S5 ENVIRONMENTAL

BUSHFIRE HAZARD ASSESSMENT & MANAGEMENT PLAN

100 Delathin Road, Algester

Client	Delathin Investments Pty Ltd
File Ref	S521003BF001v2.0
Date	5 June 2026

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Quality Control

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Date	5 June 2026

Version Control

Version	Description	Date	Author	Reviewer	Approver
1.0	DRAFT	24 March 2021	TH (Environmental Planner)	RS (Director)	RS (Director)
1.1	FINAL	10 May 2021	TH (Environmental Planner)	RS (Director)	RS (Director)
2.0	RFI	5 June 2026	JG (Env. Scientist)	DE (Snr. Consultant)	RS (Director)

Disclaimer

S5 Consulting Pty Ltd trading as S5 Environmental has developed this Bushfire Hazard and Bushfire Attack Level Assessment, taking into consideration the Australian Standard (AS3959-2018) - Construction of Buildings in Bushfire-prone Areas, the State Planning Policy and relevant local authority policies and guidelines. However, there can be no guarantee that following the recommendations made in this assessment can guarantee safety of property and human life.

Fire is an element of nature, and as such fire events (small or large) can have disastrous outcomes even with the best planning in place. The authors of this report and S5 Consulting Pty Ltd accept no responsibility for any harm to property or human life caused by fire or any other cause to persons utilising property or structures.

Abbreviations

AHD	Australian Height Datum
AS 3959-2018	*Australian Standard 3959-2018 Construction of Buildings in Bushfire-prone Areas*
BAL	Bushfire Attack Level
BCC	Brisbane City Council
BLE	Building Location Envelope
BMP	Bushfire Management Plan
BPZ	Building Protection Zone
CFA	Country Fire Authority
DES	Department of Environment and Science
DNRME	Department of Natural Resources, Mines and Energy
FFDI	Forest Fire Danger Index
ha	Hectares
NCC	National Construction Code
RE	Regional Ecosystem
SEQ	South East Queensland
SPP	*State Planning Policy, 2017*
SPP 1/03	State Planning Policy 1/03 *Mitigating the adverse Impacts of Flood, Bushfire and Landslide*
VHC	Vegetation Hazard Class

1.0 INTRODUCTION

S5 Environmental understands that Delathin Investments Pty Ltd are conducting a Bushfire Hazard Assessment and Management Plan to support an Other Change application for Stage 2 of the Staged development (Stage 1- Lots 1-17, Stage 2 Lots 21-28) in Algester, refer to Table 1.

The aim of this Bushfire Hazard Assessment is to undertake a site-specific "fit for purpose" assessment in accordance with the SPP Technical Guide - *Bushfire Resilient Communities, 2019*, (BRC) which, amongst other things, provides technical guidance on procedures for undertaking a Bushfire Hazard Assessment, Vegetation Hazard Class Assessments, calculating hazard protection zones and preparing Bushfire Management Plans.

This fit for purpose approach focuses on the actual hazard status of vegetation within, and adjacent to the site and utilises the *New Methodology For State-Wide Mapping Of Bushfire Prone Areas In Queensland* (Leonard *et al.* 2014) and the CSIRO's *Estimating the potential bushfire hazard of vegetation patches and corridors An enhancement of Queensland's methodology for State-wide mapping of bushfire prone areas* (Leonard *et al*. 2014).

This approach in undertaking a site-specific Bushfire Hazard Assessment involved a quantitative assessment of the site including a review of the vegetation communities, fuel loads and slope. S5 Environmental's Environmental Planner conducted an on-ground site and locality investigation, completed a desktop assessment utilising recent high-resolution aerial photography, available datasets and mapping to survey existing vegetation and land features of the site and surrounding area.

1.1 Site Description

Table 1. Site Description

Address	100 Delathin Road, Algester	RPD	Lot 38 on RP90981
LGA	Brisbane City Council	Site Area	1.08 ha
Zone	Emerging Community	Tenure	Freehold
Current State	The lot currently contains a Class 1 dwelling house with ancillary Class 10a sheds, an open carport, pool and landscaped vegetable garden beds. Native and invasive trees were scattered throughout the subject lot, with sixty (60) trees identified with a Diameter Breast Height (DBH) equal to or greater than 150 DBH, as indicated on the associated Vegetation Retention Plan prepared by S5 Environmental. The subject lot is situated within an increasingly urbanized area. The adjoining lots to the north, west and south of the site were subject to recent approved Development Approvals for Reconfiguring a lot (Impact Assessable) – BCC Application ref. A003933520, A006548852 and A005123861. The related works on these adjoining lots have either been completed or are currently undergoing construction. To the east and west, the		

<table>
<tr><td></td><td>subject lot is bound by Delathin Road and Woodland Street, identified as Neighbourhood roads within the BCC Road Hierarchy overlay. Tapsall Place further adjoins onto the southern side property boundary of the subject lot to service the lots approved under BCC Application ref. A003933520. Refer to Figure 1, below.</td></tr>
<tr><td>Proposed Development</td><td>S5 Environmental understands that Urbicus are assisting their Client's Delathin Investments to lodge an Other Change Application to further subdivide the balance lot into 8 residential lots and introduce staging to the current approval at 100 Delathin Road, Algester. S5 Environmental understand that the original 17 lot subdivision is Stage 1 (Lots 1-17), with the additional 8 lots being Stage 2 (Lots 21-28). Refer to Figure 2, below. Council have issued an RFI requesting a standalone Bushfire Hazard assessment for the subject site.</td></tr>
<tr><td>Potentially Hazardous Vegetation</td><td>Remnant vegetation situated to the west of the subject site, beyond Delathin Road, may be potentially hazardous with regard to bushfire risk. The Department of Natural Resources, Mines and Energy (DNRME) identify an Endangered Regional Ecosystem, RE 12.5.3 within 100 metres of the proposed lots , as follows:
<table>
<tr><th>Regional Ecosystem</th><th>VMA Class</th><th>Description</th></tr>
<tr><td>12.5.3</td><td>Endangered</td><td>Eucalyptus racemosa subsp. racemosa woodland with Corymbia intermedia, E. siderophloia +/- E. tindaliae, E. resinifera, E. pilularis, E. microcorys, Angophora leiocarpa. Melaleuca quinquenervia is often a prominent feature of lower slopes. Minor patches (<1ha) dominated by Corymbia citriodora subsp. variegata sometimes occur. Occurs on complex of remnant Tertiary surfaces +/- Cainozoic and Mesozoic sediments. (BVG1M: 9g)</td></tr>
</table>
A site inspection on 17 February, 2021 by S5 Environmental's Senior Ecologist and Environmental Planner confirmed the presence of the mapped RE 12.5.3, located on the other side of Delathin Road.</td></tr>
</table>

Figure 1 Site Aerial Source: *Nearmap* (Dated 2026)

Figure 2 Proposed Reconfiguration of a Lot

2.0 STATUTORY REQUIREMENTS

2.1 Development Applications In Bushfire Prone Areas

Bushfire Prone Areas are identified at both the State and Local Government Level. The State Planning Policy Bushfire Prone Area map was developed by CSIRO to map areas with Very High, High, and Medium Potential Bushfire Intensity. The SPP also maps a 100 m potential Impact Buffer.

The Brisbane City Council (BCC) *City Plan 2014* implements the *Bushfire Hazard Overlay Code* which acts as a development constraint within the BCC locality (Appendix C). It is understood that the *City Plan 2014* has appropriately integrated all aspects of the SPP, including the Safety and Resilience to Hazards (Natural Hazards, Risk and Resilience – Bushfire) State interest. As such the SPP bushfire hazard mapping, as well as BCC's Bushfire hazard overlay, were consulted to determine the preliminary bushfire hazard ratings of the site and locality (within 150 m), refer to Figure 3 and Figure 4, below.

Within the SPP Bushfire Prone Area overlay mapping, areas of Medium Potential Bushfire Intensity are identified to the west and south of the subject site, with a slither of Medium Hazard mapped over the south-western corner of the site. An associated Potential Impact Buffer encroaches into a majority of the subject site, excluding the eastern extent. Dissimilar to the SPP Bushfire Prone Area mapping, the BCC Bushfire overlay identifies areas of Medium and High Hazard Areas, with an associated High Hazard Buffer Area over the entire subject site. Areas of Medium and/or High Hazard Areas are further identified to the north, south and west of the subject site.

Due to potentially hazardous vegetation being mapped within and around the proposed development site, further investigation of the site-specific bushfire hazard characteristics has been undertaken to determine the actual hazard of the site, in accordance with the BCC and SPP mapping.

Figure 3 Extract of the SPP Bushfire Overlay Mapping

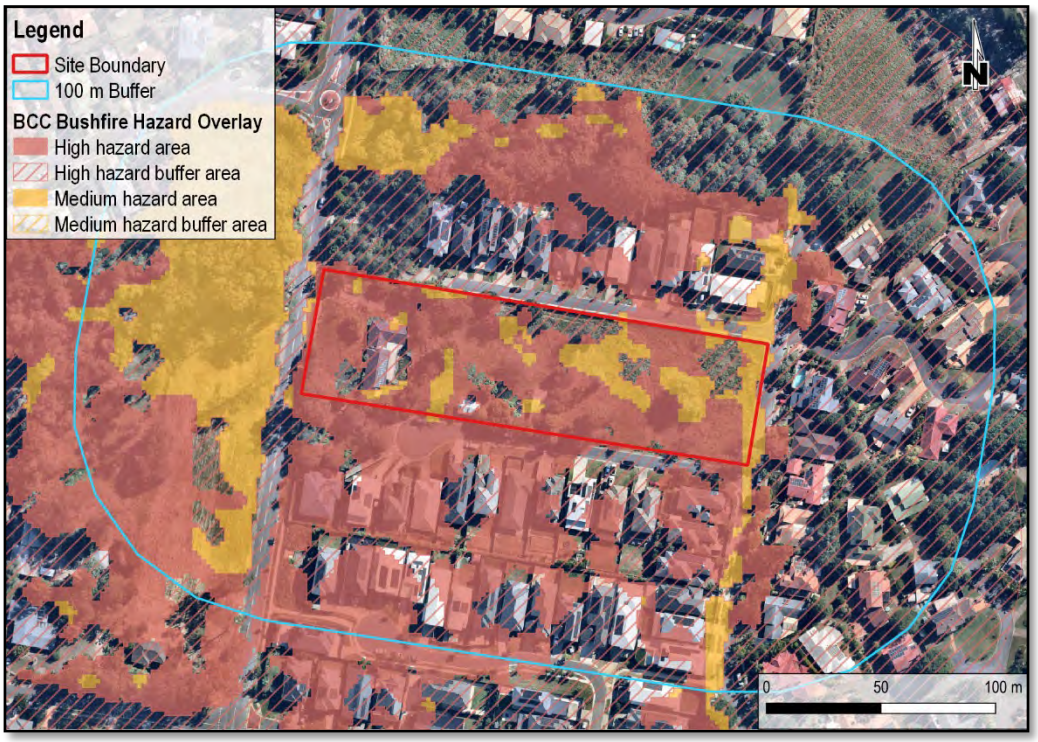

Figure 4 Extract of BCC Bushfire Overlay Mapping

2.2 AS3959-2018 Construction of Buildings in Bushfire Prone Areas

Part 8.2.5 of the BCC's *City Plan 2014* identifies potential Bushfire Hazards within the Brisbane locality, which trigger requirements under the *Building Code of Australia* (BCA).

The BCA then triggers bushfire assessment in accordance with the *Australian Standard 3959-2018 - Construction of Buildings in Bushfire Prone Areas* for Class 1, 2, 3 and associated Class 10a buildings that are proposed to be constructed in Bushfire Prone Areas. The proposed subdivision is for a residential purpose, and it is anticipated that future habitable Class 1a buildings with or without ancillary Class 10a buildings will be sited within each of the 28 proposed lots.

According to the BCA, these buildings will require a BAL assessment when constructing within areas of Medium and High Hazard and must adhere to the relevant AS 3959-2018 Construction Standards. Refer to Table 2, below.

Table 2. Summary of Building Classes 1, 2, 3, and 10a

Class	Description
Class 1	Class 1a: A single dwelling being – (i) A detached house, or (ii) One of a group of two more attached dwellings, each being a building, separated by fire resisting wall, including a row house, terrace house, town house or villa unit Class 1b: (i) A boarding house, guest house, hostel or the like – a) With a total area of all floors not exceeding 300 m^2 measured over the enclosing walls of the Class 1b; and b) In which not more than 12 persons would ordinarily be resident, o r (ii) Or more single dwellings located on one allotment and used for short-term holiday accommodation
Class 2	A building containing two or more sole-occupancy units each being a separate dwelling
Class 3	A residential building, other than a building of class 1 or 2, which is a common place of long term or transient living for several unrelated persons, including – a) A boarding house, guest house, lodging house or backpacker's accommodation; or b) A residential part of a hotel or motel; or c) A residential part of a school; d) Or accommodation for the aged, children or people with disabilities; or e) A residential part of a health-care building which accommodates members or staff; or f) A residential part of a detention centre.
Class 10a	A non-habitable building or structure – a) A non-habitable building being a private garage, carport, shed, or the like.

Source: Modified from Building Code of Australia

3.0 METHODOLOGY

3.1 Bushfire Hazard Assessment

The SPP Potential Bushfire Intensity classifications are based on the *New Methodology for State-wide Mapping of Bushfire Prone Areas in Queensland* (Leonard *et al.* 2014). This State-wide mapping methodology was developed to identify Bushfire Prone Areas in support of bushfire hazard provisions of Queensland's State Planning Policy. The new methodology scales bushfire hazard based on the Potential Fire-line Intensity (PFLI) of a severe bushfire and can be used to predict the radiation profile of areas located adjacent to potentially hazardous vegetation and an associated Potential Impact Buffer.

Accordingly, the classification of an area's PFLI is calculated as a combination of the following three metrics, using the below equation (Leonard *et al.* 2014):

- Total fuel load (W);
- The McArthur Forest Fire Danger Index (FFDI), and
- Maximum Landscape Slope (θ in ^{o}).

$$FI = 0.62\, W^2\, FFDI \exp(0.069\, \theta)$$

Equation 1

For the purposes of the bushfire hazard assessment, S5 Environmental have utilised data from the Queensland Fire and Emergency Services (QFES) published to the Queensland Government's Queensland Spatial Catalogue (QSpatial) for fuel load and FFDI. PFLI is delineated into a number of hazard categories shown in Table 3, and each patch of hazardous vegetation can be classed as Very High, High, Medium, Grassland or low hazard according to the PFLI determined for that specific patch. Any patch of hazardous vegetation classed as Very High, High or Medium is buffered by 100m called the Potential Impact Buffer.

The Potential Impact Buffer is also considered a Bushfire Prone Area, along with hazardous vegetation with a PFLI of Very High, High or Medium. Any development within a bushfire prone area requires further assessment of radiant heat exposure, assessment against the relevant local planning scheme bushfire code and/or an assessment against the SPP assessment benchmarks for Natural hazards, risk and resilience relevant to bushfire and the development of a site-specific bushfire management plan to ensure that the proposed development is exposed to an acceptable or tolerable bushfire risk.

Table 3. Summary of Building Classes 1, 2, 3, and 10a

Potential Bushfire Intensity Class	Potential Fire-line Intensity (PFLI)
Very high	>40,000kW/m
High	20,000 – 40,000kW/m
Medium	4,000 – 20,000kW/m
Low	<4,000kW/m

3.2 Modification of Potential Intensity of Small Patches and Corridors

Using the Bushfire Resilient Communities (BRC) methodology in Section 4.2.6 (The State of Queensland 2019b), small patches and narrow corridors of hazardous vegetation were removed from the map of hazardous vegetation within 150 m of the proposed development. This is as small, isolated and/or narrow patches of hazardous vegetation are not large enough to support a fully developed fire. As stated in the BRC methodology (The State of Queensland 2019b), small, isolated or narrow patches are unlikely to reach a potential fire-line intensity greater than 4,000 kW/m^2 and as such, are considered to be low hazard and not classed as a Bushfire Prone Area. The *SPP Technical Reference Guide - Bushfire Resilient Communities* (2019) summarises research by Leonard and Opie (2017) outlines four steps to filter out small patches and narrow corridors of continuous fuel (see Table 4 below).

Table 4. Steps to Downgrade Bushfire Intensity

Step	Description
1	Remove small, isolated patches of **continuous** fuel (< 1ha) surrounded completely by either discontinuous fuel or no fuel. These patches must be further than 100 m from other continuous fuel patches greater than 2 ha in area.
2	Downgrade intensity of small patches (0.5 to 3 ha) of **continuous** vegetation surrounded completely by either discontinuous or no fuel, which is more than 100 m from other **continuous** fuel patches greater than 2 ha in area.
3	Remove narrow corridors of **continuous** fuel (50 m, or less in width). The process erodes, then dilates by 25 m in width all **continuous** fuel patches in relation to **discontinuous** areas.
4	Remove small fragments (< 0.5 ha) of shrub-dominated or hazardous tree vegetation.

3.3 Radiant Heat Exposure Assessment

Radiant heat exposure for the proposed development was calculated using a Method 2 from the AS3959-2018. This Method 2 calculates the Bushfire Attack Level (BAL) for a proposed development by determining the minimum distance between hazardous vegetation and the development to achieve each BAL level. As BAL directly correlates to radiant heat exposure, this calculation reflects the level of bushfire risk for a proposed development (see Table 5).

To determine the radiant heat exposure for the proposed development, the online Flamesol Minimum Distance Calculator (FPA 2017) was used to determine the required setbacks to hazardous vegetation to achieve an acceptable radiant heat exposure for the proposed development.

Currently, S5 Environmental understand there is one set of inputs for a Method 2 calculation in accordance with AS3959-2018 or Bushfire Resilient Communities (BRC), which are accepted by BCC. Inputs to the BAL/radiant heat exposure assessment used for the purposes of this assessment include the sets of parameters as summarised in Table 6. S5 Environmental have opted for the use of AS Method 2(b) within

the below radiant heat flux assessment. This approach and set of inputs are generally more conservative and accurate as they incorporate higher fuel loads and flame temperature, as well as a site specific FFDI.

Table 5. BAL and Radiant Heat Exposure

BAL Score	Radiant Heat Exposure
Low	-
12.5	12.5 kW/m^2
19	19 kW/m^2
29	29 kW/m^2
40	40 kW/m^2
Flame zone (FZ)	> 40 kW/m^2

Table 6. Parameter inputs for Method 2 from AS3959-2018

Parameter	AS Method 2
Surface fuel load (t/ha)	Surface fuel load for identified VHC (surface + near surface)
Overall fuel load (t/ha)	Total fuel load for identified VHC
Flame temperature	1,200 K
FDI/FFDI	From Catalyst/QSpatial
Standard inputs	Bushfire Resilient Communities (QG 2019)
Effective slope	Measured as the slope under the hazardous vegetation. A minimum effective slope of 1 ° is utilised if vegetation slopes uphill or is at the same elevation (flat).
Site slope	Measured as the slope between the hazardous vegetation and the site. A minimum site slope of 1 ° is utilised if vegetation slopes uphill or is at the same elevation (flat).
Flame Width	Flame width is assumed to be 100 m (AS 3959-2018) unless a short-fire run.

3.4 Short Fire Run

Small or narrow patches of hazardous vegetation are unlikely to support a fully developed bushfire due to their limited size (see Figure 5 for a schematic representation of how fire moves across a landscape, demonstrating this). As such, the flame width and height in these small patches will not reach the standard inputs for the Method 2 from AS3959-2018 as these standard inputs are based on a fully developed bushfire. In these cases, a short fire run calculation can be used. The short fire run methodology can only be applied

when there is a maximum fire run of 150m as measured on the effective slope. In these cases where a short fire run can be justified, and thus a reduced flame width and height for a Method 2 calculation, the method from the *Short Fire Run: Methodology for Assessing Bush Fire Risk for Low Risk Vegetation* (NSW Rural Fire Service, 2019) is adopted.

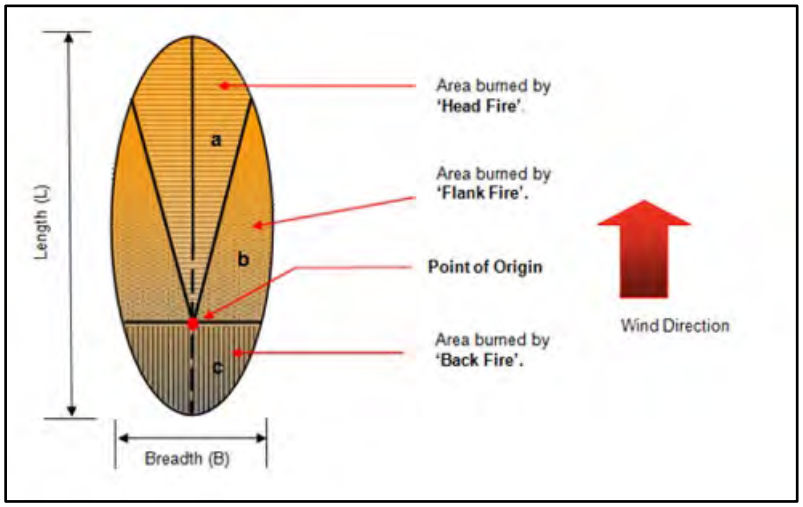

Figure 5. Schematic Diagram of Simple Elliptical Fire Growth Model (Van Wagner 1969) from NSW Rural Fire Surface (2019)

4.0 BUSHFIRE HAZARD ASSESSMENT

4.1 Potential Fire-line Intensity Assessment

In accordance with *A New Methodology for State-wide mapping of bushfire prone areas in Queensland* (Leonard *et al.* 2014), fuel loads derived from ground-truthed Vegetation Hazard Classes (VHCs), effective slope and FFDI were used to calculate the PFLI of hazardous vegetation within 150m of the proposed development and hazardous into the relevant PFLI category. The following sections discuss how these parameters were determined to calculate PFLI for hazardous vegetation in proximity to the proposed development.

4.1.1 Vegetation Assessment and Fuel Loads

In accordance with the *New Methodology for State-Wide Mapping of Bushfire Prone Areas in Queensland* (Leonard *et al.* 2014), potential fuel loads are assigned to vegetation categories (Vegetation Hazard Classes – VHC) formed by amalgamating land use and vegetation types with a moderately consistent fuel load and structure.

The Potential Fuel Load assigned to each VHC is generally representative of the higher fuel load expected for the typical vegetation types, landscape and site conditions within each VHC and approximates the ***80th percentile (%) fuel load of the "long unburnt condition"*** for the class (generally greater than 10 years without burning).

Using QFES Catalyst Mapping, numerous VHCs were mapped within and adjacent to the subject lot. An extract of the Catalyst Mapping is shown below in Figure 6.

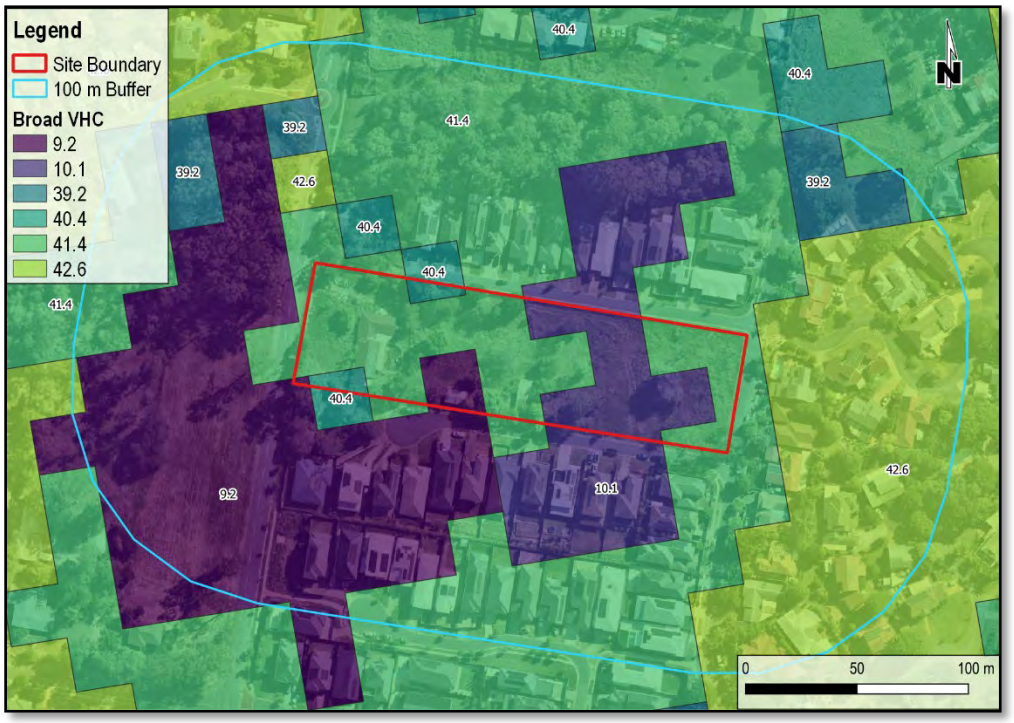

Figure 6. Extract of Vegetation Hazard Classes from Catalyst

4.1.2 VEGETATION ASSESSMENT

To confirm and ground-truth the Catalyst VHCs mapped within and adjacent to the subject lot, S5 Environmental's Environmental Planner and Senior Ecologist undertook a Reliability Assessment comparing the Local and State Government mapping with on-ground conditions. The reliability assessment incorporated a review of current hazard mapping, an on-ground site and locality assessment on 17th February, 2021, and a comprehensive review of available aerial mapping of the site, including a 150 m buffered area, external to the subject lot. Taking a conservative approach, the vegetation to the north and north-west remained as VHC 9.2. The developed residential areas in proximity of the assessment area and site were re-classified to either VHC 39.2, 41.4 or 42.6, depending on the abundance of vegetation and approved subdivisions, coverage of buildings and/or sealed areas. Refer to Plates 1 to 3, below.

The VHC mapping has, therefore, been modified to more accurately reflect the on-ground conditions, and to reflect the post-development state of the subject lot and locality. The modified VHCs are shown in Figure 7, below.

4.1.3 Fuel-loads

Table 7, below, summarises the associated fuel loads of the final VHCs in relation to the proposed development.

Table 7. Summary of Vegetation Communities and their Respective VHC and Fuel Loads

VHC	VHC Description	Fuel Continuity	Potential Fuel Load * (t/ha)
			Total
9.2	Moist to dry eucalypt woodland on coastal lowlands and ranges	Continuous	17.2
39.2	Low to moderate tree cover in built-up areas	Discontinuous	8
41.4	Discontinuous low grass or tree cover	Discontinuous	3
42.6	Nil to very low vegetation cover	Discontinuous	2

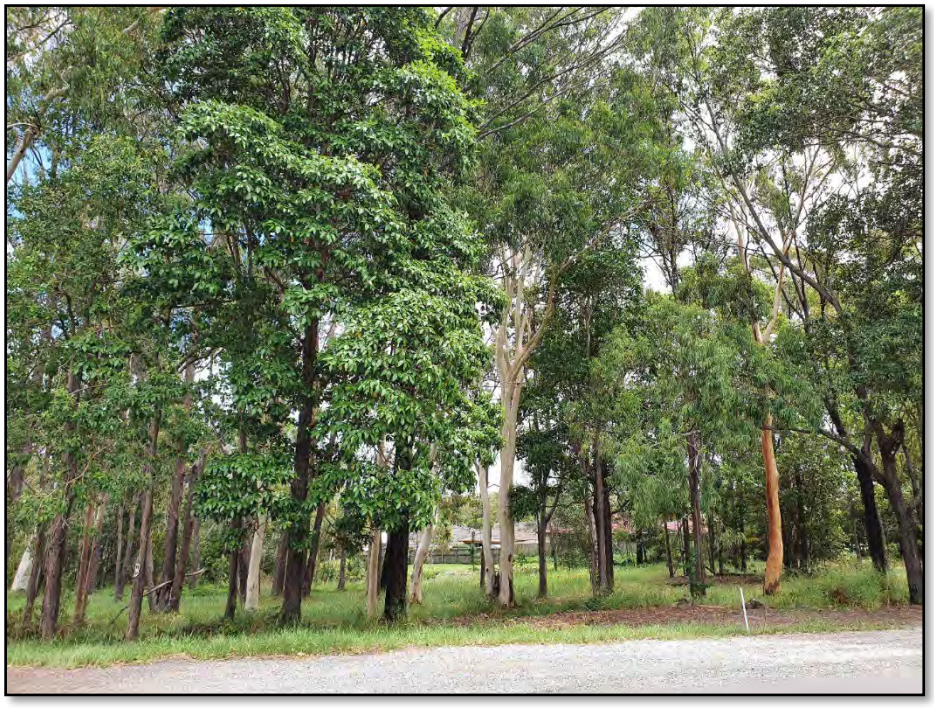

Plate 1: View of the remnant vegetation (RE 12.5.3) situated on the other side of Delathin Road, and classified as VHC 9.2

Plate 2: View of the adjoining lot to the north of the subject site. This site has been compliantly cleared to support a Reconfiguring of a Lot approval.

Plate 3: View of residential properties containing discontinuous low grass or tree coverage (VHC 41.4), situated to the east of the subject site.

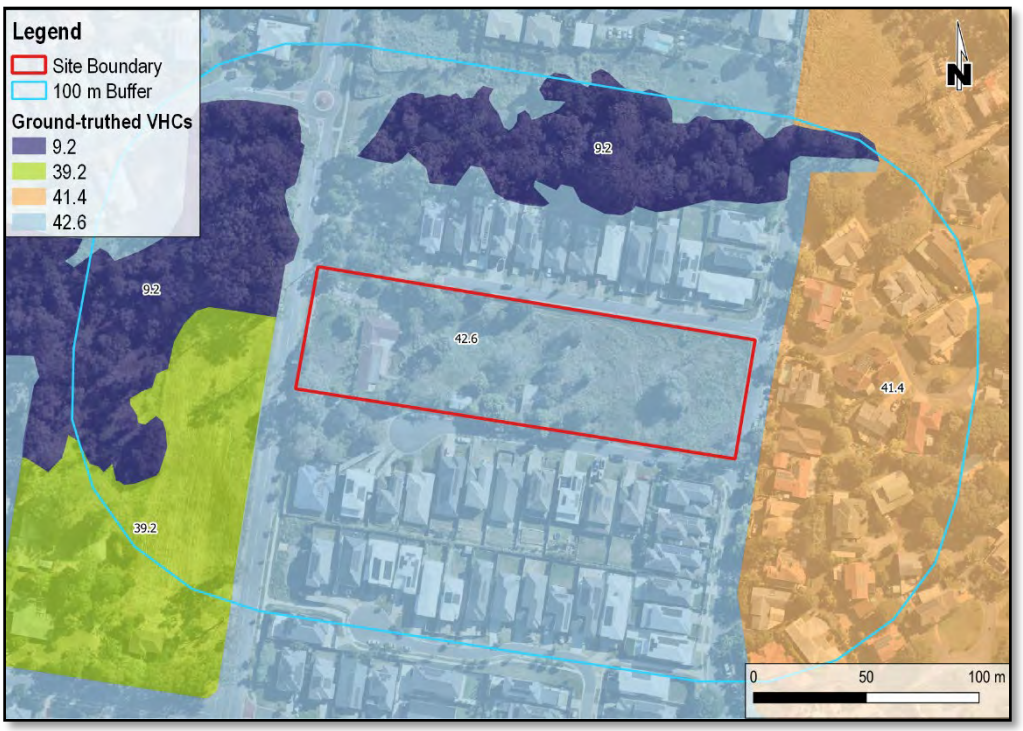

Figure 7. Ground-truthed and post-development Vegetation Hazard Class

4.1.4 Modification of Potential Intensity of Small Patches and Corridors

After ground-truthing the VHCs within the assessment area, continuous VHCs were rasterized to undergo the processing stages. Continuous and discontinuous fuel VHCs are defined as:

- Continuous: Vegetation and land uses which possess generally consistent fuel loads which can develop a full flame front; and
- Discontinuous: Vegetation and land uses which possess fuel loads which are incapable of supporting a full flame front.

The rasterization process extracts the attribute value of the polygon which occupies the centre of the raster pixel (a 25 m by 25 m cell) and uses it to populate the same cell within a raster layer. This will result in continuous VHCs within the assessment area being rasterized whilst discontinuous VHCs remain un-rasterized.

Following the rasterization of the continuous VHCs as outlined above (i.e., VHCs 9.2), S5 Environmental have applied Step 3 and 4 in accordance with the downgrading stages outlined within both Leonard and Opie (2017) and BRC (2019). Step 3 is separated into two parts:

A. the shrinking of continuous fuel load pixels adjacent to discontinuous fuel loads (i.e., continuous fuel pixels adjacent to discontinuous fuel are removed); and
B. the dilation of residual continuous fuel patches by one pixel (i.e., residual continuous fuel pixels are dilated back out one pixel).

This will result in the removal of narrow corridors less than 75 m in width (< 3 pixels), as following the initial shrinking of continuous fuel pixels adjacent to discontinuous vegetation (Step 3A), no residual pixels associated with the narrow corridor will remain and dilation cannot occur (Step 3B). Refer to Figure 8 and Figure 9.

Following the implementation of the processing stages, a narrow, isolated corridor to the north of the subject site has been downgraded, along with a small patch of vegetation to the north-west, which is small in size. The pixelated form of the finalised continuous vegetation is to be utilised within the PFLI calculations in Section 4.1.7 and was smoothed to reflect ground-truthed conditions. Refer to Figure 10 and Figure 11.

Figure 8. Shrinking of patches of continuous fuel at the interface with non-continuous fuel

Figure 9. Step 3b – Dilation of residual continuous fuel patches

Figure 10. Finalised pixelated hazardous vegetation within the assessment area

Figure 11. Smoothed hazardous vegetation to reflect ground-truthed conditions and vegetation

4.1.5 Slope Assessment

The slope of vegetated land over which a bushfire passes has a strong influence on both the intensity and rate of spread of the bushfire. From a Bushfire Hazard Assessment perspective, the relevant slopes to consider are the slopes of land beneath areas of potentially hazardous vegetation, defined as "Effective Slope" within the AS 3959-2018, that would be retained within or adjacent to the proposed development. Also, relevant, is whether the vegetated land is situated upslope or downslope of the proposed development. As fire travels upslope, there is a significant reduction in risk and fire-line intensity for sites that sit below the vegetation.

Slope has been calculated in GIS from a 25 m resolution digital elevation model (DEM). The maximum slope (in degrees) was calculated from the central point in a pixel in a group of 9 x 9 cells to the eight adjoining cells in that group, refer to Figure 12, below.

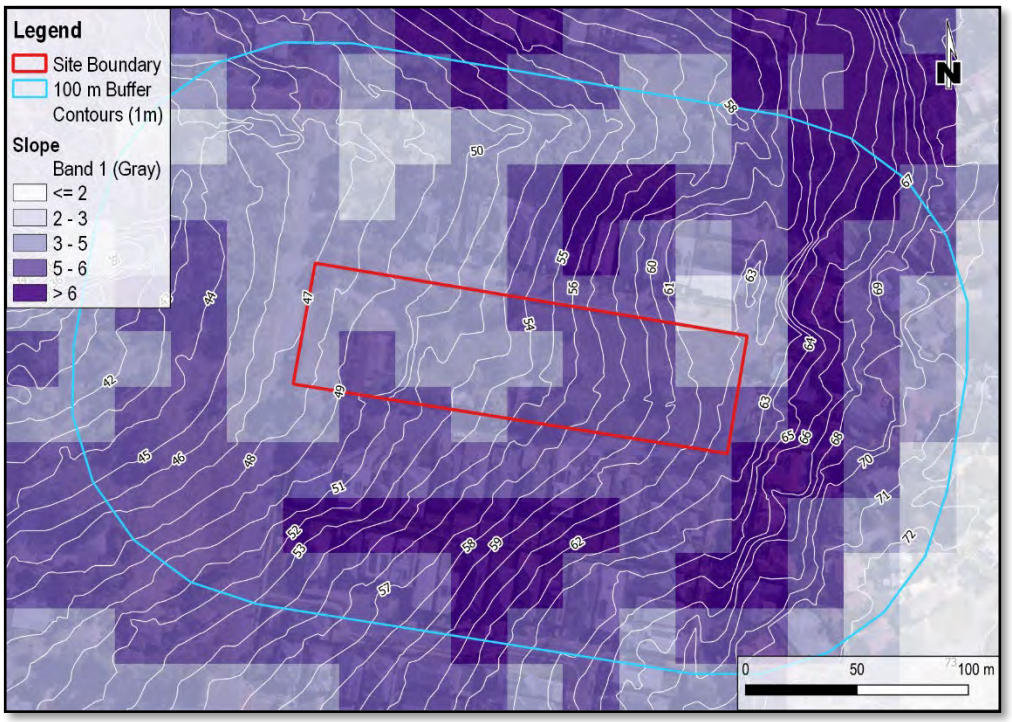

Figure 12. Slope (degrees) of the site

4.1.6 Forest Fire Danger Index

In accordance with the Australian Standard (AS) 3959-2018, *Construction of buildings in bushfire prone* areas, the Fire Danger Index (FDI) indicates the chance of a fire starting, its intensity, rate of spread and the difficultly of its suppressions, according to a number of combinations of relative humidity, air temperature, wind speed as well as long- and short-term drought effects. The QFES Catalyst Mapping indicates that the site-specific Forest Fire Danger Index (FFDI) for the subject lot is 55.

4.1.7 Post-development Potential Bushfire (Fire-line) Intensity

A bushfire hazard rating has been derived for Classifiable Vegetation in accordance with the State-wide mapping methodology for bushfire prone areas in Queensland, described in Section 3.1 (Leonard *et al.* 2014). Using *Equation 1*, calculations have been undertaken using GIS Raster Calculator, with the rasterised

inputs for Fuel Load (Table 4), Slope (Figure 12) and FFDI. Figure 13, below, summarises the output of the Bushfire Hazard Calculations at 25 m resolution.

Figure 13. Summary of the Potential Fire-line Intensity

In accordance with the *New State-Wide Mapping Methodology for Bushfire Prone Areas in Queensland* (Leonard et al. 2014), Potential Bushfire Intensity Classes are described as:

- Very high (potential intensity) > 40,000+kW/m;
- High (potential intensity) 20,000 – 40,000kW/m;
- Medium (potential intensity) 4,000 – 20,000kW/m; and
- Low (potential intensity) < 4,000kW/m.

Vegetation deemed to have Medium Potential Bushfire Intensity is located to the west, beyond Delathin Road. The surrounding areas were not classed as 'Classifiable Vegetation' as they included numerous residential lots containing dwellings with or without ancillary pools and sheds, sealed local road corridors, discontinuous landscaped vegetation and maintained mown grass. The entire subject site achieves a Low potential bushfire intensity < 4,000kW/m rating, as indicated above in Figure 13.

5.0 BUSHFIRE ATTACK LEVEL ASSESSMENT

This BAL assessment has focused on the potential impact of a fire event in hazardous vegetation located within 100 m of the subject site. Hazardous vegetation in relation to the proposed development was determined to be the vegetation to the west of the development area (refer to **Figure 13**). A Method 2 assessment in accordance with AS3959-2018 utilising the online Flamesol Minimum Distance Calculator was undertaken to determine the required setbacks from the hazardous vegetation (see **Table 8** and **Figure 14**). Refer to **Appendix A** for inputs and outputs from the Flamesol Minimum Distance Calculator.

Table 8. Summary of Setbacks and Radiant Heat Exposure for the Proposed Development

Radiant Heat Exposure (kW/m^2)	BAL	Distance from Hazardous Vegetation to the West
-	Low	100 m
12.5	12.5	33 m
19	19	23.3 m
29	29	15.9 m
40	40	11.7 m
> 40	FZ	< 11.7 m

Figure 14. Radiant Heat Flux Setbacks

Based on the results of the radiant heat exposure assessment, lots 1-17, 26 and 27 will be located over 100m away from any hazardous vegetation. Lots 21-25 and 28 achieve a maximum BAL score of 12.5.

It is important to note that although a dwelling and associated structures (where a non-habitable structure has not achieved the appropriate setback from a habitable structure) may straddle BAL contours, the highest BAL the structure is in, is the applicable BAL for construction purposes.

As the development has been determined to be located within a bushfire prone area, a Bushfire Management Plan has been prepared and is presented in Section 6.0.

6.0 BUSHFIRE MANAGEMENT PLAN

This Bushfire Management Plan (BMP) identifies management measures that must be implemented to ensure that the risk of bushfire attack is reduced to an acceptable level. It is first important to understand the processes that influence bushfire behaviour (Section 6.1), and the sources of damage that threaten people, infrastructure and property (Section 6.2).

6.1 Bushfire Behaviour

Understanding bushfire behaviour is imperative when planning new development. There are three main factors which influence fire behaviour as follows:

1) Topography

Slope influences the speed and intensity of a fire. Fire is known to burn faster uphill as flames and radiant heat preheat the vegetation ahead of the fire, drying it out and making it increasingly flammable. As a rule of thumb, for every 10 degrees slope, fire doubles in speed. Refer to Figure 15, below.

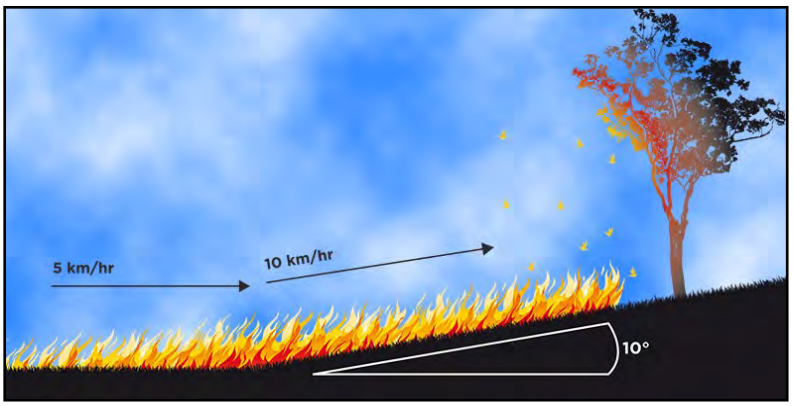

Figure 15. Effects of Topography on Bushfire (source: Country Fire Authority)

1) Weather Conditions

Bushfire weather conditions are fundamentally defined by temperature, humidity, wind, atmospheric conditions and past rainfall. For example, summer weather conditions increase the flammability of vegetation. Wind influences the speed and direction in which fire travels, fire intensity and possibility of spot fires from burning debris. A measure of weather conditions is the Forest Fire Danger Index (FFDI) and Grassland Fire Danger Index (GFDI). These measures are useful in determining the fire danger rating (refer to Fire Danger Rating in Figure 16).

2) Vegetation

Vegetation is the source of fuel for a bushfire. The amount of fuel surrounding a building can directly impact a buildings survival. Vegetation management, landscaping for bushfire and breaking the continuity of vegetation can limit the spread of fire.

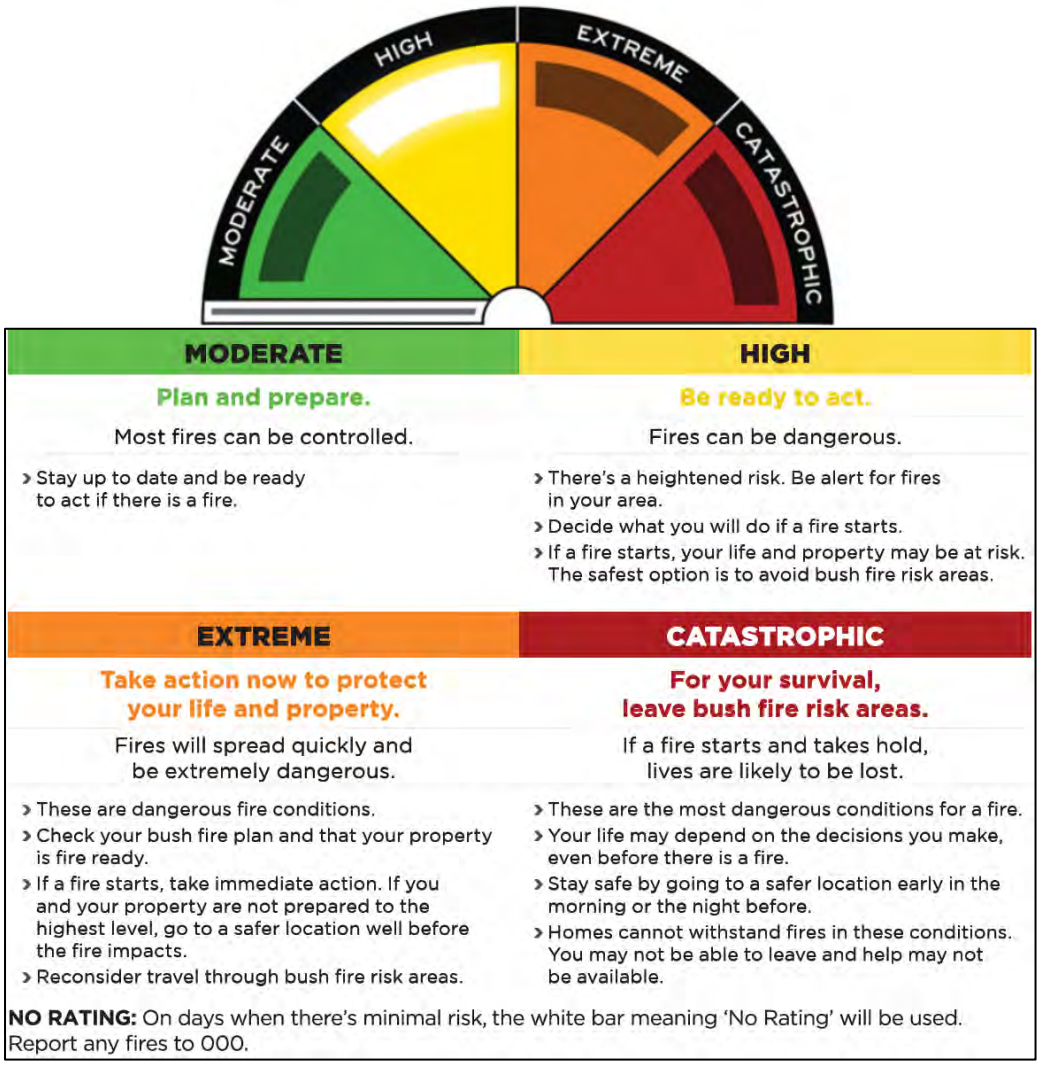

Figure 16. Australian Fire Danger Rating System (source: AFAC, 2025)

6.2 Bushfire Damage Sources

The Country Fire Authority (2012) states, "*Bushfires can vary in intensity and scale across the landscape*". As the past bushfire events throughout Australia have illustrated, bushfires can be devastating and lead to long-running fires which are difficult to suppress. Building survival is influenced by many interacting factors. The four main ways buildings are destroyed during a bushfire include:

- Ember attack;
- Radiant heat;
- Direct flame contact; and
- Fire-driven wind.

6.2.1 Ember Attack

Research indicates that the most common way buildings catch on fire is through ember attack (80% of house loss). Ember attack occurs when small burning twigs, bark, leaf are carried by wind and land in and around a building. Embers can ignite flammable plants, leaf litter, fences, outdoor furniture and sheds (refer to

Figure 17, below). Ember attack is addressed within the AS 3959-2018 through Construction Standard requirements.

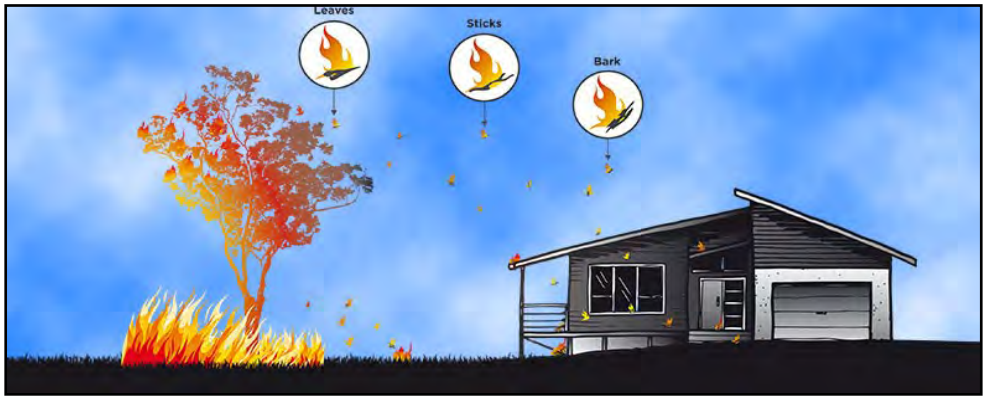

Figure 17. Ember Attack (source: Country Fire Authority)

6.2.2 Radiant Heat

Radiant heat is the heat created from burning fuel during a bushfire. Radiant heat can ignite surfaces without direct flame contact or ember attack, dry out vegetation ahead of the bushfire, crack glass (allowing embers to enter a building) and distort and melt materials (refer to Figure 18, below). The most common cause of loss of human life is via radiant heat (CFA, 2018).

Figure 18. Radiant Heat (source: Country Fire Authority)

6.2.3 Direct Flame Contact

Direct flame contact occurs when a fire front reaches a building, this is referred to as the 'Flame Zone'. Approximately 20% of house loss occurs when houses/buildings are directly adjacent to bushland.

6.2.4 Fire-driven Wind

Fire-driven wind can carry embers, cause trees to fall onto buildings, can break windows and destroy structures. The closer a building is to a fire front, the more severe the impact of fire-driven wind.

6.3 Management and Mitigation Measures – Permanent Buildings

Management and mitigation measures are generally outlined in relevant planning instruments at both the State and Local Government level.

Mitigation measures emphasize resilience to bushfire and are categorised into the following groups for the permanent structures within the site.

- Layout design;
- Building and construction requirements;
- Firefighting infrastructure;
- Bushfire emergency plan; and
- Vegetation management and landscaping.

6.4 Layout Design

6.4.1 Access and Egress

Post-development, the residential lot subdivision will front onto Delathin Road to the west, Sunnyside Street to the north, Woodland Street to the east, and Tapsall Place to the south. S5 Environmental are of the opinion that the access driveways to service each proposed lot will be appropriately constructed to the relevant BCC Brisbane Standard Drawing (BSD), to be confirmed by a qualified Town Planner. These adjoining roads are considered suitable to carry emergency vehicles, provide emergency evacuation and to prevent entrapment during a bushfire.

6.4.2 Siting of Development

The proposed lots are sited at least 17 m's from potentially hazardous vegetation situated to the west and at least 44 m's from potentially hazardous vegetation situated to the north. As mentioned above, the proposed Lots 21 and 23 will achieve a BAL 29, and possibly, a BAL 19, if the BLEs are situated entirely outside the BAL 29 and 40 contours. The remaining lots, proposed Lots 1 to 20, and 22, will achieve a BAL 12.5. These results are based on the calculations of BAL setbacks utilising the Flamesol BAL Minimum Distance Calculator.

6.4.3 Building and Construction Requirements

In accordance with the BCA, the AS 3959-2018 requirements for construction of buildings applies to any new Class 1, 2, 3 or 10a Building (when ancillary to a Class 1, 2, or 3 Building). Therefore, any future habitable Class 1, 2 and/or 3 buildings and their ancillary Class 10a building/s within the development must adhere to the relevant BAL construction Standards based on their location.

6.4.4 Early Warning Systems

Smoke alarms should be installed in accordance with the Building Code of Australia and the AS 3786-1993 - *Smoke Alarms*. The Queensland Fire and Emergency Services recommends photoelectric smoke alarms (not ionization alarms). Photoelectric smoke alarms are generally more effective than ionization types as they detect visible particles of combustion.

6.4.5 Firefighting Infrastructure

The site is expected to be connected to a reticulated water supply network. It is expected that the reticulated water supply network within the area complies with the provisions outlined in the SEQ Water Supply, Sewage Design and Construction Code. Additionally, fire hydrants are to be designed, sited and installed within the subdivision in accordance with AS2419.1-2009 and '*Fire hydrant and vehicle access guidelines for residential, commercial and industrial lots*' (QFD, 2025).

6.4.6 Bushfire Emergency

In the event of a Fire Emergency, call triple zero (000)

In the event of a Bushfire Emergency, the local QFES should be contacted immediately. The Acacia Ridge Fire Station is located approximately 2.6 km's to the north of the subject site. The contact details for the Acacia Ridge Fire Station are:

Address: 127 Bradman Street, Acacia Ridge

Phone: (07) 3344 4329

6.5 Vegetation Management and Landscaping

Landscaping

S5 Environmental recommend that future lot owners adhere to the following advice (outlined in the SPP Technical Reference Guide – Bushfire Resilient Communities) on low flammability landscaping, particularly for areas located within 100 m of hazardous vegetation.

Landscaping plays an important role in increasing a buildings' ability to endure bushfire attack. Landscaping for bushfire reduces the risk of ember attack which is the most common cause of building loss during bushfire. This includes utilisation of low flammability treatments such as rock mulches (gravel and fertilizer), concrete retaining blocks, and appropriate plantings.

Appropriate plant attributes to consider implementing in landscape design to reduce bushfire risk include:

- High leaf moisture content;
- Lower volatile oil content;
- Higher leaf mineral content;
- Broad-leaved species;
- Resilience to pruning;
- Low ignition likelihood;
- A low volume of persistent dead leaves/branches;
- Smooth or tightly held bark; and,
- Leaves and twigs that do not regularly fall.

Management of landscaped areas should ensure that there is no accumulation of litter and woody debris on garden beds and should ensure that there is horizontal and vertical separation of plants. Any grass within the proposed lots should never exceed 10 cm in height. Irrigation of garden and greenery areas could be considered to ensure a well-watered, low flammability landscape.

The Victorian Country Fire Authority (CFA) have produced an online Plant Selection Key which facilitates landscape designers and property owners to select fire wise garden plants. The CFA have also produced

the publication ‘Landscaping for Bushfire: Garden Design and Plant Selection’ (CFA, 2022). This publication, in conjunction with the ‘Bushfire Resilient Building Guidance for Queensland Homes’ (QLD Government and CSIRO, 2020), outlines planning, designing, choosing suitable plants, maintaining gardens and provides a Plant Selection Key, and can be obtained from their website.

In addition, trees should not overhang the roofline of the building, touch walls or other elements of a building and plants greater than 10 centimetres in height at maturity must not be placed directly in front of a window or other glass features.

7.0 CONCLUSIONS

This Bushfire Hazard Assessment concluded that the proposed development is within 100m of potentially hazardous vegetation to the west. The AS 3959-2018 Method 2 radiant heat flux exposure assessment determined that the residential development will be exposed to a maximum radiant heat exposure of 12.5 kW/m^2, equivalent to BAL 12.5. Lots 1-17, 26 and 27 will be located over 100m away from any hazardous vegetation, whilst lots 21-25 and 28 achieve a maximum BAL score of 12.5. Accordingly, all buildings exposed to BAL 12.5 or greater will have to adhere to the relevant BAL construction requirements.

S5 Environmental have prepared a site-specific Bushfire Management Plan to support the proposed residential development, which recommends key mitigation measures to be implemented to ensure the risk to people, infrastructure and property is acceptable and minimised.

Overall, the proposed development complies with the relevant BCC bushfire related assessment benchmarks, refer to Appendix C.

8.0 REFERENCES

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APPENDIX A

Flamesol Inputs and Outputs

Summary of Input Parameters for Hazardous Vegetation to the West

Parameter	Input	Note
FFDI	55	Source: QFD BRC MapViewer.
Surface Fuel Load	14.9 t/ha	Surface and Near Surface Fuel Load – QFD VHC 9.2. This is in line with BCC's Technical Bushfire Guide for the calculation of understorey or surface fuel loads.
Overall Fuel Load	17.2 t/ha	Total Fuel Load – QFD VHC 9.2.
Effective Slope	3.02 ^{o}	Hazardous vegetation is sited downslope of the proposed development.
Site Slope	3.47 ^{o}	Hazardous vegetation is sited downslope of the proposed development.
Flame Temperature	1,200 K	Standard input in accordance with the BRC.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

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FPA AUSTRALIA

Calculated June 4, 2026, 9:06 am (MDc v 4.9)

s526108 west 4.6.26 algester

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	55	Rate of spread	1.21 km/h
Vegetation Classification	Forest	Flame length	9.93 m
Understorey fuel load	14.9 t/ha	Flame angle	68.47 °, 74.47 °, 80.47 °, 83.47 °, 84.47 ° & 88.47 °
Total fuel load	17.2 t/ha	Elevation of receiver	3.9 m, 3.81 m, 3.48 m, 2.93 m, 2.57 m & 0 m
Vegetation height	n/a	Fire intensity	10,763 kW/m
Effective slope	3.02 °	Transmissivity	0.87, 0.855, 0.832, 0.808, 0.796 & 0.737
Site slope	3.47 °	Viewfactor	0.4105, 0.3023, 0.2042, 0.138, 0.1122 & 0.0303
Flame width	100 m	Minimum distance to < 40 kW/m²	11.7 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	15.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	23.3 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	33 m
		Minimum distance to < 10 kW/m²	39.1 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Flamesol Calculator Outputs for Required Setbacks from Hazardous Vegetation to the West

APPENDIX B

Slope Lines and Calculations

Project: 100 Delathin Rd, Algester
Number: S526108

S5 ENVIRONMENTAL

BUSHFIRE SLOPE CALCULATOR

Vegetation to the West

Effective Slope					Site Slope				
Direction	Downslope				Direction	Downslope			
Top Elevation	43	m			Top Elevation	47	m		
Bottom Elevation	41	m	Slope %	5.26%	Bottom Elevation	43	m	Slope %	6.06%
Distance	38	m	**Slope (°)**	**3.02**	Distance	66	m	**Slope (°)**	**3.47**

APPENDIX C

BCC Bushfire Hazard Overlay Code

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
Section A – If for accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development)			
PO1 Development: a. minimises the bushfire hazard; b. maximises the protection of life and property from bushfire; c. addresses the bushfire hazard determined by a bushfire hazard assessment; d. where not in compliance with an approved bushfire management plan or development footprint: i. achieves a bushfire attack level that is less than or equal to BAL-29; or ii. achieves a bushfire attack level that is less than or equal to BAL-12.5 if for vulnerable uses, difficult to evacuate uses, assembly uses, essential community infrastructure or involving the handling or storage of hazardous chemicals exceeding amount specified in Table 8.2.5.3.D; or iii. if on a site of an existing premises and not a vulnerable use, difficult to evacuate use, assembly use, essential community infrastructure or involving the handling or storage of hazardous chemicals	AO1.1 Development is designed and sited in compliance with: a. an approved bushfire management plan relevant to the full nature of the uses, which identifies the level of bushfire hazard and the location of hazardous vegetation affecting the development; or b. an approved development footprint identifying the development footprint plan and bushfire management footprint plan; or c. a bushfire hazard assessment and bushfire management plan prepared in accordance with the Bushfire planning scheme policy which: i. is undertaken by a suitably qualified person with technical expertise in the field of bushfire hazard identification and mitigation; ii. determines the relevant bushfire attack level for that part of the site in which development is proposed; iii. identifies the location of hazardous vegetation that poses a bushfire risk to the development. Note—Where a bushfire hazard assessment determines that the bushfire hazard for the part of the site in which development is proposed is 'low', no further assessment against this code is required.	Complies – S5 Environmental understand that, following the approval of this report, the proposed development will be designed and sited in compliance with an approved bushfire management plan. Additionally, the above bushfire hazard assessment determined the proposed residential subdivision will be sited in an area of Low PFLI and all lots can accommodate a BLE which will achieve a maximum BAL score of 12.5, equivalent to a radiant heat setback of 12.5kW/m^2.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
exceeding amounts specified in Table 8.2.5.3.D: a) does not extend beyond the bounds of the existing development footprint; b) does not increase the GFA by 10% or 100m^2, whichever is the greater; c) does not involve a new use on the site; d) is supported by a bushfire risk assessment prepared by a suitably qualified person with technical expertise in the field of bushfire hazard identification and mitigation, which demonstrates that the bushfire risk is acceptable. Note—Bushfire hazard is generally assessed based on the vegetation existing on site, adjacent and nearby to the site at the time of application. However, the level of bushfire hazard posed by any areas subject to revegetation or regrowth vegetation is assessed as if that area had reached its mature state. The Bushfire planning scheme policy provides advice about the sources of information to be consulted to determine areas subject to revegetation or regrowth vegetation and the hazard classification of that vegetation in its mature state. Note—Where a bushfire risk assessment is required it must be carried out in accordance with the State Planning Policy and the National Emergency Risk	Note—A 'low' bushfire attack level must not be assumed for development in the Potential impact sub-category and in any areas subject to revegetation or regrowth vegetation even where the area is non-vegetated or vegetation is considered low threat in accordance with AS 3959 Construction of buildings in bushfire-prone areas. The Bushfire planning scheme policy provides advice about the sources of information to be consulted to determine areas subject to revegetation or regrowth vegetation and the hazard classification of that vegetation in its mature state. Note—A bushfire management plan is to be prepared having regard to any bushfire hazard assessment undertaken to prepare a neighbourhood plan. Note—Any bushfire management zone, asset protection zone or similarly defined area approved as part of a bushfire management plan used for bushfire management purposes is considered to be a bushfire management footprint plan. A building protection zone can compromise both the development footprint plan and the bushfire management footprint plan.		
	AO1.2 Development where not in compliance with an approved bushfire management plan or development footprint identifying the development footprint plan and bushfire management footprint plan:	N/A – Following approval of this report, the proposed development will be in compliance with an approved bushfire management plan.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
Assessment Guidelines prepared by the Australian Institute of Disaster Resilience.	a. achieves a bushfire attack level that is less than or equal to: i. BAL-29; or ii. BAL-12.5 if for vulnerable uses, difficult to evacuate uses, assembly uses, essential community infrastructure or involving the handling or storage of hazardous chemicals exceeding the amount specified in Table 8.2.5.3.D. Note—Bushfire attack level (BAL) is the radiant heat flux that will be experienced during a bushfire and is a measure of heat energy impact expressed as kW/m2. BAL is measured within the area of the nominated development footprint plan and excludes the area of any bushfire management footprint plan.		
If for development other than reconfiguring of a lot			
PO2 Development other than an extension to an existing building is sited, designed and maintained taking account of all relevant factors affecting the bushfire hazard on the site, including site topography, aspect, location and type and structure of vegetation to: a. minimise the number of buildings and people working, living or visiting a site exposed to bushfire risk; b. protect life during bushfire;	AO2.1 Development is: a. sited in compliance with an approved development footprint identifying the development footprint plan and bushfire management footprint plan or bushfire management plan relevant to the full nature of the use; or b. if there is no approved development footprint identifying the development footprint plan and bushfire management footprint plan or bushfire management plan, where on a lot greater than 10	N/A Development is a RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
c. increase the survival of buildings and structures during a bushfire; d. minimise bushfire risk from build-up of fuels around buildings and structures. Note—A bushfire management plan prepared in accordance with the Bushfire planning scheme policy can assist in demonstrating achievement of this performance outcome.	hectares, located in the area of lowest risk from bushfire on the site; and c. if there is no approved development footprint identifying the development footprint plan and bushfire management footprint plan or bushfire management plan, where on a lot greater than 2,500m2: i. located away from ridgelines in compliance with Figure a; ii. located on land with a gradient less than 15%; iii. preferably located on east- to south-facing slopes and avoiding north- to west-facing slopes unless the slope is clear of vegetation and is not located in the High hazard buffer area sub-category or the Medium hazard buffer area sub-category.		
	AO2.2 Development is sited within a building protection zone extending a minimum of 20 m from the outermost projection of the main building or any habitable structure or to the maximum extent possible on sites less than 2500m^2 where a building protection zone would extend into neighbouring properties; and a. clusters buildings and structures in the building protection zone; b. designs the inner 10m of the building protection zone to maintain a very low fuel state in the first 10m, and a fuel-reduced state to the extent of the building protection zone, in compliance with Figure b and Figure c.		

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	Note—The building protection zone includes the dwelling and all ancillary structures and may extend to a road or a building protection zone in an adjoining site.		
PO3 Development utilises fencing that: a. does not contribute to the spread of bushfire; b. in an urban area or in proximity to accommodation uses, contributes to reducing bushfire hazard to a building; c. facilitates the safe movement of fauna.	AO3.1 Development for a fence within 20m of any building used for accommodation comprises non-combustible or fire retardant materials.	N/A Development is a RoL	
	AO3.2 Development for a fence: a. incorporates gaps and spacing to allow the safe movement of fauna; or b. is designed to enable fauna to climb the fence.		
PO4 Development ensures that the location, siting, and design of development and associated driveways and access routes: a. avoid potential for entrapment during a bushfire; b. facilitate safe and efficient emergency services to access and egress the site during a bushfire; c. enables safe evacuation of the site during a bushfire for site occupants.	AO4 Development ensures that: a. the length of driveways or access routes does not exceed 70m between the most distant part of any occupied building and the nearest part of the public road; or b. where the length of the driveway or access route exceeds 70m: i. the driveway or private access route design meets the requirements of emergency vehicles in compliance with Table 8.2.5.3.C; ii. the driveway or access route provides all weather access for two-wheel-drive vehicles; iii. where relying on a private access route or driveway longer than 200m to reach a public road, a safe alternative access and egress route is provided.	N/A Development is a RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
PO5 Development has adequate road access to the site for emergency vehicles and safe evacuation in a bushfire.	AO5 Development has frontage to a constructed, all-weather public road capable of carrying emergency service vehicles.	N/A Development is a RoL	
PO6 Development makes adequate provision for fire-fighting requirements, including water supply.	AO6 Development ensures that: a. a reliable reticulated water supply and water pressure is available for fire-fighting requirements with water supply and pressure, which is in compliance with the standards specified by the relevant utilities provider; or: b. where sufficient reticulated water supply is not available for: i. residential lots, there is a minimum water supply available and retained for fire-fighting purposes in compliance with Table 8.2.5.3.B, which may be in the form of a separate tank or a reserve section as part of a main water supply tank; or ii. development other than for residential lots involving new premises or an existing premises with a gross floor area greater than 50m2, on-site water storage is provided which is appropriate to the use, according to the standards specified by the relevant emergency services agency and is not less than 5,000 litres. Note—Water supply for fire fighting is in addition to water supply for household use. Where a non-reticulated supply of water is required, swimming pools, creeks and dams should	N/A Development is a RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	not be used as a substitute for a dedicated static supply as these sources of water are not reliable during drought conditions.		
PO7 Development ensures that the water supply provided for fire-fighting is safely located and freely accessible for fire-fighting purposes at all times.	AO7 Development, for which sufficient reticulated water supply is not available, provides: a. a water supply outlet located away from any potential fire hazards, such as gas bottles; b. a hardstand area of 11m by 3.5m for fire-fighting vehicles within 2m of the water supply outlet; c. tanks on the bushfire hazard side of the buildings with adequate shielding for the protection of fire fighters; d. pumps which are shielded from bushfire hazard; e. an outlet pipe which is 50mm in diameter and fitted with a 50mm male camlock (standard rural fire brigade fitting); f. that any underground tank for fire-fighting purposes has an access hole of 200mm to allow a tanker to refill direct from the tank; g. that any above-ground water tank is made of concrete or metal and its stand is protected from bushfire hazard; h. that all above-ground water pipes external to the building are metal, including and up to any taps. Note—Plastic tanks are not to be used.	N/A Development is a RoL	
Additional performance outcomes and acceptable outcomes for all development in Biodiversity areas overlay if on a site larger than 2,500 m^2			

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
PO8 Development through the siting, design, and construction of buildings, access routes and fire maintenance trails, and ongoing site management: - provides effective separation from sources of bushfire risk; - responds to the bushfire risk in that location; - maintains the safety and protection of people and property over time; - maximises the protection of vegetation in areas of high biodiversity value. Note—A bushfire management plan prepared in accordance with the Bushfire planning scheme policy can assist in demonstrating compliance with this performance outcome that ensures: • ongoing site management, such as the bushfire risk to buildings, does not increase beyond the standard to which they have been designed and constructed; • appropriate design and maintenance of the site, and access routes and driveways.	AO8 Development locates building protection zones as shown on Figure b and Figure c, driveways and access routes and any fire maintenance trails: a. outside of the Biodiversity areas overlay; or b. within the existing disturbed, degraded or cleared areas, using natural fire breaks to avoid vegetation clearing and to avoid or otherwise minimise fragmentation or incursions into a habitat area, fauna movement corridor or remnant vegetation.	The entire subject site I s not mapped within any Biodiversity areas overlay. A BPZ is not required as the maximum radiant heat setback achieved for the site is 12.5 kW/m2.	
Section B—If for assessable development other than ROL			
PO9 Development: c. provides for safe and efficient evacuation and emergency	AO9.1 Development: a. does not increase the number of people living, working on or visiting the site by more than 10%; or increasing the number of people living, working on or visiting the site, or vulnerable uses, difficult to evacuate	NA – development is for an RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
services access to the site during a bushfire; d. does not concentrate large numbers of people or locate significant worker or resident populations in an area of bushfire hazard; e. avoids locating the following uses in an area of bushfire hazard: ▪ vulnerable uses; ▪ difficult to evacuate uses; ▪ assembly uses. Note—This includes consideration of appropriate alternative shelter for vulnerable uses, management of health and wellbeing requirements during evacuation, safe site operation, and access and egress arrangements in bushfire events. Note—A bushfire management plan prepared in accordance with the Bushfire planning scheme policy can assist in demonstrating compliance with this performance outcome.	uses or assembly uses by more than 10%, implements the recommendations of an approved bushfire management plan, which identifies measures that address the identified bushfire risk relevant to the development.		
	AO9.2 Development provides alternative access routes that meet the road design requirements of items 1–7 in Table 8.2.5.3.C, for the following:	NA – development is for an RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	a. an extension to existing premises which increases the number of people living, working on or visiting the site by more than 10%; the introduction of vulnerable, difficult to evacuate or assembly uses.		
Additional performance outcomes and acceptable outcomes if involving storage or handling on site of hazardous chemicals in quantities that would be equivalent to or exceed the threshold quantities set out in Table 8.2.5.3.D			
PO10 Development does not cause: a. unacceptable risk to people, property and the environment due to the impact of bushfire on the storage or handling on site of hazardous chemicals; excessive danger or difficulty to emergency services for emergency response or evacuation.	AO10 Development for storage or handling of hazardous chemicals: a. is not located within the bushfire overlay; or b. complies with an approved bushfire management plan prepared in accordance with the Bushfire planning scheme policy which identifies measures that ensure the development: i. mitigates the bushfire risk relevant to the development; ii. does not pose an unacceptable risk to people, public health and safety or risk environmental harm; iii. does not present significant difficulties to emergency services for emergency response or evacuation. Note—Bushfire management plans and site-based risk assessments are prepared in accordance with the Bushfire planning scheme	N/A – S5 Environmental understand the proposed development is for a residential development and will not include the storage or handling of hazardous chemicals.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	policy. Guidance on the preparation of a hazard and risk analysis is provided in the Industrial hazard and risk assessment planning scheme policy. Note—Any risk mitigation measures, including construction of underground tanks or fire-protected above-ground tanks or package stores, are in compliance with AS 1940-2004 The storage and handling of flammable and combustible liquids.		
Additional performance outcomes and acceptable outcomes for essential community infrastructure			
PO11 Development for essential community infrastructure is located, designed and sited to: a. protect the safety of people during a bushfire; b. not create or increase the exposure of people to an unacceptable risk from a bushfire; c. minimise the risk to vulnerable populations from a bushfire; mitigate the impacts on the community and environment from the effects of a bushfire on the development.	AO11 Development for essential community infrastructure: a. is ancillary to and not relied on for the provision of the essential service during a bushfire; or b. implements an approved bushfire management plan prepared in accordance with the Bushfire planning scheme policy which identifies measures that: i. ensure the development allows for safe and efficient emergency access and site evacuation during a bushfire; ii. do not pose an unacceptable risk to people on a premises during a bushfire; iii. ensure the development is not at risk of failure during a bushfire which results in health or safety risks or adverse environmental impacts; enable people and property to be defended safely and effectively from a bushfire.	N/A – Proposed development will not include essential community infrastructure.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
PO12 Development for essential community infrastructure is able to function effectively during and immediately after bushfire events.	AO12 Development for essential community infrastructure: a. is ancillary to and not relied upon for the provision of the essential service during a bushfire; or b. containing elements vital to the function of the essential service during a bushfire is not located in the Bushfire overlay area; or c. implements an approved bushfire management plan prepared in accordance with the Bushfire planning scheme policy which identifies measures that ensure that: i. essential community infrastructure is able to function during bushfire events; ii. access necessary to maintain safety or function of the development is not compromised by a bushfire; iii. mitigation measures are not unduly reliant on human activation to respond to a bushfire; the safe storage of valuable records or items of cultural or historical significance, including storage of public records under the Public Records Act 2002, is able to be maintained during a bushfire event.	N/A – Proposed development will not include essential community infrastructure.	
Additional performance outcomes and acceptable outcomes if for landscaping or a park landscape plan is a requirement for development			
PO13	AO13	S5 Environmental have made landscaping recommendations within the BMP which will ensure	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
Development provides landscaping that does not create an unacceptable risk to people or property and provides for ongoing management of risk to the development and people from a bushfire.	Development is in compliance with a landscaping plan which: a. is prepared in compliance with an approved bushfire management plan; b. preserves the requirements of any building protection zone; c. does not increase the exposure of a habitable building not located in a building protection zone to a bushfire hazard. Note—The requirements of a building protection zone are shown in Figure b and Figure c.	onsite vegetation is maintained within a low fuel state and predominantly utilises low-fuel vegetation species.	
PO14 Development for a park is designed so that the park: a. is practical to maintain and requires minimal resources to be restored to its designed function and condition after a bushfire; b. provides for safe and efficient site evacuation and efficient emergency services access avoiding potential for entrapment during a bushfire; c. does not place unacceptable bushfire risk on an adjoining or nearby site, people and assets; d. provides efficient access for fire fighting;	AO14 Development provides a park landscape plan that complies with a bushfire management plan prepared in accordance with the Bushfire planning scheme policy.	N/A – Proposed development does not include a park.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
e. provides ongoing protection from bushfire for major park assets and buildings. Note—A bushfire management plan prepared in accordance with the Bushfire planning scheme policy can assist in demonstrating compliance with this performance outcome.			
Section C – If for ROL			
PO15 Development does not materially increase the number of premises exposed to unacceptable risk during bushfire events.	AO15 Development does not materially increase the number of people living or working in the Bushfire overlay area.	The development is situated in an area of Low PFLI. The proposed development comprises a reasonable level of additional lots in-line with other development in the locality and in the context of a residential area, and therefore does not materially increase the number of persons living or working within the area.	
PO16 Development is designed to: a. mitigate the risk of bushfire hazard to each lot; b. limit the spread of bushfire; c. achieve and maintain sufficient separation distance between development and hazardous vegetation to minimise bushfire hazard to future buildings during a bushfire;	AO16 Development requires that lot number, size, shape and layout allow for the siting of future buildings within the lowest hazard locations on the site being located: a. within a building protection zone in accordance with Figure b and Figure c; b. away from ridgelines and hilltop sites in compliance with Figure a; c. on land with a gradient less than 15%;	Stage 1 lots are all located over 100m from any surrounding hazardous vegetation. Stage 2 lots can accommodate a BLE which will be exposed to a maximum radiant heat flux of 12.5 kW/m^2, equivalent to BAL 12.5. Proposed works are to be built to AO16.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
d. allow for emergency services access; e. locate buildings within a building protection zone Note—Lot size, location, configuration, dimensions and building measures are balanced to achieve an acceptable level of risk to future occupants. Note—A bushfire management plan prepared in accordance with the Bushfire planning scheme policy can assist in demonstrating compliance with this performance outcome.	d. preferably on east to south facing slopes and avoiding north to west facing slopes unless the slope is clear of vegetation and is not located in the High hazard buffer area sub-category or Medium hazard buffer area sub-category.		
PO17 Development promotes safe site access, avoids creating a potential entrapment situation and supports accessibility and manoeuvring for fire fighting during bushfires. Note—This includes easements and boundary realignments. Note—A bushfire management plan prepared in accordance with the Bushfire planning scheme policy can assist in demonstrating compliance with this performance outcome.	AO17 Development provides a lot layout which: a. provides direct road access and egress for new lots to public roads, rather than the creation of easements; b. in an urban category, avoids creating a new lot less than or equal to 2,500m2 which directly adjoins hazardous vegetation; c. in an urban category, locates a future building protection zone to avoid a driveway of longer than 70m from the road frontage to a habitable building; d. in a rural category, provides for an alternative access where the private access roads or driveways are longer than 200m to reach a public road.	The proposed road reserves are to adjoin the existing roads to the north and south so the site and are to be designed in accordance with AO17.	
PO18 Development ensures that the road layout and design provides:	AO18 Development involving a new road or fire maintenance trail is designed and constructed in compliance with: a. Table 8.2.5.3.C; or	The new road reserve is to be designed in accordance with AO18. The new road reserves are	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
a. efficient emergency services access to sites and manoeuvring within the subdivision; b. safe and efficient movement of residents, workers and visitors out of the subdivision and away from an approaching bushfire; c. safe and efficient movement of emergency services into the subdivision; d. alternative egress routes considering the most likely bushfire scenarios; e. ongoing availability and maintenance of access and egress routes for the purposes of evacuation and emergency services access. Note—A bushfire management plan prepared in accordance with the Bushfire planning scheme policy can assist in demonstrating compliance with this performance outcome.	b. an approved bushfire management plan.	to adjoin the existing roads to the north and south so the site.	
	AO18.2 Development has a road layout and design which: a. provides for alternative access routes to the subdivision, by public roads that meet the requirements in Table 8.2.5.3.C and are able to access the arterial road network; b. excludes cul-de-sacs, except where a perimeter road with a cleared width of 20m isolates the development from hazardous vegetation; c. does not include dead-end roads or if a dead-end road is unavoidable, it is a maximum of 60m long, or 200m where located in the Environmental management zone, Conservation zone, Rural zone, or Rural residential zone, and an alternative emergency evacuation and egress route away from the most likely source of bushfire risk is provided for lots where multiple road access or exit points are not possible; d. links road within the subdivision to, or provides for future links to roads in adjacent subdivisions. Note—Where staged development occurs or development is in accordance with an approved master plan, a temporary perimeter road may be considered, subject to availability of reticulated water supply.	The new road reserve is to be designed in accordance with AO19. The new road reserves are to adjoin the existing roads to the north and south so the site.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
PO19 Development involving new premises provides adequate infrastructure to support fire fighting.	AO19.1 Development involving new premises ensures that: a. lots have access to reticulated water supply and water pressure available for fire-fighting requirements with water supply and pressure that accord with the standards specified by the relevant utilities provider; or b. where reticulated water supply is not available for: i. residential lots, there is a minimum water supply available and retained for fire-fighting purposes in compliance with Table 8.2.5.3.B, which may be in the form of a separate tank or a reserve section as part of a main water supply tank; ii. development other than residential lots, onsite water storage is provided which is appropriate to the proposed future use according to the standards specified by the relevant emergency services agency and is not less than 5,000 litres. Note—Water supply for fire-fighting is in addition to water supply for household use. Where a non-reticulated supply of water is required, swimming pools, creeks and dams should not be used as a substitute for a dedicated static supply as these sources of water are not reliable during drought conditions.	Lots are to be connected reticulated water and this is expected to comply with the relevant standards. Fire hydrants to be specified where required as outlined in the BMP.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	AO19.2 Development provides fire hydrants in accordance with Central SEQ Distributor-Retailor Authority, Queensland Urban Utilities (incorporating Water Services Association of Australia) standards.		