

Bushfire Management & Evacuation Plan



Pachamama Activity Centre

Lots 54 & 55 Coolinga Road

Lesmurdie

Shire of Kalamunda

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EXECUTIVE SUMMARY

This Bushfire Management and Evacuation Plan (BMEP) has been developed to assess bushfire hazard levels on and surrounding the site and to determine if the site can accommodate additional Child Care use. The proposal is consistent with the definition of 'vulnerable land uses' under SPP 3.7 therefore policy measure 6.6 in addition to other policy requirements apply. A comprehensive Bushfire Emergency Evacuation Plan has been developed in response to this policy trigger. The BMEP has been specifically developed to support the proposed additional childcare land use.

The subject land comprises Lots 54 and 55 Coolinga Road, Lesmurdie which is controlled by Pachamama Pty Ltd. The site is 3776.63m² in size and contains an existing residential dwelling and the Pachamama Activity Centre (**Appendix B**). The site is 4.5 kms south of Kalamunda (**Appendix A**) and the existing Activity Centre on Lot 55 is licenced as an OSHCare service to provide before and after school care and vacation care for 43 children.

The subject land is bordered by Coolinga Road on the northern perimeter and Gladys Road on the west. Welshpool Road is a major connector Road 60 metres to the south.

Pachamama Pty Ltd propose to convert the existing residential dwelling on Lot 54 into a Child Care centre. It is proposed that this new centre accommodates a total of 38 children: 8 babies (aged 0-2 years) and 30 school-aged children (aged 7-11).

In addition to this, there is an existing Pachamama Early Education and Childcare located at 36 Marri Crescent in Lesmurdie, which is across the street from the Pachamama Activity Centre. It is licensed as a long day care service to provide care and education for 69 children, ranging in ages from 6 weeks to 5 years.

The Bushfire Attack Level (BAL) Rating for the existing dwelling is BAL-29. It is obvious at the site that Pachamama comply with the Bush Fires Act (1954) and the Shire of Kalamunda Fire Break and Fuel Load Notice. They manage the property to APZ standards as outlined in the firebreak notice by having "all inflammable matter except living trees, shrubs, plants under cultivation and lawns, slashed, mowed or trimmed down by other means to a height no greater than 50mm across the entire property and have "Installed and maintain a building protection zone in accordance with the requirements set out in Part 11 of the Fire Break and Fuel Load Notice.

Multiple public roads exist around the site. A fire hydrant is located within 50 metres of the site and water supply complies with minimum standards. Surrounding public roads provide multiple evacuation options and access to the site.

Employees and children at the new service may face the threat of bushfire without warning, advice or assistance from fire authorities or emergency services. Self-reliance is essential. Early evacuation is the safest response to a bushfire.

Recommendations contained in this report detail strategies to mitigate this risk by outlining triggers to self-evacuate early, before a fire threatens either the Service or potential evacuation roads. Contingency plans such as sheltering on-site in a safer building and actively defending the property provide an alternative when safe evacuation is not possible. The existing Activity Centre building has been identified as the assembly building and 'safer building' on the site because it is a brick structure with brick stumps, fully rendered to the ground with the subfloor being fully enclosed (more than 400mm above ground), the eaves

are fully enclosed, the colorbond gutters and downpipes are new, with all gutters covered with gutter guard, all windows are new: aluminium with safety glass, the verandah is fully enclosed with colorbond exterior siding and aluminium windows with safety glass, all window have external metal fly screens, the external doors are solid timber with minimum thickness of 35mm, and all of the vans and busses are parked adjacent to this building for rapid evacuation

Other mitigation recommendations include the maintenance of vegetation management zones, water supply and staff training.

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1 INTRODUCTION

Pachamama Pty Ltd is a service provider in Lesmurdie that manages a Long Day Care (LDC) at 36 Marri Crescent and an Out of School Hours (OSHCare) Pachamama Activity Centre at Lot 55 Coolinga Road in Lesmurdie.

It is proposed to change the land use of the residential dwelling on the site into a Child Care Service that expands the existing Activity Centre. The proposed development would allow the expansion of the adjacent Activity Centre and an increase in children of up to 38 children: 8 babies (aged 0-2 years) and 30 school-aged children (aged 7-11). Based on this mix of ages, a total of up to 5 staff would be required at full capacity.

The site is located on Coolinga Road, Lesmurdie in the Shire of Kalamunda (**Appendix A**).

The two existing Pachamama facilities cater for up to 112 children and the gardens and landscapes are kept in a low fuel managed condition. The site is located 22 metres from Class A open forest vegetation which could carry an extreme fire event. A small area of weeds and forest vegetation also occurs in Coolinga Road Reserve. Extreme bushfire hazard areas are concentrated south of the site and south of Welshpool Road East.

People usually have two safe options when threatened by bushfire: leave early or stay and defend an adequately prepared property. Leaving early before a bushfire threatens is always the safest option. Sheltering in a well-prepared building that is being actively defended can provide a safe environment in some conditions.

Bushfires are unpredictable so it is difficult for fire authorities, police and government to offer uniform advice on when to evacuate and what roads to use for this purpose. Management must have contingency plans and be able to act independently to evacuate early or shelter on-site if necessary.

Bushfires are highly stressful situations. People often show signs of anxiety, such as a racing heart, dizziness and sweating (DFES 2015). Having a plan to follow helps avoid last minute decisions that can cost lives.

This report follows the Risk Management process described in the Australian Standard AS/NZS ISO 31000:2009. It is a systematic method for identifying, analysing, evaluating and treating emergency risks.

Early evacuation is always the safest option (AFAC 2010). This plan provides triggers to initiate early evacuation and contingency plans if this is found to be unsafe or impossible.

Community bushfire safety is a shared responsibility between governments, fire agencies, communities and individuals.

The bushfire mitigation strategies outlined in this plan, if fully implemented, will mitigate the risk of bushfire to people and property. It will not remove the risk. How the management and staff interpret the risk, prepare and maintain the property and buildings and the decisions and actions they take (i.e. early evacuation) greatly influences the outcome of a bushfire. The Service must be self-reliant, and not expect warnings or assistance from emergency services.

2 OBJECTIVES

Fully implemented, the recommendations contained in this Plan will mitigate the risk of bushfire to the Service, its occupants and firefighters. The recommendations will not completely remove the risk. The Strategy includes:

- A description of the site, the surrounding area, fire climate and bushfire history;
- A summary of the factors affecting building survival in bushfires;
- A summary of research into bushfire related fatalities;
- A bushfire hazard assessment;
- Recommendations to mitigate the risk; and
- Maps and plans of fire reduction measures.

Recommendations address a range of topics including:

- Vehicle access requirements;
- Strategies to manage vegetation to maintain asset protection zones;
- Identification of a Safer Building and practical retrofitting modifications to buildings to comply with the Australian Standard (AS 3959 - 2009) 'Construction of buildings in bushfire-prone areas';
- Strategies to monitor for bushfires;
- Triggers to identify a safe time to evacuate the site;
- Evacuation and stay, shelter and actively defend procedures; and
- Staff training.

2.1 Accreditation

This Strategy has been prepared by Bushfire Safety Consulting. Bushfire Safety Consulting is owned and operated by Rohan Carboon and Ken Strahan. Rohan and Ken have provided all technical input and review for this bushfire assessment.

Rohan has an undergraduate degree in Environmental Management and postgraduate qualifications in Bushfire Protection and has been providing bushfire risk and hazard assessment and mitigation advice to the urban planning and development industry for more than 7 years. He first worked professionally in community bushfire safety education in 1999 and has been involved in land management including bushfire suppression since 1993.

Ken Strahan has twenty years of experience in emergency management research for a number of major emergency management organisations including the Victorian Country Fire Authority, the Office of the Emergency Services Commissioner (Victoria), Country Fire Service (SA) Office of Premier and Cabinet (NSW) and a large number of local councils. His work was cited extensively by the Black Saturday Bushfire Royal Commission. He is currently completing a PHD thesis researching community responses during bushfire events including the Perth Hills bushfire in 2014.

Bushfire Safety Consulting is a Corporate Bronze Member of the Fire Protection Association of Australia. Rohan and Ken are both in the process of obtaining BPAD Level 2 accreditation under the Fire Protection Association of Australia's new accreditation scheme. Rohan is currently applying for Level 3 accreditation.

3 STATUTORY AND POLICY FRAMEWORK

The following key legislation, policies and guidelines are relevant to the preparation of the Strategy.

3.1.1.1 Fire and Emergency Services Act 1998

Areas within Western Australia have now been designated as bushfire prone by the Fire and Emergency Services (FES) Commissioner, through the release of the *Map of Bush Fire Prone Areas* (OBRM 2015). The *Fire and Emergency Services Act 1998* (FES Act) enables the statutory delineation of Bushfire Prone Areas, which are areas within 100 m of classified bushfire prone vegetation or 50 m from grassland. In turn, Bushfire Prone Areas enable the implementation of the regulations and guidelines outlined below.

3.1.1.2 Bush Fires Act 1954

The *Bush Fires Act 1954* sets out provisions to reduce the dangers resulting from bushfires; prevent, control and extinguish bushfires; and for other purposes. The Act addresses various matters including prohibited burning times, enabling Local Government to require landowners and/or occupiers to plough or clear fire breaks, to control and extinguish bushfires and establish and maintain Bush Fire Brigades.

Accordingly, the Shire of Murray publishes an annual Fire Regulations Notice that can be downloaded from: <http://www.murray.wa.gov.au/single-download/firebreak-notice-bushfire-information-booklet/>

3.1.1.3 Planning and Development (Local Planning Scheme amendment) Regulations 2015

The Planning and Development (local planning Scheme amendment) Regulations 2015 (WAPC 2015a) (the Regulations) include deemed provisions which reference the FES Commissioner's power to designate bushfire prone areas, and provide a mechanism to apply State Planning Policy 3.7 Planning in Bushfire Prone Areas (WAPC 2015) and the assessment requirements through planning and development decisions.

3.1.1.4 Building Regulations

All building work in Western Australia is required to comply with the Building Code of Australia (BCA). The Building Regulations recognise that properties that are located within a designated bushfire prone areas may require additional assessment for bushfire risk and for construction of dwellings to be in accordance with the Australian Standard (AS) 3959-2009 construction of buildings in bushfire prone areas (Standards Australia 2009)

3.1.1.5 State Planning Policy (SPP) 3.7: Planning in Bushfire Prone Areas

SPP 3.7 provides the overarching policy for bushfire planning throughout the State. The policy refers to the relevant guidelines and standards that must be addressed in land use planning decisions and the design of proposed developments in areas identified as bushfire prone.

Policy measure 6.2 in SPP 3.7 applies to development applications within designated bushfire prone areas relating to land that has a Bushfire Hazard Level above low and/or where a BAL rating above BAL-LOW applies, are to comply with the policy measures.

A development application in an area to which policy measure 6.2a) applies that has, or will on completion have, a BAL-12.5-BAL-29 rating may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.

Policy measure 6.4 outlines the information to accompany a development application including the preparation of a Bushfire Management and Evacuation Plan.

3.1.1.6 State Bushfire Prone Map

The Office of Bushfire Risk Management (OBRM) has established a single data standard for mapping bushfire-prone areas that has been adopted by all State and Local Government Areas. A bushfire-prone area is an area defined as an area that is subject to, or likely to be subject to, bushfire attack.

This declaration is being undertaken for the purposes of initiating application of AS3959-2009 Construction of Buildings in Bushfire Prone Areas (Standards Australia 2009 as amended), and State Planning Policy 3.7: Planning for Bushfire Risk Management. The entire site is declared 'bushfire prone' under this process, urban areas north of the site are not declared bushfire prone.

3.1.1.7 Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)

The Department of Planning have recently released the *Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)*. The requirements of this document are accommodated within this BMP.

The *Guidelines for Planning in Bushfire Prone Areas V 1.1(2017)* is intended to inform and guide decision makers, referral authorities and proponents to achieve acceptable bushfire protection outcomes, including expectations at the different stages of planning.

3.1.1.8 AS3959-2009: Construction of buildings in bushfire-prone areas (Standards Australia 2009, as amended) and the Building Code of Australia (BCA)

These documents set out the construction requirements for buildings in bushfire-prone areas. AS 3959-2009 has six categories of Bushfire Attack Level, namely BAL-LOW, BAL-12.5, BAL19, BAL-29, BAL-40 and BAL-FZ. These categories are based on heat flux exposure thresholds. The method for determining the BAL involves a site assessment of vegetation, setback distances and local topography. The assumed Fire Danger Index (FDI) for Western Australia is 80. The BAL identifies the appropriate construction standard that applies as a minimum standard in AS 3959-2009.

3.1.1.9 Evacuation Planning Handbook 4 (Australian Government – Attorney-Generals Department) Australian Emergency Management Institute

This document sets out the process to develop a bushfire evacuation plan for community facilities and residential areas. The document details issues such as decisions to evacuate, warnings, withdrawal, shelter and returning home.

4 BUSHFIRE RELATED FATALITIES

Several studies on bushfire related fatalities prior to the Victorian ‘Black Saturday’ Bushfires on 9 February 2009 suggested that people were likely to be killed by radiant heat or a vehicle accident when evacuating late from a bushfire. The research found that well-prepared houses (and buildings) can be successfully defended from most bushfires and provide safe refuge for people during the main passage of the fire front (McArthur and Cheney, 1967; Miller et al, 1984; Wilson and Ferguson, 1984; Lazarus and Elley, 1984; Leonard and McArthur, 1999; Leonard, 2003; Handmer and Tibbits, 2005; Blanchi and Leonard, 2008).

The Victorian Bushfires Royal Commission (VBRC) Final Report into the Black Saturday bushfires provided the most comprehensive evidence regarding Australian bushfire fatalities. Where people died on Black Saturday contrasts strikingly with studies from previous bushfire fatalities (VBRC 2010). Historically about 32% of people died in late evacuations (Risk Frontiers et al. 2008), however on Black Saturday the majority of people (113 out of 173) died inside or close to structures. The severity of the fire on Black Saturday was such that the only way to ensure ones safety was to leave early, well before any fire arrived. When the Fire Danger rating is “Catastrophic” most buildings are undefendable.

The elderly, ill or vulnerable in the community are over-represented in bushfire fatality statistics. Krusel and Petris (1999) who examined civilian deaths in the Ash Wednesday bushfires in Victoria in 1983 established that the majority of victims died during a late evacuation as the fire front arrived or because they were incapable of implementing a safe strategy due to inadequate warning, age or infirmity. Forty four percent of those who died on Black Saturday were considered to be potentially vulnerable to bushfire because of age, ill health or a combination of both (VBRC 2010).

Bushfires generate enormous amounts of radiant heat and most people die in bushfires from radiant heat exposure. Protection from radiant heat is essential in a bushfire. Wearing long sleeved natural fibre clothing, and having solid barriers between people and the fire (i.e. source of radiant heat) provides the best protection. Bushfires also generate enormous amounts of smoke and wind resulting in trees being blown over. Emergency vehicles are also using the roads. These circumstances make driving on roads near bushfires extremely hazardous.

5 DESCRIPTION OF THE AREA AND DEVELOPMENT PROPOSAL

5.1 General

Lesmurdie is located in the southern part of the Shire of Kalamunda and there are large areas of woodland and forest south of Welshpool Road East that could carry a large landscape scale fire.

The site is located 22 metres from a strip of forest vegetation in Mick Conti Park and the residential dwelling is exposed to BAL-29. The Pachamama Activity Centre is exposed to BAL-12.5.

Pachamama is a Childcare service provider that manages a Long Day Care (LDC) at 36 Marri Crescent and an Out of School Hours Service at 61 Coolinga Road in Lesmurdie.

The residential dwelling at Lot 55 Coolinga Road is proposed to change in land use from a residential dwelling into a Service that expands the existing OSHCare service, trading as Pachamama Activity Centre, on the adjacent lot.

The existing services are situated on sites across Gladys Road from the other, with addresses as follows:

Pachamama Early Education and Childcare (LDC), licensed for 69 children

36 Marri Crescent (cnr of Gladys Road)

Pachamama Activity Centre (OSHCare), licensed for 43 children

Lot 55 Coolinga Road (cnr of Gladys Road)

The size of the existing building on the proposed site allows for around 38 children, under the Education and Care Services National Law (WA) Act 2012. It is the intention to have 8 babies (aged 0-2 years) in the back of the residence and up to 30 children aged 7-12 in the front area of the residence for After School Care. (Before School Care will still be conducted from 61 Coolinga Road.)

Pachamama's current After School Care operates from 3:30-6:30pm. Their electronic sign in/out records indicate that around 80% of the children depart by 5:30pm. (Parents struggle most with having to leave work at 2:30pm to pick their children up from school at 3:00pm. The support from an After School Care service allows employees to leaving work at 5pm which considerably enhances their employability.)

The topography of the area is influenced by land sloping down to the south briefly before rising at Welshpool Road East and continuing upslope into the woodland and forest further south.

The proposal is to change land use and convert the residential dwelling into a Child Care Service to care for children and babies. The site plan is shown in **Appendix B**.

5.2 Climate and Fire Weather

The behaviour of bushfires is significantly affected by weather conditions, which burn more intensely when high temperatures combine with low humidity and strong winds. In Perth and surrounding coastal areas, the fire risk is greatest from summer through autumn when the moisture content in vegetation is low. Summer and autumn days with high temperatures, low humidity and strong winds are particularly conducive to the spread of fire. This threat is increased if thunderstorms develop, accompanied by lightning and little or no rain.

Research indicates that virtually all house losses occur during severe, extreme or catastrophic conditions, when the Fire Danger Index is over 50 (Blanchi et al., 2010).

The Bureau of Meteorology (2015) states that extreme fire weather conditions in the Perth region typically occur with strong easterly or north-easterly winds associated with a strong high to the south of the state and a trough offshore. Easterly winds represent approximately

60% of extreme fire weather days (events) compared to fewer than 5% associated with southerly winds. About 15% of Perth events occurred in a westerly flow following the passage of a trough. Very dangerous fire weather conditions often follow a sequence of hot days and easterly winds that culminate when the trough deepens near the coast and moves inland. Winds can change from easterly to northerly and then to westerly during this sequence of climatic events.

Data from the Bickley Bureau of Meteorology weather station indicate the area experiences warm dry summers and cool wet winters (Figure 1), and is classified as a Mediterranean climate. Mean maximum temperatures vary from 31 degrees Celsius in February to 19 degrees Celsius in July.

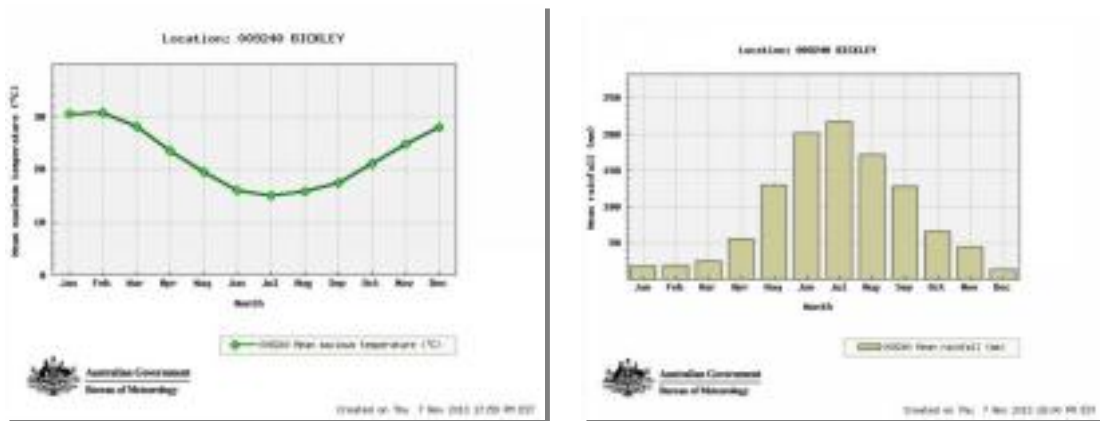


Figure 1: Mean maximum recorded temperatures (1994-2013) and mean rainfall (1969-2013) for Bickley Bureau of Meteorology Station

Data also indicate that the predominant winds in the summer months at 3pm near the study site are south-westerly (Figure 2). Easterly and south-easterly winds are more common in February. Wind strength, direction and frequency from the south-west is dominant and occurs 70 to 80% of the time.

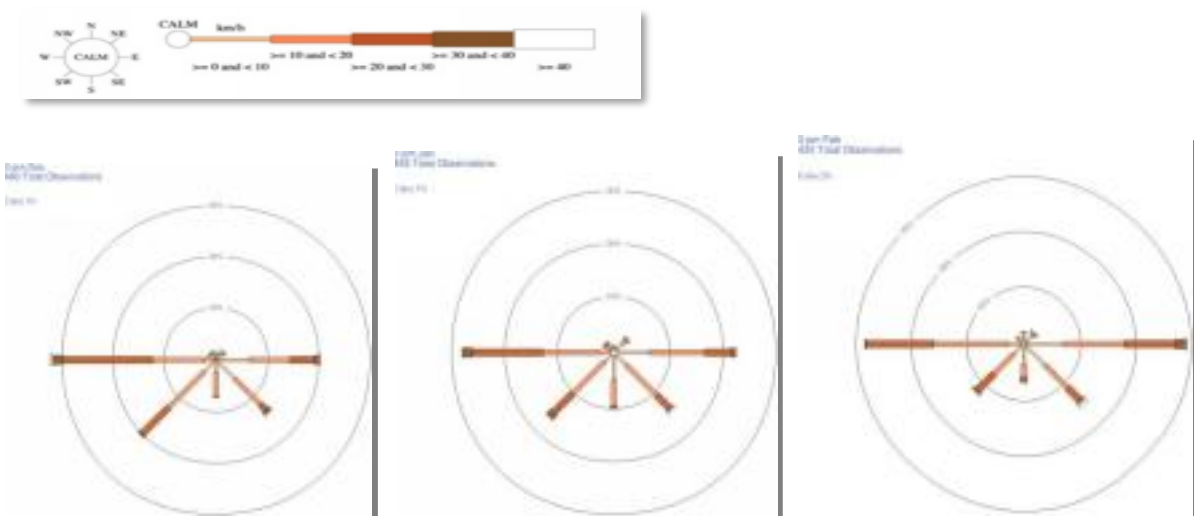


Figure 2: Rose of wind direction and wind speed in km/hr for 3pm in the afternoon in December, January and February between 1994 and 2030 at the Bickley Meteorology Station

Interpreting Figure 2– wind speed vs. direction plot

Wind roses summarize the occurrence of winds at a location, showing their strength, direction and frequency. The percentage of calm conditions is represented by the size of the centre circle - the bigger the circle, the higher is the frequency of calm conditions. Each branch of the rose represents wind coming from that direction, with north to the top of the diagram. Eight directions are used. The branches are divided into segments of different thickness and colour, which represent wind speed ranges in that direction. Speed ranges of 10 km/h are used. The length of each segment within a branch is proportional to the frequency of winds blowing within corresponding range of speeds from that direction (BOM, 2010).

6 FIRE PROBLEM

6.1 Bushfire History and Climate Change

Research has found that bushfires may have been in the Australian Landscape for 50 million years longer than previously thought. The adaption of eucalypts that allows them to recover from bushfires has been traced back more than 60 million years (Crisp et. al. 2011), indicating fire has been in the Australian landscape since that time. Evidence of frequent fires in the south west of Western Australia for the past 2.5 million years has been documented (Hassel and Dodson 2003).

During 15-25 January 2005, the Mundaring-Karragullen bushfire burnt as a high intensity forest fire. The fire started as a result of seven arson-caused ignitions in forest east of the development site. Rates of spread were recorded at 900 metres per hour when the fire was burning towards the Brookton Highway in Roleystone and the Araluen Estate (DEC 2011). Bushfires are common in the Shire of Kalamunda. The most recent nearby devastating large bushfire occurred to the south in Roleystone/Kelmscott on 6 February 2011. This fire claimed 72 homes on an afternoon with strong east-south-easterly winds.

Given that bushfires are common in the Shire of Kalamunda, this BMEP plays a critical role in ensuring that the Service is appropriately mitigated from bushfire risk and threat.

Winter and spring rainfall in the Perth Hills area has significantly decreased by approximately 24mm per decade since 1950 (CSIRO 2007). CSIRO (2001, 2007) research on climate change suggests that:

- Winter and spring rainfall will continue to decline by approximately 10% till 2030 and temperatures will continue to increase;
- River flows will decline as a result of decreased rainfall;
- Weather events are likely to be more extreme, with more frequent and prolonged drought;
- The number of days of very high and extreme fire danger will increase; and

- The risk of more frequent bushfires will increase.

7 Bushfire Assessment

7.1 Bushfire Hazard Level

Assessing bushfire hazard level ratings takes into account the predominant class of vegetation surrounding the site for a minimum of 100 m as shown in **Appendix C**. Fuel layers in a typical forest environment can be broken-down into five segments as illustrated in Figure below. These defined fuel layers are used in the following descriptions regarding vegetation types, fuel structure and bushfire hazard levels.



Source: Gould et al. (2007)

Figure 3: The five fuel layers in a forest environment that could be associated with fire behaviour

7.1.1 AS 3959 Vegetation Classification, Fuel Structure and Fuel Load

The site contains established gardens and grounds dominated primarily by deciduous and evergreen trees such as camellias, lilly pillys, English oaks, white cedar and apple trees. These species can reduce fire behaviour if cared for appropriately. The entire site complies with the Bush Fires Act (1954) and the Shire of Kalamunda Fire Break and Fuel Load Notice. The property is managed to APZ standards as outlined in the firebreak notice by having “all inflammable matter except living trees, shrubs, plants under cultivation and lawns, slashed, mowed or trimmed down by other means to a height no greater than 50mm across the entire property. The Pachamama Activity Centre has virtually no near surface or litter fuels (Figure 4) and the entire area around the residential dwelling is similarly highly managed (Figure 5). The area between the open forest and the residential dwelling contains an American Oak tree and a Pride of Bolivia tree, the litter fuels and similarly thoroughly managed (Figure 6).

The lots immediately to the south west are managed by the property owners in a low fuel condition that complies with the Shire Firebreak notice and Exclusion Clause 2.2.3.2(f) in AS3959-2009 (Figures 7 & 8). A 3 metre wide lot containing a pipeline for drainage purposes is managed by the Shire of Kalamunda on the eastern boundary of the site. This area has

recently been subject to significant upgrading works by the Shire and contains no vegetation (Figure 9).

A narrow strip of weeds and Class A (forest) vegetation exists in Coolinga Road Reserve (Figure 10), but the road reserve is largely managed in a low fuel condition (Figure 11). Significant forest vegetation also occurs in Mick Conti Park south of the site with near surface, intermediate and overstorey vegetation (Figure 12). A large area of Class B (woodland) and Class A (forest) (Figure 13) vegetation occurs south of Welshpool Road East and this is where a large fire front could approach and threaten the site. North west of the site, there are patches of fuel loads including a small area of forest (Figure 14) and largely managed fuel loads in the road reserves (Figure 15).

The vegetation class map for the site buildings and surrounding area for a minimum of 100 metres is attached is **Appendix C**, with reference to the photographic reference points. The broader forest area can be partially seen in the location plan (**Appendix A**).



Figure 4: Minimal litter fuels at the Pachamama Activity Centre



Figure 5: Minimal litter fuels under Camelias and palms around the residential dwelling.



Figure 6: Minimal litter fuels under the American Oak and Pride of Bolivia between the site and open forest



Figure 7: Mown and irrigated grass under American oak tree south west of the site



Figure 8: Fuel managed garden south west of the site



Figure 9: The Shire of Kalamunda Drainage reserve is clear of vegetation



Figure 10: Strip of weeds and forest fuels in Coolinga Road Reserve



Figure 11: Managed fuels in Coolinga Road Reserve



Figure 12: Forest vegetation in Mick Conti Park



Figure 13: Forest vegetation with elevated fuels south of Welshpool Road East.



Figure 14: Small area of forest north of Coolinga Road



Figure 15: Managed road verges west of the site.

7.1.2 Effective Slope

The landscape surrounding the sites slopes down to the south for a short distance. The forest vegetation in Mick Conti Park has a flat effective slope and the strip of forest in Coolinga Road reserve is upslope 17°.

The topography and effective slope was measured onsite and referenced against available digital contour data and is outlined in **Appendix D**.

7.1.3 Bushfire Hazard Level Assessment

The vegetation class map (**Appendix C**) outlines the vegetation classifications on and surrounding the site within the 100 m assessment area as identified in AS 3959:2009. Descriptions of the vegetation types, structure and fuel layers are outlined in Section 7.1.1.

The bushfire hazard assessment levels were determined using Appendix 2 of the *Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)*.

All forest and woodland areas are rated as extreme bushfire hazard levels and areas within 100 metres of extreme hazard are rated as moderate as per the guidelines. At the site this results in the property being rated as moderate and extreme hazard, but will all be moderate hazard post development.

The bushfire hazard level plan is found in **Appendix E**.

8 BUSHFIRE MITIGATION STRATEGIES

This report makes recommendations to mitigate bushfire hazard to people and property at the site. This approach is consistent with Appendix 4 of the *Guidelines for Planning in Bushfire Prone Areas (2015)* and the State Planning Policy (SPP) 3.7: Planning in Bushfire Prone Areas.

The management issues are:

- Siting of Development;
- Vehicular Access;

- Water Supply;
- Building Controls and Utilities; and
- Evacuation planning

Recommendations are outlined in the Risk Treatment (Section 10) by providing responses to the performance criteria that fulfil the intent of the bushfire hazard management issues outlined in the *Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)*. The risk treatment recommendations are also consistent with the Risk Management Standard ISO AS/NZ 31000:2009.

8.1.1 Element 1: Location of the Development

8.1.1.1 Intent

To ensure that the site is located in an area with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.

8.1.1.2 Acceptable Solution

The dwelling on the lot proposed for additional Child Care Use is exposed to BAL-29 and the existing Pachamama Activity Centre is exposed to BAL-12.5. The existing Pachamama Activity Centre on Lot 55 will be maintained to the Australian Bushfire Standard BAL-12.5 as it is the logical building (ie. has lower bushfire exposure, higher construction standards and the buses are parked in the carpark) to assemble in and evacuate from.

8.1.2 Element 2: Siting of the Development

8.1.2.1 Intent

To ensure that the siting of buildings at the site minimises the level of bushfire impact.

8.1.2.1 Background

The building on Lot 54 at the site is currently exposed to BAL-29.

8.1.2.1 Acceptable Solution A2.1: Asset Protection Zone (APZ)

One of the most important fire protection measures influencing the safety of people and property is to create an Asset Protection Zone (APZ) around buildings. The APZ is a low fuel area immediately surrounding a building. Non-flammable features such as irrigated landscapes, mown and slashed grasslands, gardens, driveways and roads can form parts of an APZ.

Research into land management and house losses during the 'Black Saturday' Victorian bushfires concluded that the action of private landholders who managed fuel loads close to their houses was the single most important factor in determining house survival when compared with other land management practices, such as broad scale fuel reduction burning remote from residential areas (Gibbons et al., 2012).

The existing APZ over the entire lot (**Appendix F**) ensures the predicted radiant heat flux exposure level for the building on Lot 55 at the site is exposed to BAL-29. It also ensures the

building on Lot 54 is exposed to BAL-12.5. The BAL Contour Plan for the site is found in **Appendix G**.

Managing vegetation in the APZ has two main purposes:

- To reduce direct flame contact and radiant heat from igniting buildings during the passage of a fire front; and
- To reduce ember attack and provide a safer space for people to defend (if required) before, during and after a fire front passes.

The APZ achieves the following standards. (Table 1)

Table 1: Asset Protection Zone requirements

Width:	Includes entire site as depicted in Appendix F to ensure BAL-29 is never exceeded.
Location:	Within the lot boundary.
Fine Fuel load:	Currently complies and Combustible dead vegetation matter less than 6 mm in thickness and reduced to and maintained at two tonnes per hectare.
Trees and Shrubs (> 5m in height):	Trunks at maturity a minimum 6 metres from all elevations of the building. Branches at maturity not touch or overhang the building. Lower branches removed to 2 m above ground or surface vegetation. Canopy cover < 15%. Tree canopies at maturity at least 5 m apart so as not to form a continuous canopy. The density of tree crowns for evergreen and deciduous trees can be retained less than 10m separation if trees are well watered and maintained in good condition.
Shrubs and ground cover (0.5 to 5 m):	Not located under trees or within 3 m of buildings. Not planted in clumps >5m ² . Clumps separated from each other and exposed window or door by at least 10 m.
Ground cover (< 0.5 m in height)	If > 100mm in height, maintained to remove dead plant material if within 2m of a structure or 3m from windows or doors
Grass:	Managed to maintain a height of 10mm or less.
Fences:	Fences within the APZ are constructed using non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended solid or slatted non-combustible perimeter fences are used.
Objects:	Within 10 m of a building must not be located close to vulnerable parts of the building (i.e. windows and doors)

8.1.2.2 Building Siting and Predicted Bushfire Attack Levels

AS 3959:2009 *Construction of buildings in bushfire prone areas* has six categories of Bushfire Attack Level, namely BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ. These categories are based on heat flux exposure thresholds.

8.1.2.3 Methodology and Assumptions

8.1.2.4 Design Bushfire Threat Modelling

One design bushfire threat model was assessed at the northern interface zone, because the narrow strip of weeds and forest vegetation is setback 11.4 metres from the building and has an effective slope of -17°.

The length of fire run possible from a point source ignition towards the site is 6.5 metres maximum.

Design bushfire threat modelling and calculation of radiant heat flux (and BAL) was completed in accordance with AS3959:2009 Appendix B Method 2.

Fire Run and Flame Width

A head fire developing from a point source under these conditions is expected to achieve a narrow head fire. Using Alexander (1985) to determine the length to breadth ratio, it is calculated to a ratio of 1:2.82 under conditions of 30km/hr winds speeds as established from our discussions with DFES. A 6.5 metre fire run therefore has a breadth of 2.4 metres.

Potential Bushfire Impacts

The bushfire threat model's outputs and potential bushfire impact to the northern interface from the Method 2 assessment are outlined below, and summarised in Table 2. All base data can be found in Figure 14.

AS3959 Method B modelling

The modelling and data is consistent with Method 2 in AS3959-2009 and the outputs are summarised in Table 2.

Table 2: Bushfire Attack Level outcomes for Method 2 BAL assessment

Design Fire Model	1				
Fire run length	6.5 metres				
Head Fire Width - Alexander (1985)	2.4 metres				
Vegetation Class	Class A Forest				
Effective Slope	-17°				
Site Slope	-9°				
Rate of Spread	0.74km/hr				
Flame Length	9.02 metres				
Setback	0-<6m	6-6.5m	6.5-<7.5m	47.5-<9m	9-100m
Radiant Heat Flux/BAL	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5

Bushfire  Safety CONSULTING			
Calculated November 15, 2016, 5:51 pm (BAL v4.3)			
Lot 54 Coolings Road, Leemurdie			
Assessment Method: Standard Assessment - AS 3959:2009 (Method A)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	0.74 km/h
Vegetation classification	Forest	Flame length	9.02 m
Surface fuel load	25 t/ha	Flame angle	37 °
Overall fuel load	35 t/ha	Elevation of receiver	3.5 m (user defined value)
Vegetation height	n/a	Fire intensity	13,429 kW/m
Effective slope	-17 °	Transmissivity	0.872
Site slope	-8 °	Viewfactor	0.0714
Distance to vegetation	11.4 m	Radiant heat flux	4.73 kW/m ²
Flame width	2.4 m	Receivable heat flux	50.42 kW/m ²
Windspeed	45 km/h		
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		
Rate of Spread - McArthur, 1973 & Noble et al., 1999			
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1999			
Flame angle - Douglas & Tarr, 2005			
Radiant heat flux - Drysdale, 1998; Sullivan et al., 2003; Douglas & Tarr, 2005			

Figure 16: Design Fire Data for Forest north of the building

The building is exposed to a predicted radiant heat flux of 4.73kW/m² which results in a BAL-12.5 rating. An assessment of BAL-12.5 means the risk is considered to be low. It is expected that the construction elements will be exposed to a radiant heat flux not greater than 12.5 kW/m². There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat (AS 3959:2009). The recommended construction sections in AS 3959:2009 are 3 and 5.

A BAL assessment has been undertaken using the simplified Method A in order to determine the maximum level of radiant heat flux to which the building is exposed on the southern interface, and has been carried out based on the post development vegetation classification and effective slopes.

The criteria used to undertake the BAL assessment is as follows:

- Designated FDI: 80
- Flame Temperature: 1090
- Effective Slope: Flat/upslope
- Vegetation Class: Forest
- Setback distance: 23 metres

8.1.2.5 BAL outcome for Method A Assessment

BAL ratings for the majority of exposed areas of the development on the western interface were determined using the methodology in Appendix A of AS 3959. This methodology is also outlined in Appendix Four of the Guidelines for Planning in Bushfire Prone Areas (WAPC et al. 2015).

Table 3: Bushfire Attack Level assessment for the southern interface

AREA OF CLASSIFIED VEGETATION	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE (°)	SETBACK DISTANCE	BAL RATING
South of site	Forest – Class A	Flat/upslope	21-<31 metres	BAL-29
			31-<42 metres	BAL-19
			42-<100 metres	BAL-12.5

The building is setback 22 metres (Figure 17) from forest vegetation and accumulated litter fuels (Figure 17) so is exposed to BAL-29. An assessment of BAL-29 means there is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat (AS 3959). The risk is considered to be high. It is expected that the construction elements will be exposed to a heat flux not greater than 29 kW/m².



Figure 17: At 22 metres the managed landscape changes to forest vegetation

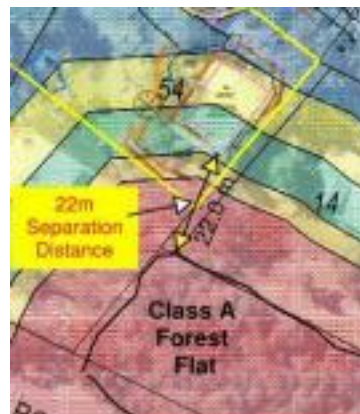


Figure 18: Transect showing setback from forest.

There are no structures in the development which will be located exposed to a BAL rating above BAL-29. The BAL contour plan for the site is shown in **Appendix G**.

8.1.3 BAL Contour Map – Post Development Conditions

The BAL assessment was undertaken on the existing site conditions because the APZ is thoroughly established and maintained. This reflects what the site is exposed to.

An overall site BAL contour plan has been prepared (**Appendix G**) which demonstrates the building proposed for childcare is exposed to BAL-29.

8.1.3.1 Acceptable Solution A2.2: Hazard Separation Zone (HSZ)

A HSZ is not required and does not fit within the site because it is being managed entirely as an APZ. The existing building proposed for Child Care uses are exposed to BAL-29 under these management arrangements.

8.2 Utilities - Power, Gas and Communications

It is commonly observed that power is lost prior to or during a bushfire (Leonard 2009). A power failure has significant implications for the communication system at the site. This has been considered by management and mobile phones will become the primary source of communication during a power failure. The vulnerability with this reliance is having mobile phone batteries run down and not being able to recharge them. Standard mobile phone reception can also be unreliable.

Communication options at the Service include: using the analogue phone landlines at each Service and having access to equipment and a process whereby mobile phones can be recharged when battery life is low.

Being able to access websites, phone DFES, local government, the fire brigade, emergency services and student's parents is important for many reasons including:

- To report a bushfire;
- To receive a bushfire warning;
- To determine a bushfire's location and threat level;
- To co-ordinate a response (i.e. safe evacuation, sheltering and active defence or further monitoring, etc); and
- To communicate plans to the families .

There are no liquid petroleum gas cylinders at the site.

8.2.1 Element 3: Vehicular Access

Intent

To ensure that the vehicular access serving the site is available and safe during a bushfire event.

Background

The site is located on Coolinga Road in Lesmurdie which provides two immediate alternative roads for evacuation and for fire appliance access. Within 100 metres of the site there are 7 access options on public roads. Driving north of the site is moving away from the large area of extreme hazard and predicted fire behaviour.

Surrounding public roads and access options are shown in **Appendix H**. Broader road access away from Pachamama is found on the Bushfire Monitoring poster in the Evacuation Plan in **Attachment 1**.

8.2.1.1 Acceptable Solution A3.1: Two Access Routes

Management, staff and children at the site require two road access options at all times. This is achieved and exceeded, a total of 7 access options are within 100 metres of the site on well maintained public roads.

8.2.1.2 Acceptable Solution A3.2: Public Road

Coolinga Road and all surrounding public roads achieve minimum public road standards. The technical vehicle access standards are provided in Table 4.

8.2.1.3 Acceptable Solution A3.8: Firebreak width

Compliance with the Shire of Kalamunda Firebreak Notice is required at all times.

Table 4: Vehicle Access Technical Requirements

TECHNICAL REQUIREMENTS	Coolinga Road and all surrounding public roads
Minimal 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

8.2.2 Element 4 : Water

8.2.2.1 Intent

To ensure that water is available to the site to enable people, property and infrastructure to be defended from bushfire.

8.2.2.2 Acceptable Solution A4.1: Reticulated Area

The site is in a reticulated area and a hydrant is located 47 metres east of the site in Coolinga Road as marked in **Appendix H**.

9 Bushfire Risk Management Measures

The risk management process described in AS/NZS ISO 31000:2009 *Risk management – Principles and guidelines* is a systematic method for identifying, analysing, evaluating and treating emergency risks.

Bushfire risk is determined by assessing:

- Bushfire hazard (i.e. vegetation);
- Threat level (i.e. proximity of the hazard to assets and people);
- Vulnerability of the asset; and
- Consequence rating (i.e. a rating for the potential outcome once the ‘incident’ has occurred).
- Likelihood rating (i.e. the chance of an event).

The vulnerability of assets, such as buildings, is impacted by several factors. Some relate to the way a bushfire behaves at a site, others to the design, to the construction materials used in the building and to the siting of surrounding elements. Infrastructure, utilities and human behaviour are also factors. Leonard (2009) identified the following factors:

- Terrain (slope);
- Vegetation (overall fuel load, steady state litter load, bark fuels, etc.);
- Weather (temperature, relative humidity and wind speed);
- Distance of building from unmanaged vegetation;
- Individual elements surrounding the building that are either a shield or an additional fuel source;
- Proximity to surrounding infrastructure;
- Building design and maintenance;
- Human behaviour (ability to be present and capacity to fight the fire);
- Access to the building and how that influences human behaviour;
- Water supply for active and/or passive defence; and
- Power supply.

It is likely that buildings are lost because of their vulnerability to the mechanisms of bushfire attack. Buildings constructed to AS 3959:2009 *Construction of buildings in bushfire-prone areas* (Standards Australia 2009) are more likely to survive a bushfire than buildings that do not conform to construction standards. That being said, building survival is not guaranteed.

The vulnerability of people is determined by several factors, including age, fitness levels, level of preparation, evacuation triggers and number of occupants who can actively defend a property. Vulnerability, consequence and likelihood ratings are all determined using a risk assessment matrix. Recognising vulnerability a comprehensive Bushfire Evacuation Plan has been developed (Attachment 1) that must be reviewed annually.

9.1 Bushfire Analysis and Risk Evaluation

This report focuses on assessing the bushfire vulnerability of the existing dwelling, all staff and children. The protection of life is the primary consideration in this analysis.

The consequence of the bushfire hazard adjacent to the existing building was determined by assessing the:

- Threat level; and
- Vulnerability of the asset.

9.1.1 The Threat Level

The threat level has been determined by assessing the proximity of vegetation and fuel loads to buildings using the Australian Standard methodology outlined in (AS 3959-2009): Construction of Buildings in Bushfire-Prone Areas. Forest vegetation occurs 23 metres south of the existing dwelling in Mick Conti Park as assessed in section 7.1

The BAL Contour plan (**Appendix G**) highlights the exposure of all buildings at the completion of the Asset Protection Zone.

Overall, the threat level is considered to be high due to the proximity of building to the open forest vegetation.

Outcome

The calculations determined that the bushfire attack level for the existing dwelling for proposed Child Care Service is BAL-29 (Table 3).

An assessment of BAL-29 means there is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat (AS 3959). The risk is considered to be high. It is expected that the construction elements will be exposed to a heat flux not greater than 29 kW/m².

9.2 Vulnerability Level

The vulnerability of the buildings is based on their susceptibility to the adverse effects of a bushfire.

Site occupants are vulnerable to bushfire for a number of reasons such as:

- The number of children on-site (i.e. potentially 38 children, comprised of 8 babies and 30 school-aged children) plus 5 staff);
- Organisational difficulties for relocation and/or management of people;
- Occupants more vulnerable to stress and anxiety (children are unlikely to be expecting a bushfire);
- Supervision of children in a stressful situation will be challenging; and
- The building are not constructed to any current or previous Australian Bushfire Standard.

The vulnerability level of the site is reduced because evacuation of all occupants from the site is possible in vehicles that are either on-site, are on the adjacent property. Several

evacuation roads are also accessible that generally lead away from extreme bushfire hazard areas. The management of the Service will also be trained in self evacuation strategies and are not reliant on assistance from emergency services.

However, the overall vulnerability category is assessed as medium, because the site is exposed to high bushfire threat levels and the number of children potentially on-site.

9.3 Consequence Rating

In the emergency context, this is a rating for the potential outcome once the “incident” has occurred. A very high threat level combined with a medium vulnerability rating results in a consequence rating of “major” (Table 5).

Table 5: Consequence matrix used to determine the consequence rating.

Threat	Low	Medium	High	Very high
Vulnerability				
High	Moderate	Major	Catastrophic	Catastrophic
Moderate	Minor	Moderate	Major	Catastrophic
Low	Minor	Minor	Moderate	Major

9.4 Likelihood Rating

The likelihood of a bushfire igniting and spreading is considered in the context of long-term planning. Likelihood is the “chance of something happening” (AS/NZS ISO 31000:2009) and the forested areas in the Shire of Kalamunda regularly experience bushfire, it is possible that the Service will experience a bushfire that could impact on the site.

The vast majority of fires in the Shire of Kalamunda are extinguished rapidly by fire authorities and are not of any great significance. However, even if most fire runs are usually kept short, it is possible that a fire could spread and impact the site with smoke embers, flames and radiant heat attack. The likelihood rating is “possible” for a bushfire to have an impact on the site.

9.5 Bushfire Risk Level

The bushfire risk level was determined using Table 6, and is a result of the likelihood of a bushfire affecting the buildings combined with the consequence of such an impact. The result is that the occupants are exposed to a “high” level of bushfire risk.

Table 6: Risk matrix used to determine the bushfire risk level.

Consequence	Minor	Moderate	Major	Catastrophic
Likelihood				
Almost Certain	High	Very High	Extreme	Extreme
Likely	Medium	High	Very High	Extreme
Possible	Low	Medium	High	Very High
Unlikely	Low	Low	Medium	High

10 Risk Treatment Recommendations

The following criteria were considered when assessing and selecting the most appropriate risk treatment options:

- Acceptability by stakeholders;
- Capacity to undertake;
- Compatibility with other treatment options; and
- Cost effectiveness.

10.1 Reducing the Consequences: Building Controls

The Pachamama Activity Centre on Lot 55 will be maintained and retrofitted if applicable to increase its resistance to bushfire attack. The existing Activity Centre building has been identified as the assembly building and 'safer building' on the site because it is a brick structure with brick stumps, fully rendered to the ground with the subfloor being fully enclosed (more than 400mm above ground), the eaves are fully enclosed, the colorbond gutters and downpipes are new, with all gutters covered with gutter guard

All windows are new: aluminium with safety glass, the verandah is fully enclosed with colorbond exterior siding and aluminium windows with safety glass, all windows have external metal fly screens and the external doors are solid timber with minimum thickness of 35mm. The buses and vans are parked adjacent to this building for rapid evacuation. It is thus the most capable structure amongst buildings at the overall site to provide some protection from radiant heat to staff and students.

The proposed Child Care on Lot 54 has cedar cladding and large decking areas, it is exposed to a higher radiant heat flux (ie. BAL-29) and is unsuitable for retro-fitting.

Building loss in a bushfire follows a weakest link principle, so implementing effective and efficient approaches that involve systematically identifying and eliminating the weakest points will help to manage bushfire risk. A bushfire could attack all buildings in the same three ways that a bushfire spreads:

- Embers and burning debris carried by the wind which has been identified as the main cause of building damage in many bushfires;

- Radiant heat from the fire in nearby burning vegetation, materials or structures; and
- Flames directly touching buildings from a localised fire in garden vegetation or burning structures.

The effects on buildings and other structures are predictable and can be mitigated with good planning.

10.1.1 What Constitutes the Best “Shelter On-Site Option”?

Seeking shelter from a bushfire could occur in one of the following two situations:

- Taking shelter becomes the only reasonable option; fire is close to the Service and surrounding roads have been blocked by fire;
- Leaving is perceived as too risky; the precise location and intensity of a fast-approaching fire is uncertain and the perceived margin of safety in evacuating is too small. In these circumstances, it is generally best to seek shelter rather than risk being overcome by the fire attempting to reach safety.

The Pachamama Activity Centre at lot 54 Coolinga Road will become the designated “shelter on-site” location”. DFES defines a safer place as “a local open space or building where people may go to seek shelter from a bushfire” and suggests safer places can be dams, pools, sheds or homes, but are places of last resort (DFES 2010).

Those who find themselves threatened by a bushfire need options (VBRC 2009). This may be because their plan to evacuate is no longer possible because they cannot reach a place away from the fire front.

The Shire of Kalamunda does not have designated Community Fire Refuges or Neighbourhood Safer Places. The selection of an evacuation centre is usually made by the relevant authorities at the time of the emergency and these details are then advised to the community by DFES, the City and Police.

Recommendation 1

Maintain and retro-fit (if applicable) the Pachamama Activity Centre at lot 55 Coolinga Road to BAL-12.5 standard and designate it as the “shelter on-site” option

10.2 Reducing the Consequences: Vegetation & Fuel Management

Establishing and maintaining bushfire fuel levels surrounding all buildings at the site as outlined in Section 8.1.2 Element 2: Siting of the Development.

This is achieved by establishing and maintaining the Asset Protection Zone as outlined in Section 8.1.2 Element 2: Siting of the Development. As previously identified, the APZ standards are currently achieved.

Recommendation 2

Establish and maintain the APZ as outlined in Section 8.1.2 Element 2: Siting of the Development.

10.3 Reducing the Consequences: Access

Vehicular access to and from the site complies with minimum standards. There are multiple public roads leading away from the site and away from extreme bushfire hazard areas.

Recommendation 3

Ensure all vehicular access standards are achieved as outlined in Section 8.2.1 Element 3: Vehicular Access.

10.4 Reducing the Consequences: Water Supply

The site is in a reticulated area and fire hydrants are spaced every 200 metres in the surrounding public road reserves.

10.5 Retain the Risk

Bushfire evacuation planning for the site is essential for an adequate response during a bushfire event. This includes building capacity to be self-reliant and identifying self-evacuation triggers and resourcing adequate transport, in a timely manner. As discussed, contingency planning is also required to ensure staff and children at the Service have an on-site sheltering option to shelter from bushfire impacts such as radiant heat, flames and embers.

10.5.1 Bushfire Evacuation Plan

The evacuation plan in Attachment 1 seeks to mitigate and manage the risk associated with a fire emergency threatening staff and children at the Service. The plan details the components, personnel functions and implementation of evacuation procedures. An annual review and update of the bushfire evacuation plan by management is required.

The plan follows the guidance in the 'Evacuation Planning Handbook 4' (Attorney General's Department; Australian Emergency Management Institute) and Australian Standard 3745-2010.

An alternative to evacuation is to shelter in place rather than evacuate. This would occur if the risk associated with evacuation were greater than sheltering in place.

Recommendation 4

Implement the Bushfire Evacuation Plan as outlined in Attachment 1

Recommendation 5

Pachamama to review this Bushfire Management and Evacuation Plan annually

10.6 Assessment of Fire Management Strategies

The bushfire hazard that could threaten the Service occurs to the south of the site and contains forest fuel loads.

The fire management strategies include acceptable access arrangements, water for fire-fighting and the retro-fitting construction standards being acceptable for the predicted radiant heat levels exposed at Pachamama Activity Centre. A comprehensive Bushfire Evacuation Plan has also been developed (Attachment 1) which will be reviewed annually by Management.

10.7 Implementing the Bushfire Management and Evacuation Plan

10.7.1 Pachamama Pty Ltd Responsibilities

To maintain a reduced level of risk from bushfire, the owner's responsibilities are to:

- Comply with the Shire of Kalamunda Firebreak and Fuel Load notice as published.
- Ensuring retrofitting of the Activity Centre construction of buildings complies with AS 3959:2009 where applicable.
- If buildings are subject to additional construction in the future, AS 3959:2009 compliance is required.
- Implement the Bushfire Risk Management Recommendations as outlined in this report.
- Review and update the BMEP annually.

10.7.2 Shire of Kalamunda's Responsibilities

The responsibility for compliance with the law rests with the individual property owner and occupiers, and the following conditions are not intended to unnecessarily transfer some of the responsibilities to the Shire.

The Shire will be responsible for:

- Providing fire prevention and preparedness advice to landowners upon request, including the *Homeowners Bush Fire Survival Manual, Prepare, Act, Survive* (or similar suitable documentation) and the Shire of Kalamunda Fire Control and Fuel Load Notice.
- Monitoring bush fuel loads in road reserve sites and liaising with relevant stakeholders to maintain fuel loads at safe levels.
- Maintaining low bushfire fuels in the drainage reserve Public Access Way south east of the site.

11 CONCLUSIONS

This Plan provides acceptable solutions and responses to the performance criteria that fulfil the intent of the bushfire hazard management issues outlined in Guidelines for *Planning for in Bushfire Prone Areas V1.1* (WAPC, 2017).

The site is located in the bushfire prone area (i.e. within 100 m of classified vegetation) and will have the risk mitigated via a number of different measures. By implementing the recommendations of this report, maintaining the APZ around the building and retrofitting the shelter on-site option to AS3959 BAL-12.5 standards.

Water supply and hydrants are established. A Bushfire Evacuation Plan has been developed to provide guidance to staff on how to trigger decisions and the process to evacuate the site and personal responsibilities during a bushfire event that does not rely on agency assistance or warnings.

The site will fall within the acceptable level of risk when all mitigation strategies are implemented.

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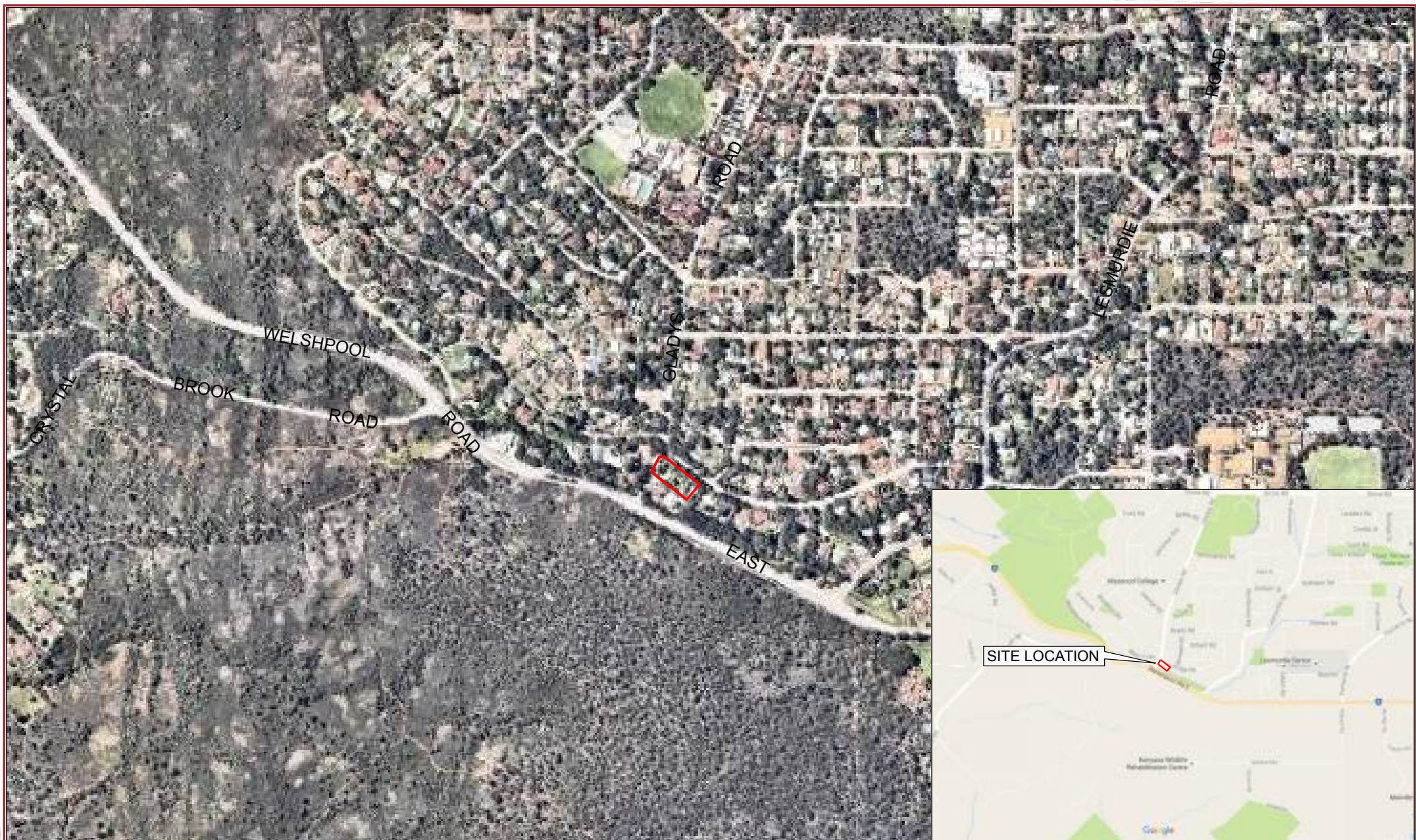
13 GLOSSARY

AS	Australian Standard
AHD	Australian Height Datum
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BOM	Bureau of Meteorology
BPZ	Building Protection Zone
DAP	Detailed Area Plan
DFES	Department of Fire and Emergency Services (was FESA)
DPAW	Department of Parks and Wildlife
ESL	Emergency Services Levy
FESA	Fire and Emergency Services (now DFES)
FMP	Fire Management Plan
HSZ	Hazard Separation Zone
LPS3	Local Planning Scheme No. 3
LSP	Local Structure Plan
POS	Public Open Space
TPS	Town Planning Scheme
VBRC	Victorian Bushfires Royal Commission
WAPC	Western Australian Planning Commission



APPENDICES

Appendix A: Site Location Plan
Appendix B: Site Plan
Appendix C: AS3959 Vegetation Classification
Appendix D: Topogropahy and Effective slope
Appendix E: Bushfire Hazard Level Rating
Appendix F: Building Siting & Asset Protection Zone
Appendix G: BAL Contour Plan
Appendix H: Vehicular Access & Water supply
Appendix I: Bushfire Management Plan Checklist



APPENDIX A: SITE LOCATION PLAN

LOT 54 COOLINGA ROAD
LESMURDIE
Shire of Kalamunda

LEGEND:

SUBJECT LAND.....



NORTH

0 100 200 300m

SCALE 1:10 000 @ A4

DATE: APRIL 2017

Base mapping supplied by Nearmap & Google Maps

Bushfire Safety
CONSULTING

BUSHFIRE SAFETY CONSULTING

PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net



APPENDIX B SITE PLAN

LOTS 54 & 55 COOLINGA ROAD
LESMURDIE
SHIRE OF KALAMUNDA

LEGEND

SUBJECT LAND.....



SOURCE OF PHOTOGRAPHY: NEARMAP



0 10 20 30m
NOT TO SCALE @ A3
DATE: APRIL 2017
Base mapping supplied by Nearmap

Bushfire Safety
CONSULTING

BUSHFIRE SAFETY CONSULTING
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net



APPENDIX C

AS3959 VEGETATION CLASSIFICATION

LOTS 54 & 55 COOLINGA ROAD
LESMURDIE
SHIRE OF KALAMUNDA

LEGEND

SUBJECT LAND 
CLASS A - FOREST
CLASS B - WOODLAND
Ex 2.2.3.2(e) - Exclusion Clause 2.2.3.2(e)
Ex 2.2.3.2(f) - Exclusion Clause 2.2.3.2(f)
Ex 2.2.3.2(c) - Exclusion Clause 2.2.3.2(c)

SOURCE OF PHOTOGRAPHY: NEARMAP

PHOTO POINT AND FIGURE IN REPORT 



0 10 20 30m
NOT TO SCALE @ A3
DATE: APRIL 2017
Base mapping supplied by Nearmap

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CONSULTING

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Mbl: 0429 949 262
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APPENDIX D

TOPOGRAPHY AND EFFECTIVE SLOPE

LOTS 54 & 55 COOLINGA ROAD
LESMURDIE
SHIRE OF KALAMUNDA

LEGEND

SUBJECT LAND.....



SOURCE OF PHOTOGRAPHY: NEARMAP



0 10 20 30m

NOT TO SCALE @ A3
DATE: APRIL 2017
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APPENDIX E

BUSHFIRE HAZARD LEVEL RATING

LOTS 54 & 55 COOLINGA ROAD
LESMURDIE
SHIRE OF KALAMUNDA

LEGEND

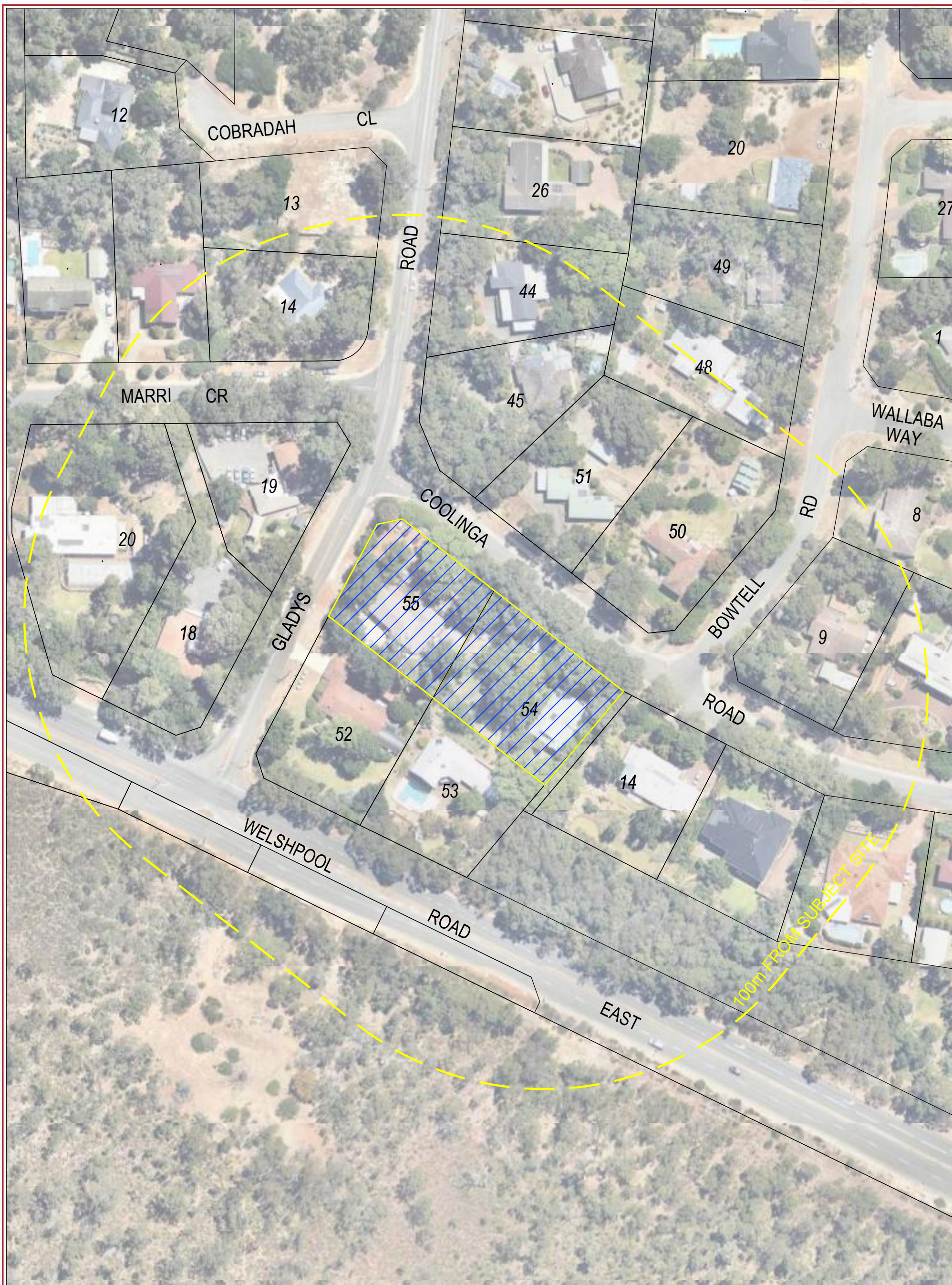
SUBJECT LAND.....	
EXTREME.....	
MODERATE.....	
LOW.....	



0 10 20 30m
NOT TO SCALE @ A3
DATE: APRIL 2017
Base mapping supplied by Nearmap

Bushfire Safety
CONSULTING

BUSHFIRE SAFETY CONSULTING
PO BOX 84 STONEVILLE WA 6081
Mob: 0429 949 262
www.bushfiresafety.net



APPENDIX F

ASSET PROTECTION ZONE

LOTS 54 & 55 COOLINGA ROAD
LESMURDIE
SHIRE OF KALAMUNDA

LEGEND

ASSET PROTECTION ZONE



SOURCE OF PHOTOGRAPHY: NEARMAP

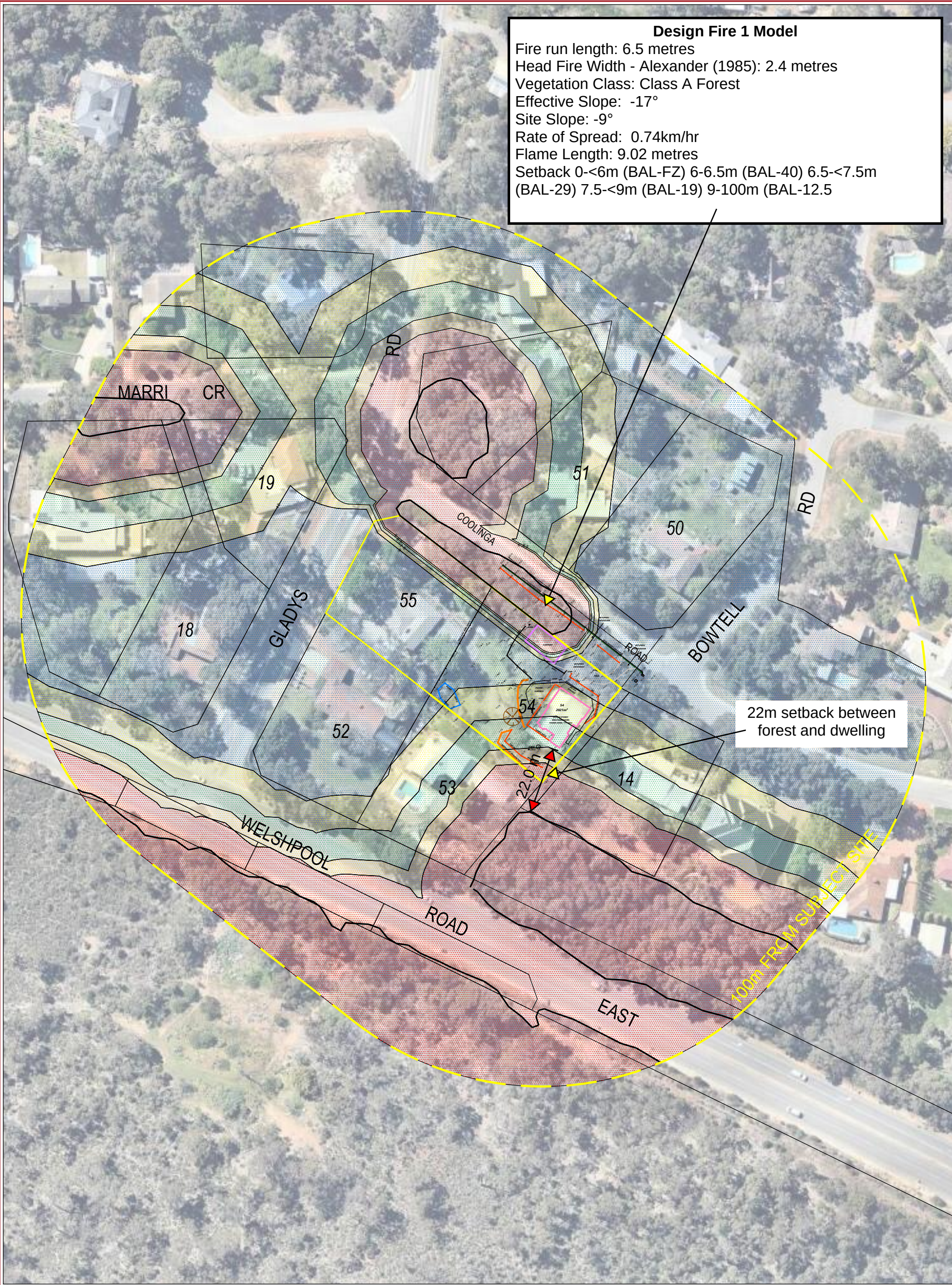


0 10 20 30m
NOT TO SCALE @ A3
DATE: APRIL 2017
Base mapping supplied by Nearmap

Bushfire Safety
CONSULTING

BUSHFIRE SAFETY CONSULTING
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net

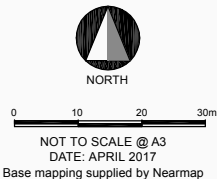
Design Fire 1 Model
Fire run length: 6.5 metres
Head Fire Width - Alexander (1985): 2.4 metres
Vegetation Class: Class A Forest
Effective Slope: -17°
Site Slope: -9°
Rate of Spread: 0.74km/hr
Flame Length: 9.02 metres
Setback 0-<6m (BAL-FZ) 6-6.5m (BAL-40) 6.5-<7.5m (BAL-29) 7.5-<9m (BAL-19) 9-100m (BAL-12.5)



APPENDIX G
BAL CONTOUR PLAN

LOTS 54 & 55 COOLINGA ROAD
LESMURDIE
SHIRE OF KALAMUNDA

BAL RATING	
BAL FLAME ZONE	
BAL 40	
BAL 29	
BAL 19	
BAL 12.5	



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PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net



APPENDIX H VEHICULAR ACCESS & WATER SUPPLY LOTS 54 & 55 COOLINGA ROAD LESMURDIE SHIRE OF KALAMUNDA	LEGEND SUBJECT LAND  FIRE HYDRANT  SOURCE OF PHOTOGRAPHY: NEARMAP	 NORTH 0 10 20 30m NOT TO SCALE @ A3 DATE: APRIL 2017 Base mapping supplied by Nearmap	Bushfire Safety CONSULTING BUSHFIRE SAFETY CONSULTING PO BOX 84 STONEVILLE WA 6081 M/t: 0429 949 262 www.bushfiresafety.net
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Appendix I: Bushfire Management Plan Checklist

Criteria	Response
1 Background Information	Details on skills, expertise, qualifications and accreditation provided.
2. Spatial Consideration of Bushfire Threat	Aerial photography and maps are provided outlining spatial distribution of vegetation and bushfire hazard on the site and within 100 metres of the site boundary
3. Proposal Compliance	The site can achieve all of the objectives of SPP 3.7, the existing building is exposed to BAL-29 and the shelter on site option is exposed to lower levels of radiant heat (i.e. BAL-12.5). Sufficient vehicles and staff are sited at the Service to quickly evacuate every child away from the bushfire threat. There are no buildings exposed to BAL-FZ and BAL-40.
3.1 Location of Development	
Does the proposal comply with the performance criteria by applying acceptable solution A1.1?	Yes. The proposed development is located in an area that the existing building is subject to a BAL rating of BAL-29 or lower.
3.2: Siting of Development	
Does the proposal comply with the performance criteria by applying acceptable solution A2.1?	Yes. An APZ is accommodated within the entire lot. The APZ provides sufficient setback from bushfire when combined with existing fuel management in adjacent means the building is subject to a BAL rating of BAL-29 or lower.
Does the proposal comply with the performance criteria by applying acceptable solution A2.2?	Yes.
3.3: Vehicular Access	
Does the proposal comply with the performance criteria by applying acceptable solution A3.1?	Yes
Does the proposal comply with the performance criteria by applying acceptable solution A3.2?	Yes
Does the proposal comply with the performance criteria by applying acceptable solution A3.3?	Not applicable
Does the proposal comply with the performance criteria by applying acceptable solution A3.4?	Not applicable
Does the proposal comply with the performance criteria by applying acceptable solution A3.5?	Not applicable.
Does the proposal comply with the performance criteria by applying acceptable solution A3.6?	Not applicable.
Does the proposal comply with the performance criteria by applying acceptable solution A3.7?	Not applicable.
Does the proposal comply with the performance criteria by applying acceptable solution A3.8?	Yes, compliance with fire control notice can be achieved

Criteria	Response
Does the proposal comply with the performance criteria by applying acceptable solution A3.9?	Not applicable.
4: Water	
Does the proposal comply with the performance criteria by applying acceptable solution A4.1?	Yes
Does the proposal comply with the performance criteria by applying acceptable solution A4.2?	Not applicable
Does the proposal comply with the performance criteria by applying acceptable solution A4.3?	Not applicable

Applicant Declaration

We declare that the information provided is true and correct to the best of our knowledge.

Signature:



Name: Rohan Carboon

Date: 20/04/2017

Signature:



Name: Ken Strahan

Date: 20/04/2017



ATTACHMENTS

Attachment 1 – Pachamama Activity Centre (Coolinga West) - Bushfire Evacuation Plan

Pachamama's Activity Centre – Evacuation Plan

1 Plan objective

To clearly define the process to be followed in the event of an emergency situation caused by an imminent threat from bushfire. This plan should be regarded as a 'living document' with guidelines that can be adapted to changing circumstances.

The plan will be used by staff for:

- The written procedures developed for evacuation of students and staff.
- Definition of the functions, roles and responsibilities of staff in a bushfire emergency.
- Ongoing education and training as part of the overall strategy.

2 Scope

This plan applies to the Pachamama's Activity Centre and relates to the potential impact of a bushfire on the site.

3 Response actions

A bushfire threat to the Childcare Centre will require either an evacuation of all people or sheltering on site until it is safe to evacuate from the property.

4 Emergency preparation and testing

4.1 Training requirements

Personnel working at the childcare centre shall be trained in the following emergency management information:

- The general information contained in this Evacuation Plan document.
- Individual roles and responsibilities.
- Access and egress routes.
- Assembly point locations.
- The written procedures applicable to the venue.

All staff must acknowledge that they have read and understood the emergency evacuation procedures, understand their role and responsibilities, and had any questions relating to the evacuation procedure adequately answered.

4.2 Exercise drills

Assembly on-site procedures can be practiced, however a total site evacuation cannot easily be practiced.

Staff would be briefed prior to each such event and there would be a debriefing of all staff following any bushfire event to discuss any issues regarding the plan.

4.3 Maintenance of equipment

Ember attack may last for many hours and the staff must be prepared to shelter with the children at the Pachamama Activity Centre. Ember attack can also be effectively mitigated by active defence strategies by trained staff if they are present at the site and have sufficient resources.

Equipment to store water such as buckets, knapsacks, bins and sinks are all useful for holding water to assist building defence if people are present. The vehicular access and water supply infrastructure is outlined in **Appendix H**.

It is necessary to ensure the following equipment is available to opportunistically extinguish any embers or small fires during an active defence of the site:

- 5 X 10 litre heavy duty buckets.
- other water holding containers (e.g. wheelie bins, sinks, 44 gallon drums, etc).
- 5 X heavy duty cotton mops.
- 3 X 15 litre fire fighting backpacks.
- hoses that can connect to internal and external taps in the Pachamama Activity Centre to extinguish embers.
- 3 X shovels and rakes or rakehoes.

4.4 Evacuation plan review

A review of the plan will take place following each event and after an evacuation.

5 General Roles and Responsibilities

5.1 OS&H planning committee

The Committee consists of the following personnel:

1. Centre Director
2. CEO
3. Centre Manager – Chief Warden
4. 2IC

The OS&H Emergency Planning Committee will review the Evacuation Plan, evaluate response and drills, and revise the plan as is required.

5.2 Chief Warden

- Evaluate the need for evacuation (Bushfire Monitoring Poster/Flow Chart);
- Initiate evacuation;
- As required, contact statutory authorities – for fire this is DFES and may include the Shire of Kalamunda fire and emergency services manager – and advise that an evacuation is underway; and
- Document the emergency situation, what happened, and what the outcome was.

5.3 Evacuation Wardens

The 2IC will be identified as Evacuation Wardens and should:

- Receive directions from the Chief Warden;
- Check all buildings/facilities;
- Ensure that all the staff and children have been alerted and a relocation / evacuation has been initiated;
- Maintain communication with, and update the Chief Warden with situation reports via hand held radios;
- Provide information of the situation to staff when asked;
- Carry out tasks as directed by the Chief Warden;
- Be readily identifiable, such as the wearing of tabards; and
- Contribute to debriefing.

6 Evacuation plan

The objective of this plan is to:

- Decrease the level of risk to life; and
- Ensure safe and effective evacuation of students and staff through effective control and management.

6.1 Evacuation

The Chief Warden will take the following issues into consideration when determining if and when to evacuate:

- The severity of a bush fire incident;
- The location of and distance to the fire incident relative to the property;
- The actual and forecast wind conditions at the time of a bush fire; and
- The approximate time for the bushfire to impact the property.

The generic process for evacuation can be summarized as:

- The relocation/evacuation trigger has been met;

Pachamama's Activity Centre – Evacuation Plan

- Staff are notified;
- Children are notified;
- DFES is notified by the Centre Director that an evacuation is in progress;
- ECRU is notified by the Centre Director that an evacuation is in progress;
- Parents are notified by the Centre Director through Facebook that an evacuation is in progress; and
- Following the relocation of students, await an emergency services assessment (where appropriate).

6.1.1 Evacuation triggers

- The trigger for pre-emptively closing Pachamama's Activity Centre will be days when the FDR is predicted to be Catastrophic;
- Monitoring of the DFES Alerts and Warnings web page by Centre Manager (<http://www.dfes.wa.gov.au/alerts/Pages/default.aspx>) at regular intervals must occur;
- The primary relocation trigger is defined as a bush fire that has the potential to impact Pachamama's operations during the normal operating hours;
- A one hour allows for an orderly evacuation of all people on site and subsequently allowing safe and easy access by fire fighting agencies; and
- Though highly undesirable and during an event, a shelter in place trigger is defined as a bush fire that has the potential to impact Pachamama's Activity Centre during the normal operating hours and it is assessed as unsafe to evacuate because surrounding roads are also under threat.

6.1.2 Phasing

To facilitate an orderly evacuation of Pachamama's Activity Centre, the departure of students and staff could be phased, if necessary, depending upon the number of children present at that particular time. This can be achieved by:

- Identifying age groups based on room registrations;
- Staff being responsible for the children in their room;
- Directing children of walking age to exit the centre via the front door and walk to the buses;
- Staff to carry the babies via the north sliding door to the buses;
- Wardens are clearly identifiable and appropriately equipped.

6.1.3 Evacuation Vehicles

Pachamama owns 4 buses and 2 vehicles, with a total capacity of 74 people. For the new centre, Pachamama will purchase an additional 26 seater bus for the additional 30 school aged children. This will result in a total transport capacity for Pachamama of 100 people.

Pachamama's Activity Centre – Evacuation Plan

During peak operating hours at maximum capacity, there would be 150 children and 30 staff members.

All staff members drive to work but, for the sake of being conservative, say 90% staff vehicle availability (27 additional vehicles with minimum 4 seats each).
 $27 \times 4 = 108$ extra seats.

Total transport requirement: 150 children and 30 staff members = 180 people.
Total vehicle seats: 100 (Pachamama) + 108 (staff vehicles) = 208 seats
minimum

Pachamama must ensure there is sufficient vehicle capacity every day in summer to evacuate every person from the site at all times.

A variety of vehicle types, including buses on site, means that consideration must be given to priorities for vehicle movement, including the appropriate route, as well as the potential for breakdown and vehicle management;

EVACUATION PLAN APPENDIX 1 - LIST OF EMERGENCY CONTROL PERSONNEL

Function	Name
CHIEF WARDEN	Centre Manager
EVAC WARDEN 1	2IC
EVAC WARDEN 2	Room Leader
TRAFFIC WARDEN 1	Room Assistant

EVACUATION PLAN APPENDIX 2 - LIST OF EMERGENCY CONTACTS

Emergency Service	Phone number	CALLED
DEPARTMENT OF FIRE EMERGENCY SERVICES (for emergency information)	133 337	Y/N
EDUCATION CARE AND REGULATORY UNIT	08 6551 8333	Y/N
POLICE	000	Y/N
AMBULANCE	000	Y/N
SHIRE OF KALAMUNDA Fire Manager	08 9257 999	Y/N
SHIRE OF KALAMUNDA Rangers	08 9257 9999	Y/N
PACHAMAMA - MARRI	08 9291 3666 0418 110 022	Y/N
PACHAMAMA - COOLINGA	08 9291 8876 0418 11 44 66	Y/N
CENTRE DIRECTOR Kristen McPhail	0412 202 244	Y/N
CEO Andrew White	0412 179 131	Y/N
CENTRE MANAGER Rocky Beaton	0450 569 367	Y/N

Annexure 6

DFES Response



Our Ref: D01231

Chris Lodge
Shire of Kalamunda
chris.lodge@kalamunda.wa.gov.au

Dear Mr Lodge

RE: VULNERABLE LAND USE AT LOTS 54 AND 55 COOLINGA ROAD, KALAMUNDA

I refer to an email received by the Department of Fire and Emergency Services (DFES) from you dated 21 April 2017.

The email is regarding the submission of a Bushfire Management Plan (BMP) prepared by Bushfire Safety Consulting dated 17 April 2017 (V2), for the above development application.

DFES provide the following comments with regard to *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) and the *Guidelines for Planning in Bushfire Prone Areas* (Guidelines).

Recommendation – supported compliant application

DFES advises that the proponent has adequately identified issues arising from the bushfire risk assessment and considered how compliance with the bushfire protection criteria can be achieved with the submitted BMP.

Should you require further information, please contact Sasha De Brito on telephone number 9482 1764.

Yours sincerely

Michelle Neil
DIRECTOR ADVISORY SERVICES

29 May 2017