 29	
			
Photo ID: Appendix 30			
Note: (↓) – Downslope, (↑) - Upslope			

3.3 Relevant Fire Danger Index

The fire danger index for this site has been determined in accordance with Table 2.1 or otherwise determined in accordance with a jurisdictional variation applicable to the site.

Fire Danger Index			
FDI 40 <input type="checkbox"/>	FDI 50 <input type="checkbox"/>	FDI 80 <input checked="" type="checkbox"/>	FDI 100 <input type="checkbox"/>
Table 2.4.5	Table 2.4.4	Table 2.4.3	Table 2.4.2

3.4 Potential Bushfire Impacts

The potential bushfire impact to the proposed development from each of the identified vegetation plots are identified in Table 3.

Table 3: BAL Analysis

Plot	Vegetation Classification	Effective Slope (°)	Separation (m)	BAL
1	Clause 2.2.3.2 (a)	0 - 5 (downslope)	114 m	BAL-LOW
2	B (Woodland) and G (Grassland)	0 (upslope or flat ground)	56 m	BAL-12.5
3	D (Closed Scrub) and G (Grassland)	0 (upslope or flat ground)	81 m	BAL-12.5
4	B (Woodland) and G (Grassland)	0 – 5 (downslope)	46 m	BAL-12.5
5	D (Closed Scrub) and G (Grassland)	0 – 5 (downslope)	100 m	BAL-12.5

3.5 Determined Bushfire Attack Level (BAL)

The determined Bushfire Attack Level (highest BAL) for the proposed development has been determined in accordance with Clause 2.2.6 of AS 3959-2009 using the above analysis.

Determined Bushfire Attack Level	BAL – 12.5
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4 REFERENCE

ABCB. (2016a). *NCC Series Volume One , BCA: Class 2 to Class 9 Buildings*. Canberra Australia: Australian Building Codes Board.

ABCB. (2016b). *NCC Series Guide to Volume One, BCA: Class 2 to 9 Buildings*. Canberra Australia: Australian Building Code Board.

AS 3959. (2009). *Construction of Buildings in Bushfire-Prone Areas (incorporating Amendment Nos. 1, 2 and 3)*. NSW, Australia: Standards Australia.

DFES. (n.d.). *Map of Bush Fire Prone Areas*. Retrieved January 23, 2016, from Regulation and Compliance:

<http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx>

SPP 3.7. (Planning in Bushfire Prone Areas, State Planning Policy 3.7 (December 2015 Issue)). 2015. Western Australia: Western Australian Planning Commission.

WA Department of Commerce. (2011). *WA Building Act 2011*. Western Australia: WA Department of Commerce.

WA Department of Commerce. (2012). *Building Regulations 2012*. Western Australia: WA Department of Commerce.