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ENVIRONMENTAL

BUSHFIRE HAZARD ASSESSMENT AND MANAGEMENT PLAN

457 Simpsons Road, Bardon 4065

Client: Matthew Uhe C/- Urbicus
Reference: S526142_BHAMP_v1.0
Date: 17 August 2026

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Quality Control

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Version Control

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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.

This report is valid as at the date of final revision. However, it should be noted that the regulatory framework governing Bushfire Hazard Management, as well as the methodologies used to assess and mitigate risk, may change over time. Prior to implementation, a review should be undertaken to confirm the currency of this report and the continued suitability of the recommended mitigation measures.

Abbreviations

AS 3959-2018	*Australian Standard 3959-2018 Construction of Buildings in Bushfire-prone Areas*
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BCC	Brisbane City Council
BMP	Bushfire Management Plan
BMZ	Bushfire Management Zone
BPA	Bushfire Prone Area
BRC	Bushfire Resilient Communities (The State of Queensland 2019)
CFA	Country Fire Authority
FFDI	Forest Fire Danger Index
ha	Hectares
QFD	Queensland Fire Department
RE	Regional Ecosystem
RFS	Rural Fire Service
SEQ	South East Queensland
SPP	*State Planning Policy, 2017*
VHC	Vegetation Hazard Class

1.0 INTRODUCTION

S5 Environmental understands that Urbicus are assisting their client, Matthew Uhe, with a Development Application for Reconfiguring a Lot (1 into 3 Lots) at 457 Simpsons Road, Bardon. Refer to **Table 1**.

The aim of this Bushfire Hazard Assessment and Management Plan (BHAMP) is to undertake a site-specific bushfire hazard assessment, determine any set back required between the proposed development and hazardous vegetation and prepare a Bushfire Management Plan to ensure the proposed development is not exposed to an unacceptable bushfire risk and can comply with the relevant legislative bushfire requirements.

Table 1. Site Description

Street Address	457 Simpsons Road, Bardon	**Lot on Plan**	Lot 1 on RP94635
LGA	Brisbane City Council (BCC)	**Area**	1,813 m^2
Zone	Environmental Management	**Neighbourhood Plan**	Mt Coot-tha Neighbourhood Plan
Current State	Lot 1 on RP94635, herein referred to as the 'subject site', is currently zoned within the Environmental Management Zone under the BCC Planning Scheme. The subject site currently contains an existing residential dwelling in the centre of the site, accessed off Simpsons Road via a driveway along the western boundary. The site steeply increases in elevation from Simpsons Road to the rear of the lot. The balance of the site is landscaped in keeping with a residential lot, containing mown grass and scattered, planted garden species. Immediately north, east and west of the subject site are similar, landscaped residential lots containing existing residential dwellings with the surrounding scattered native canopy species above what is largely maintained understories. To the south beyond Simpsons Road, West Ithaca Creek runs east-west and is surrounded by native remnant vegetation connecting to the base of Mount Coot-tha Forest. Throughout the 150m assessment area to the north, east and west beyond residential lots, native remnant vegetation was present. Refer to **Figure 1**.		
Proposed Development	A 1 into 3 lot subdivision is proposed for the subject site, retaining the existing dwelling on the middle lot (Lot 11). The two rear lots (Lots 11 and 12) will be accessed via an easement along the western boundary. See **Figure 2** for the proposed development footprint.		
Potentially Hazardous Vegetation	Post development, potentially hazardous vegetation is situated to the north, east, south and west of the proposed development. This potentially hazardous vegetation was determined to reflect the Regional Ecosystems (RE) 12.11.3a and 12.11.5. These REs are described as: **RE 12.11.3a:** *Eucalyptus siderophloia* and *E. propinqua* open forest +/- *E. microcorys, Lophostemon confertus, Corymbia intermedia, E. biturbinata, E. acmenoides, E. tereticornis, E. moluccana, Angophora leiocarpa, Syncarpia verecunda* with vine forest species and *E. grandis* or *E. saligna* in gullies. *Eucalyptus pilularis* and *E. tindaliae* sometimes present e.g. mid D'Aguilar Range, Conondale Range. Occurs predominantly on hills and ranges of Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics. Not a Wetland.		

Equivalent to VHC 9.2: *Moist to dry eucalypt woodland on coastal lowlands and ranges;*

and

RE 12.11.5: *Corymbia citriodora subsp. variegata* open forest to woodland, usually including *Eucalyptus siderophloia/E. crebra* (sub coastal ranges), E*. propinqua and E. acmenoides or E. carnea.* Other species that may be present and abundant locally include *Corymbia intermedia, C. trachyphloia subsp. trachyphloia, Eucalyptus tereticornis, E. microcorys, E. portuensis, E. helidonica, E. major, E. longirostrata, E. biturbinata, E. moluccana* and *Angophora leiocarpa. Lophostemon confertus* often present in gullies and as a sub-canopy or understorey tree. Mixed understorey of grasses, shrubs and ferns. Occurs on hills and ranges of Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics. Not a Wetland.

Equivalent to VHC 10.1: *Spotted gum dominated open forests.*

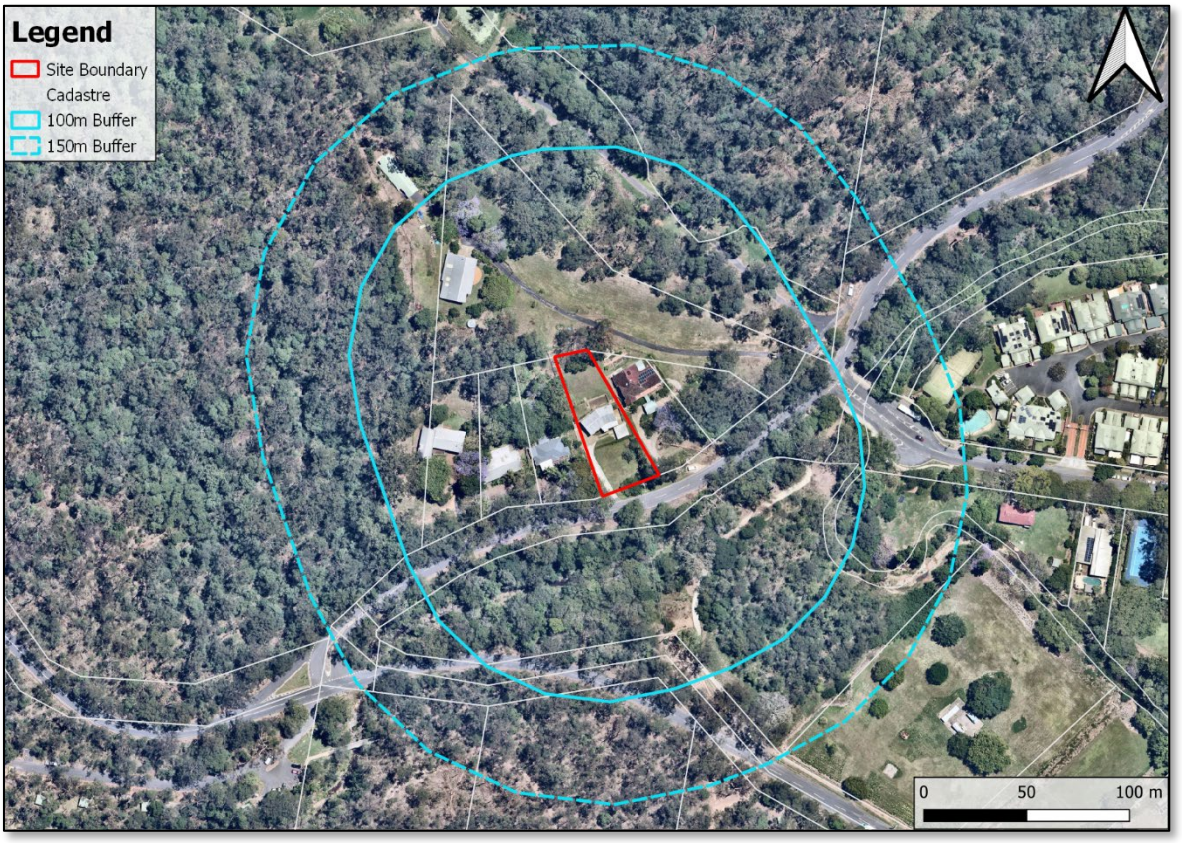


Figure 1. Site Aerial (source: Nearmap, date: 05/11/2025)

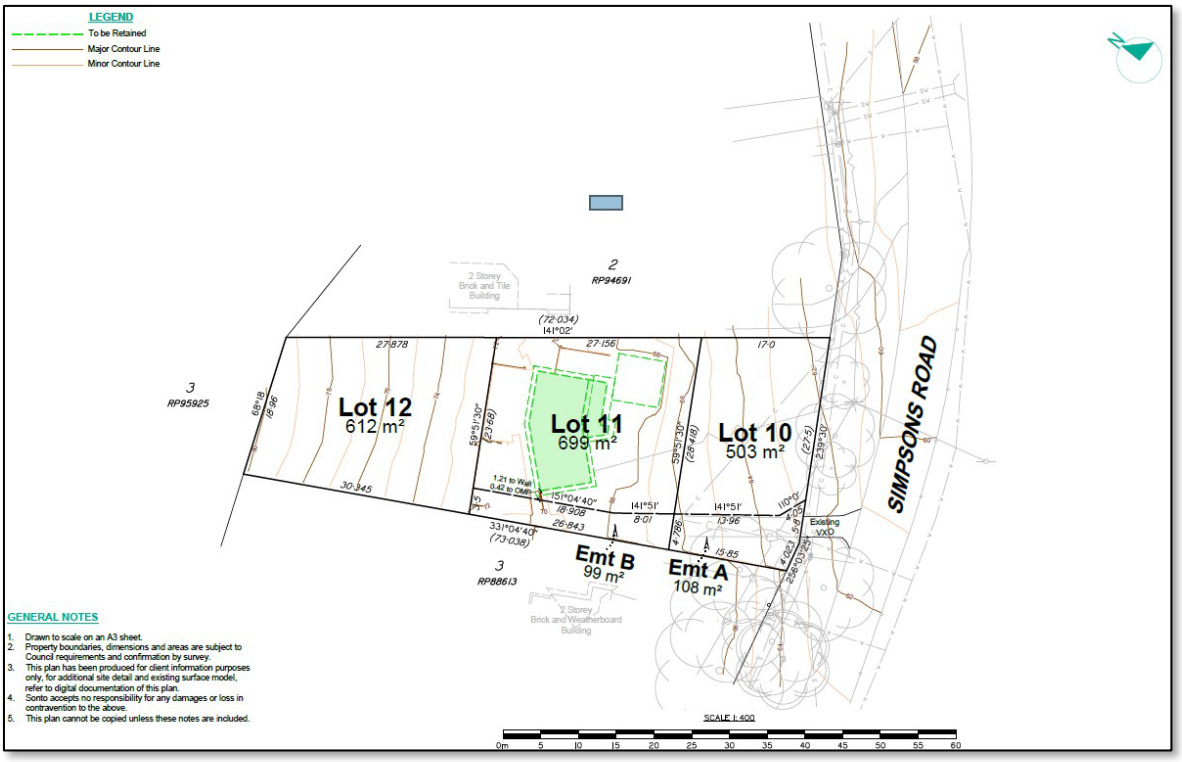


Figure 2. Plan of Proposed Lots (source: SONTO, drawing no: P-26648 – PRO2 REV_A, Rev. A, date: 02/07/2026)

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 (SPP) 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. It is understood that the *City Plan 2014* has not integrated all aspects of the SPP: Safety and Resilience to Hazards (Natural Hazards, Risk and Resilience – Bushfire Prone Areas). 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**.

The BCC Bushfire Hazard Overlay has mapped the balance of the assessment area under a combination of all four Bushfire Hazard categories (i.e., high hazard area, medium hazard area, high hazard buffer area and medium hazard buffer area). The footprint of the proposed residential subdivision within the subject site is mapped primarily under high hazard buffer area, with a small patch of medium hazard area in the south-eastern corner.

The SPP Bushfire Prone Areas Overlay similarly maps the balance of the assessment area under a combination of all four Bushfire Prone Area categories (i.e. very high potential bushfire intensity, high potential bushfire intensity, medium potential bushfire intensity and potential impact buffer). The subject site is mapped entirely as potential impact buffer, with areas mapped under medium, high and very high potential bushfire intensity extending to the surrounding area within the 150 m assessment area.

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.

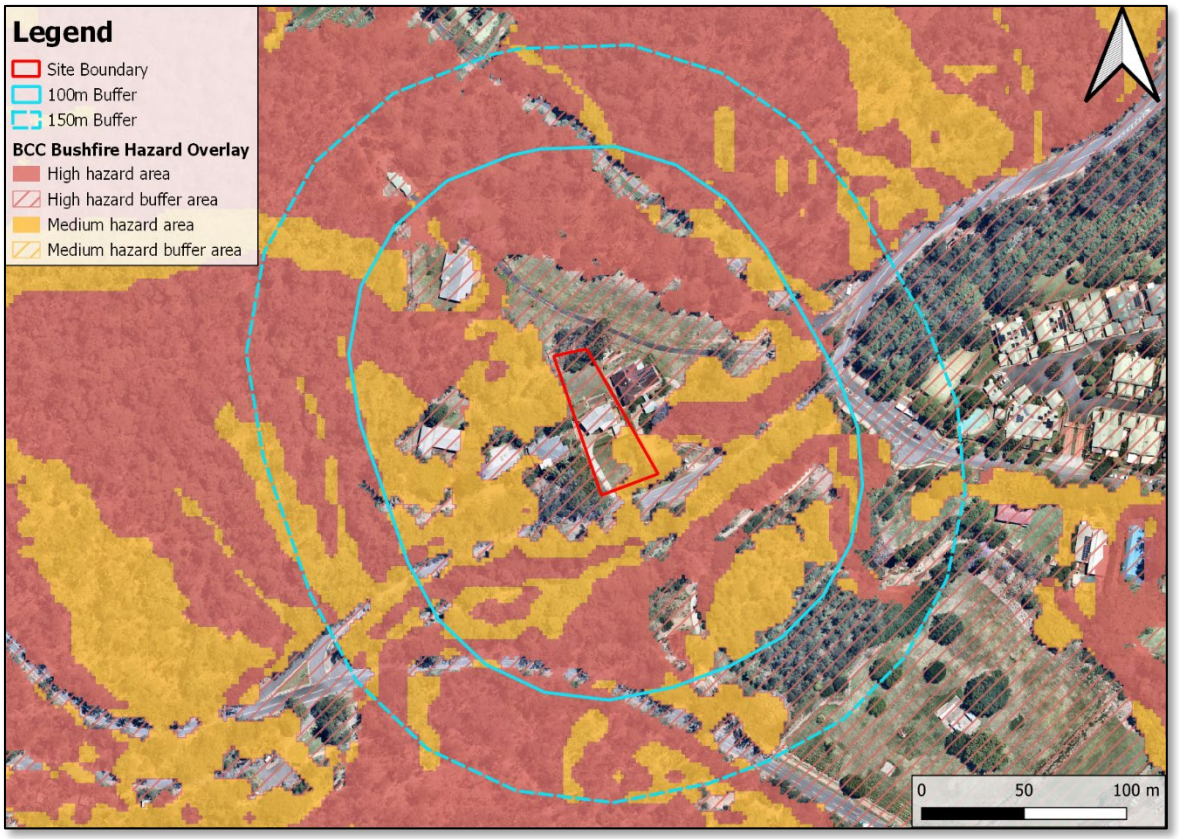


Figure 3. BCC Bushfire Hazard Mapping within and in Proximity to the Site

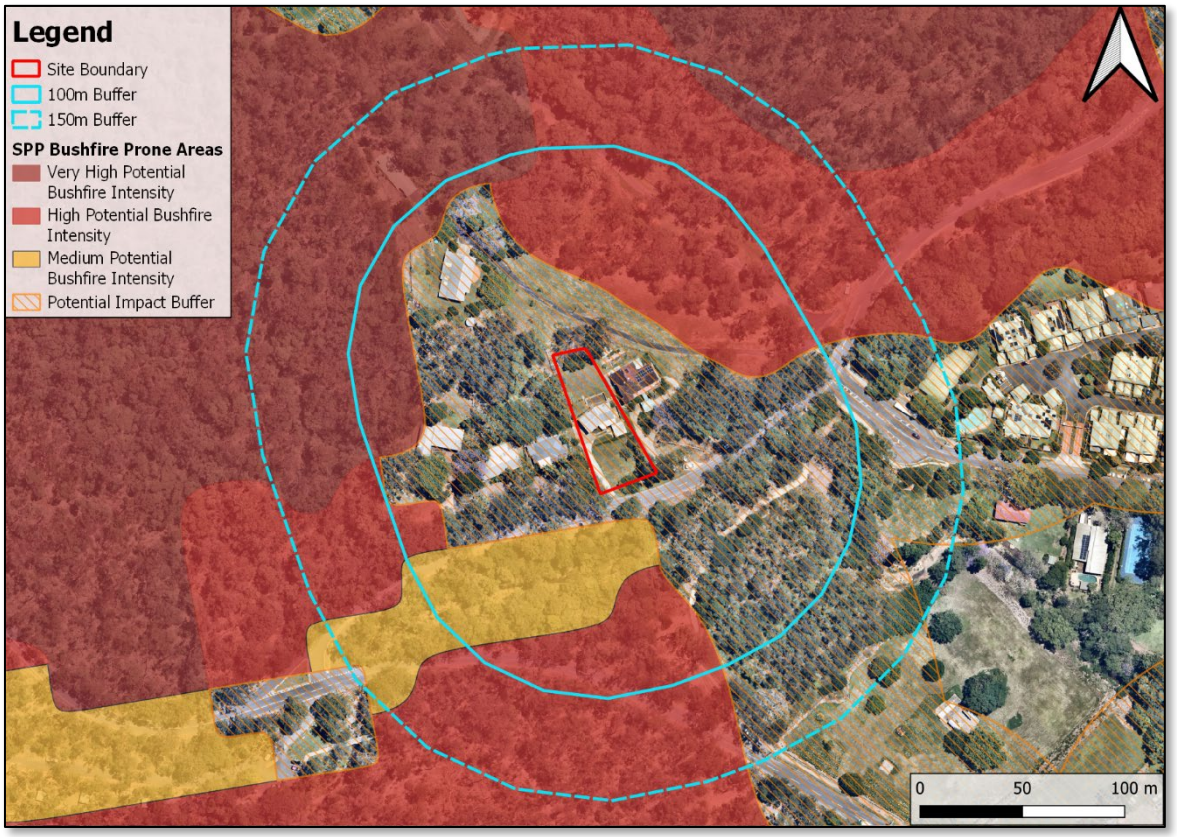


Figure 4. SPP Bushfire Prone Area Mapping within and in Proximity to the Site

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}).

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

For the purposes of the bushfire hazard assessment, S5 Environmental have utilised data from the Queensland Fire Department (QFD) 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 2**, 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 100 m 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 2. Potential Bushfire Intensity Classification

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

Small, isolated and/or narrow patches of hazardous vegetation are not large enough to support a fully developed fire and therefore following the Bushfire Resilient Communities (BRC) methodology in Section 4.2.6 (The State of Queensland 2019b), small patches and narrow corridors of continuous vegetation that meet the definitions, are removed from as part of a downgrading process within 150 m of the development. 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) and outlines four steps to filter out small patches and narrow corridors of continuous fuel (see **Table 3** below).

Table 3. Steps to Downgrade Bushfire Intensity

Step	Description
1	Remove small, isolated patches of **continuous** fuel (< 1 ha) 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 (less than 3 pixels (50 m) 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 AS 3959-*2018 Construction of Buildings in Bushfire-prone Areas*. 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 4 and Figure 5**).

To determine the radiant heat exposure for the proposed development, the online Flamesol Minimum Distance Calculator (FPA, 2026) 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. Accordingly, the inputs to the BAL/radiant heat exposure assessment used for the purposes of this assessment are

summarised in **Table 5** below. 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 4. BAL and Radiant Heat Exposure

BAL Rating	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

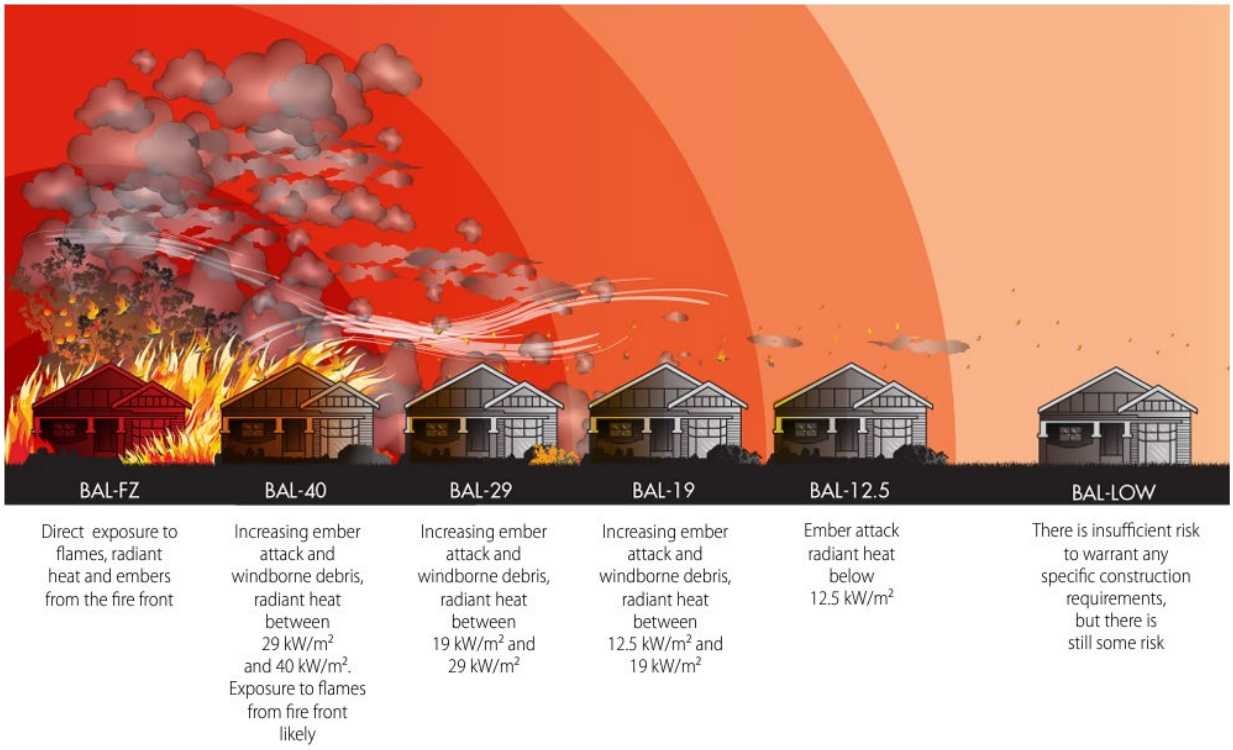


Figure 5. Bushfire Attack Levels (BAL) (Source: WAPC, 2024)

Table 5. 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 in accordance with BRC and the BCC Technical Assessment Guide.
FDI/FFDI	From BRC MapViewer/QSpatial
Standard inputs	Bushfire Resilient Communities (QG 2019)
Effective slope	Measured as the slope under the hazardous vegetation.
Site slope	Measured as the slope between buildings and the hazardous vegetation.
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 because of their limited extent. **Figure 6** provides a schematic representation of how fire moves across a landscape and illustrates this constraint. As a result, flame width and height in these smaller vegetation patches are unlikely to reach the standard Method 2 inputs under AS 3959:2018, which are based on a fully developed bushfire scenario.

The short fire run methodology is only applicable where the maximum fire run is 150 m or less, as measured along the effective slope. Where a short fire run can be justified, reduced flame width and height inputs are appropriate, the methodology set out in *Short Fire Run: Methodology for Assessing Bush Fire Risk for Low Risk Vegetation* (NSW Rural Fire Service, 2019) is adopted. The application of a short fire run was not considered suitable for this assessment. Short Flame Run was not utilised for this assessment as the vegetation is highly connected to vegetation within the broader landscape.

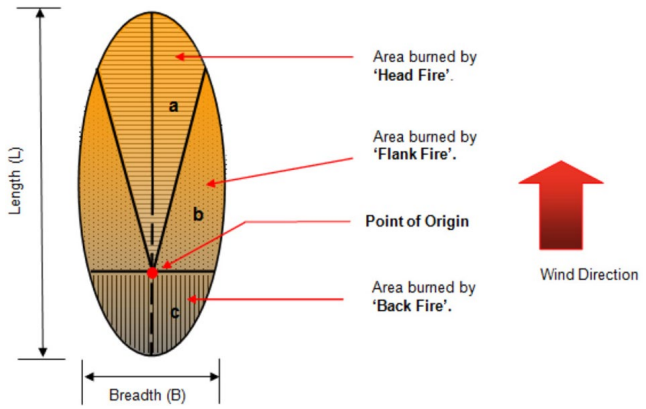


Figure 6. Schematic Diagram of Simple Elliptical Fire Growth Model (Van Wagner 1969) from NSW Rural Fire Surface (2019)

The Short Flame Run formula utilised to calculate the flame width is as follows:

$$\frac{Length\ of\ Vegetation\ along\ effective\ slope\ (xx\ m)}{1.0 + 0.0012\ (Wind\ speed\ (30km/hr)^{2.154}} = Flame\ Width\ (xx\ m)$$

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 150 m of the proposed development. 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 Hazard Class Mapping

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 – VHCs) 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 the QFD BRC MapViewer, numerous VHCs were mapped within and adjacent to the subject site, an extract is shown below in **Figure 7.**

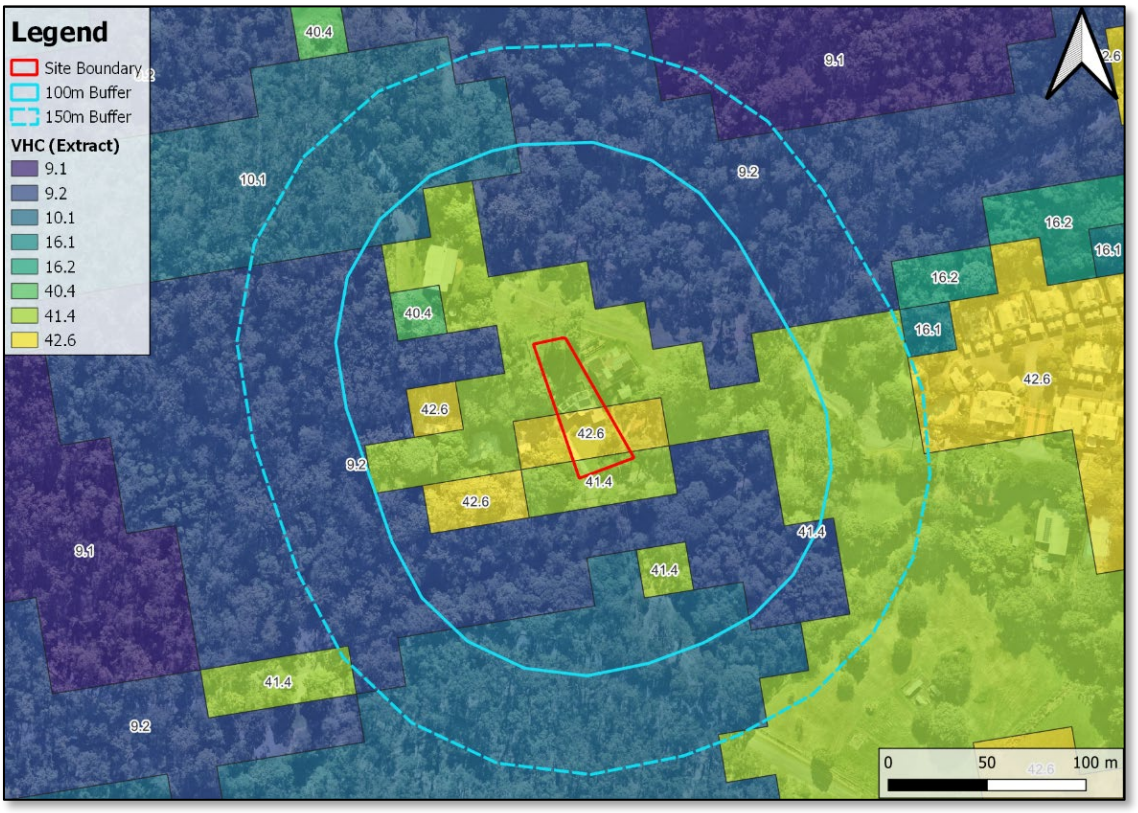


Figure 7. Extract of Vegetation Hazard Classes from the BRC MapViewer

4.1.2 Vegetation Hazard Class Verification

To ground-truth the State Government VHCs mapped within and adjacent to the subject site, S5 Environmental Ecologists conducted a site visit on the 28th of July 2026 and subsequently a Reliability Assessment in accordance with BRC methodology. The assessment compared available bushfire and vegetation mapping with observed on-ground conditions and included a comprehensive review of aerial imagery and overlay mapping for the site and the 150 m buffer surrounding the proposed development

Post development, the subject site and adjacent lots to the north and east within the assessment area (i.e. within 150 m of the proposed development) have been mapped to reflect VHC 41.4 *'Discontinuous low grass or tree cover',* reflecting the nature of surrounding residential developments and expected limited vegetation cover throughout future lots, post development. Numerous small patches containing maintained open, grass areas throughout the assessment area were also modified to reflect VHC 41.4, reflecting the managed and discontinuous nature of the tree cover and fuel load within these areas. Vegetation within adjacent lots to the west of the subject site has been modified to reflect VHC 40.4 '*Continuous low grass or tree cover',* to reflect the leafy park-like nature of these landscaped residential lots, with garden beds and broad areas of canopy cover over a mown, turf understorey.

Larger patches of remnant vegetation north-east and north-west of the site within assessment area were mapped and ground-truthed as a heterogeneous patch of vegetation containing VHC 9.2 *'Moist to dry eucalypt woodland on coastal lowlands and ranges'* and 10.1 *'Spotted gum dominated open forests'*. This vegetation was modified to reflect VHC 10.1 as a conservative measure as the VHC possesses the highest fuel load. A large patch of vegetation within the south-eastern extent of the assessment area as well as two small patches of vegetation to the east of the subject site were ground-truthed to reflect regional ecosystem (RE) 12.11.3a, equivalent to VHC 9.2. Vegetation within the south-western extent of the assessment area, associated with Mount Coot-tha Forest, was ground-truthed to reflect numerous REs, specifically RE 12.11.3a and 12.11.5. S5 have conservatively mapped this vegetation as RE 12.11.5, equivalent to VHC 10.1, as this vegetation possesses the highest fuel load.

Simpsons Road, Carwoola Street, Mount Coot-tha Road and Sir Samuel Griffith Drive have been mapped to reflect VHC 42.6 *'Nil to very low vegetation cover*'.

The VHC mapping has, therefore, been refined to more accurately reflect the on-ground conditions and the anticipated post-development state of the subject site and surrounding locality (see **Figure 9**). As shown in **Figure 9**, the modified VHC mapping is limited to a 150 m buffer around the development area, consistent with the assessment requirements of BRC.

Plates 1 to **8** below show the various areas and communities existing across the site and throughout the assessment area, corresponding to the locations indicated on **Figure 8**.

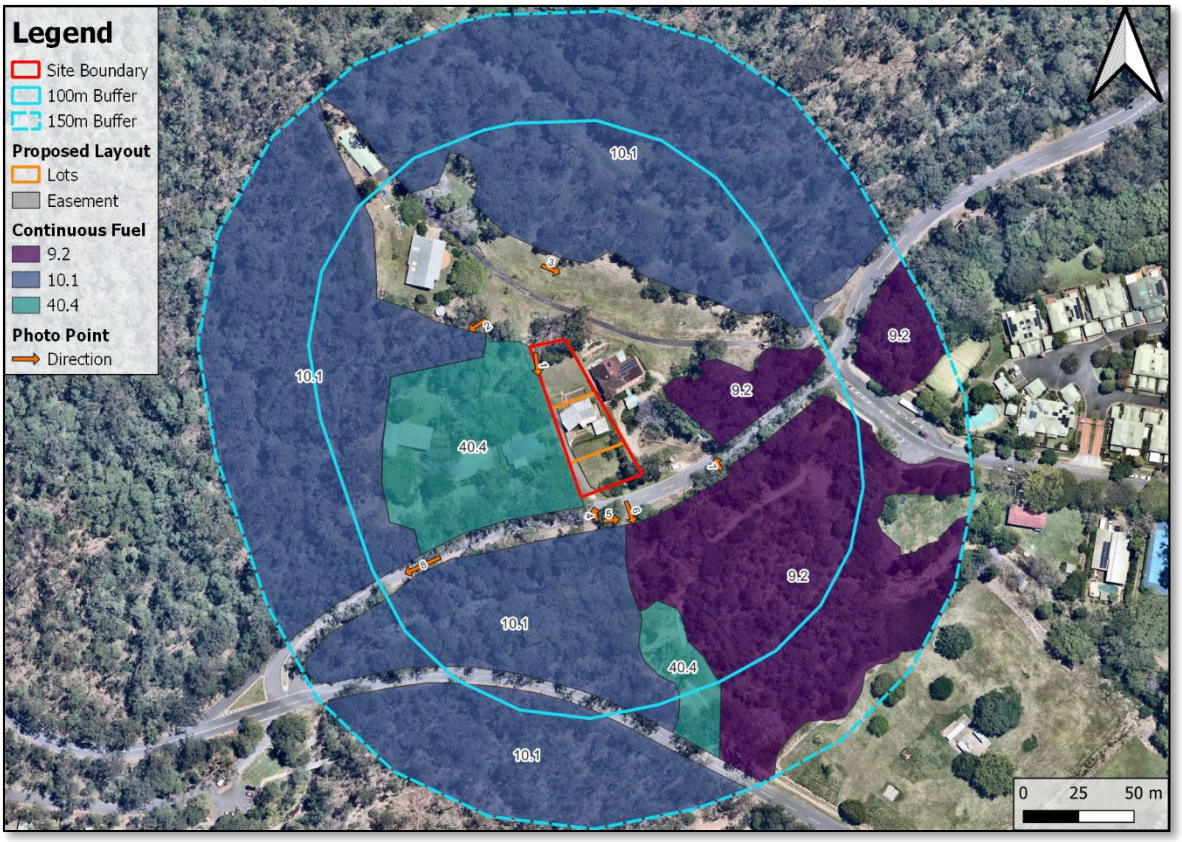


Figure 8. Assessment Area Photograph Locations.



Plate 1. General view of canopy vegetation above managed understories within adjacent lots to the west – VHC 40.4.



Plate 2. View of unmanaged area within lot to the north-west – VHC 10.1.



Plate 3. View of interface of managed area to the right (VHC 41.4) and remnant vegetation to the left (VHC 10.1).



Plate 4. View north of subject site and Simpsons Road demonstrating lack of vegetation along the road verge.



Plate 5. Alternative view east along Simpsons Road demonstrating lack of vegetation along the road verge.



Plate 6. Vegetation south-east of the site – VHC 9.2.



Plate 7. Interface between adjacent lot to the east (left) and remnant vegetation (right) ground-truthed as VHC 9.2.



Plate 8. View south-west along Simpsons Road with remnant vegetation on either side – VHC 10.1.

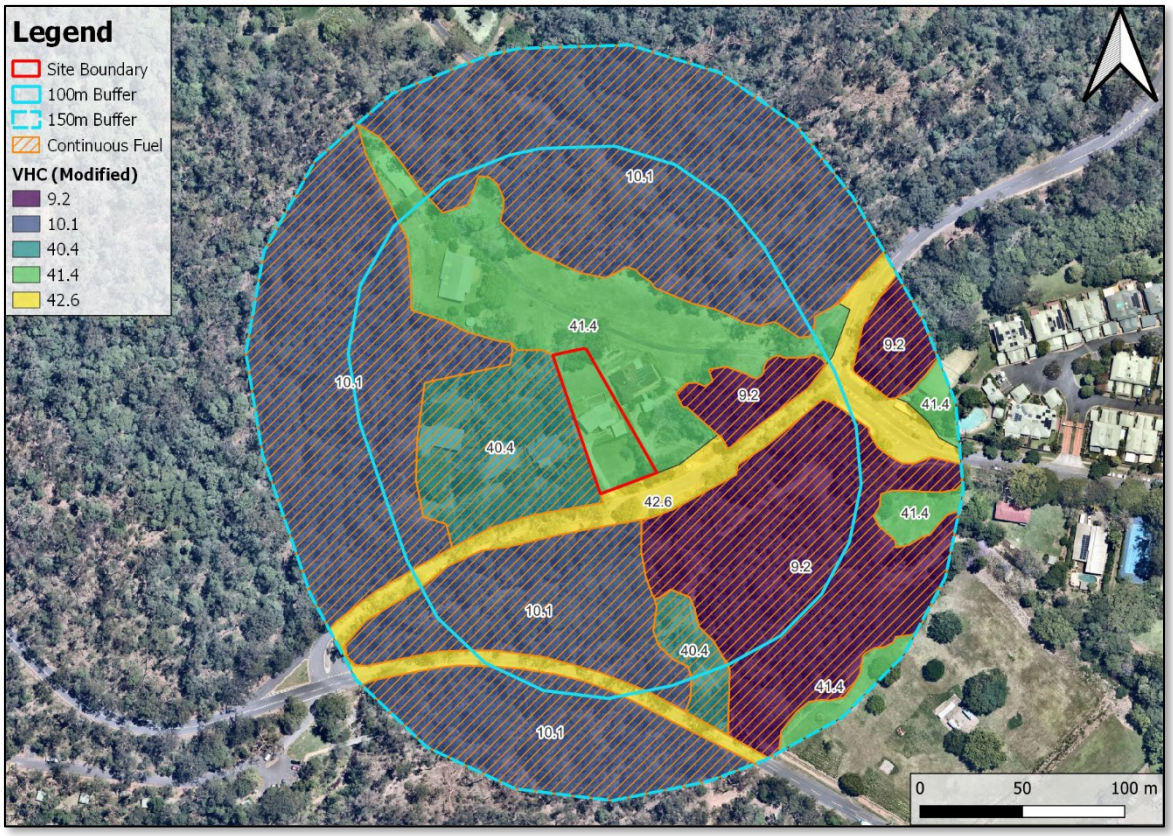


Figure 9. Ground-truthed and Post-development Vegetation Hazard Classes

4.1.3 Fuel Loads

Table 6 below, summarises the associated fuel loads of the final VHCs in relation to the proposed development.

Table 6. Summary of VHCs and their Associated Fuel Continuity and 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
10.1	Spotted gum dominated open forests	Continuous	20.8
40.4	Continuous low grass or tree cover	Continuous	5
41.4	Discontinuous low grass or tree cover	Discontinuous	3
42.6	Nil to very low vegetation cover	Discontinuous	2

*CSIRO A Methodology for State-wide Mapping of Annual Fuel Load and Bushfire Hazard in Queensland. Glenn Newnham, Kimberley Opie, Justin Leonard CSIRO Land and Water, 2017.

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. Refer to **Figure 10**.

4.1.4 Modification of Potential Intensity of Small Patches and Corridors

Following the rasterization of the continuous VHCs as outlined above (i.e., VHCs 9.2, 10.1 and 40.4), S5 Environmental have applied Step 3 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).

Following the implementation of the processing stages, a small, discrete patch to the east has been downgraded through implementing Step 3 (eroded on all sides with no residual pixels remaining). Refer to **Figure 10** and **Figure 11**. 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 12** and **Figure 13**.

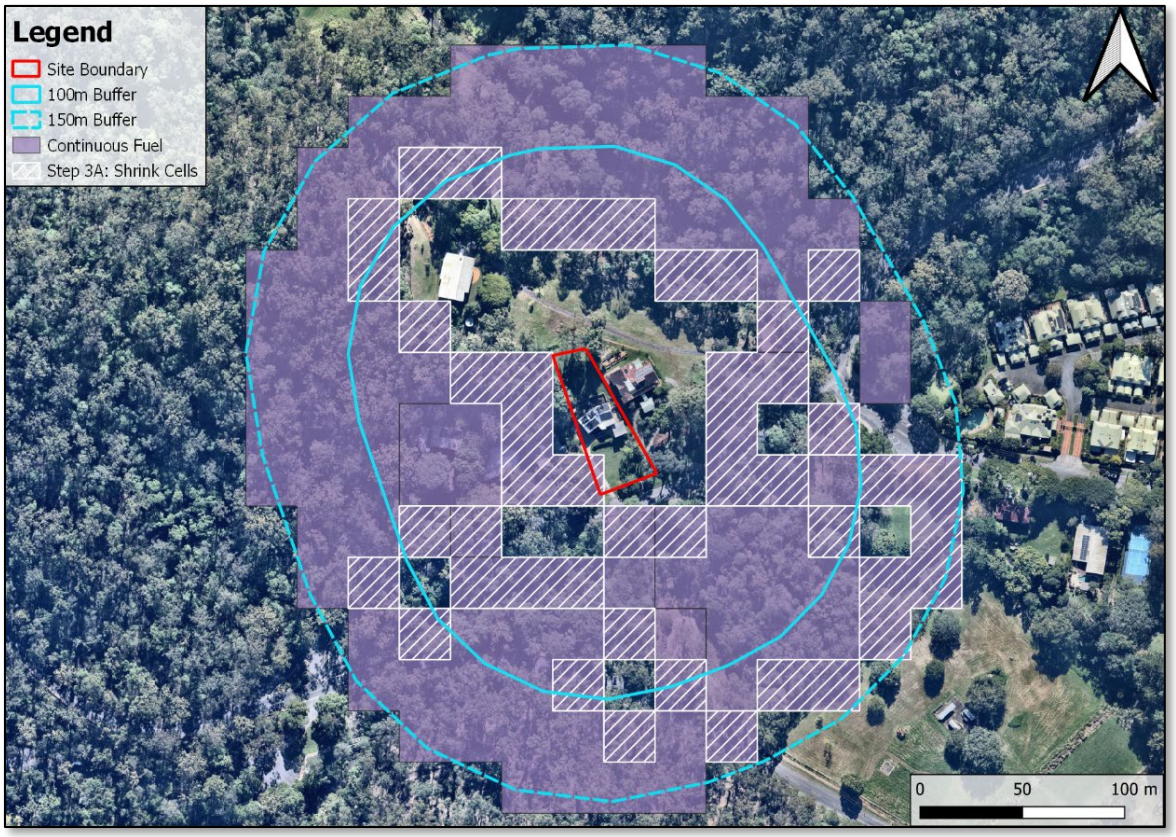


Figure 10. Shrinking of patches of continuous fuel at the interface with non-continuous fuel

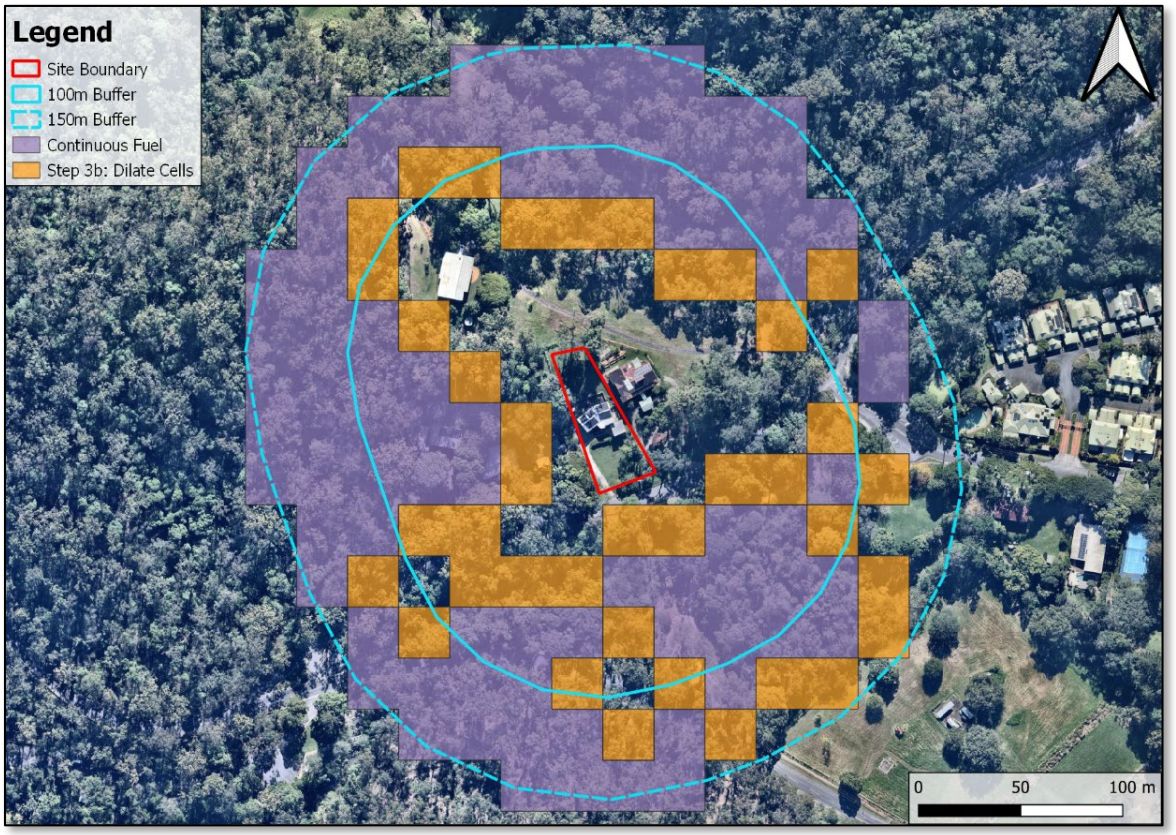


Figure 11. Step 3b – Dilation of residual continuous fuel patches

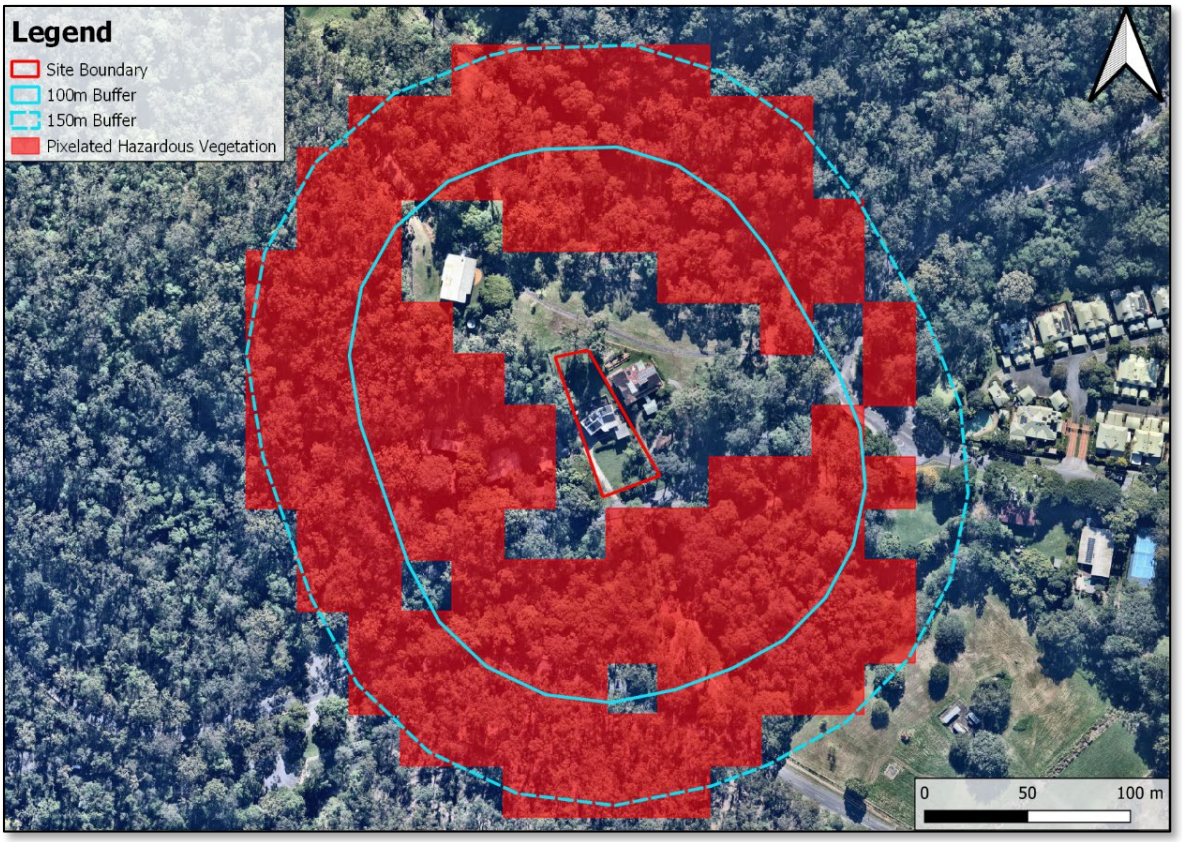


Figure 12. Finalised pixelated hazardous vegetation within the assessment area



Figure 13. 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 beneath areas of potentially hazardous vegetation, defined as "effective slope" in AS 3959-2018, that would be retained within or adjacent to the proposed development site. Also relevant, is whether the vegetated land is situated upslope or downslope of the proposed development. As fire travels faster upslope, there is a significant reduction in risk and fire-line intensity for sites that sit below the vegetation.

Potentially hazardous vegetation to the north-east is downslope of the proposed development and potentially hazardous vegetation to the north-west, south-west and south-east is upslope of the proposed development. Several measurements were made for effective (slope under the potentially hazardous vegetation) and site slope (the area between the development and the hazardous vegetation), and the most conservative measurements were adopted for the PFLI and BAL Setback calculations (refer **Figure 14** and **Appendix B**).

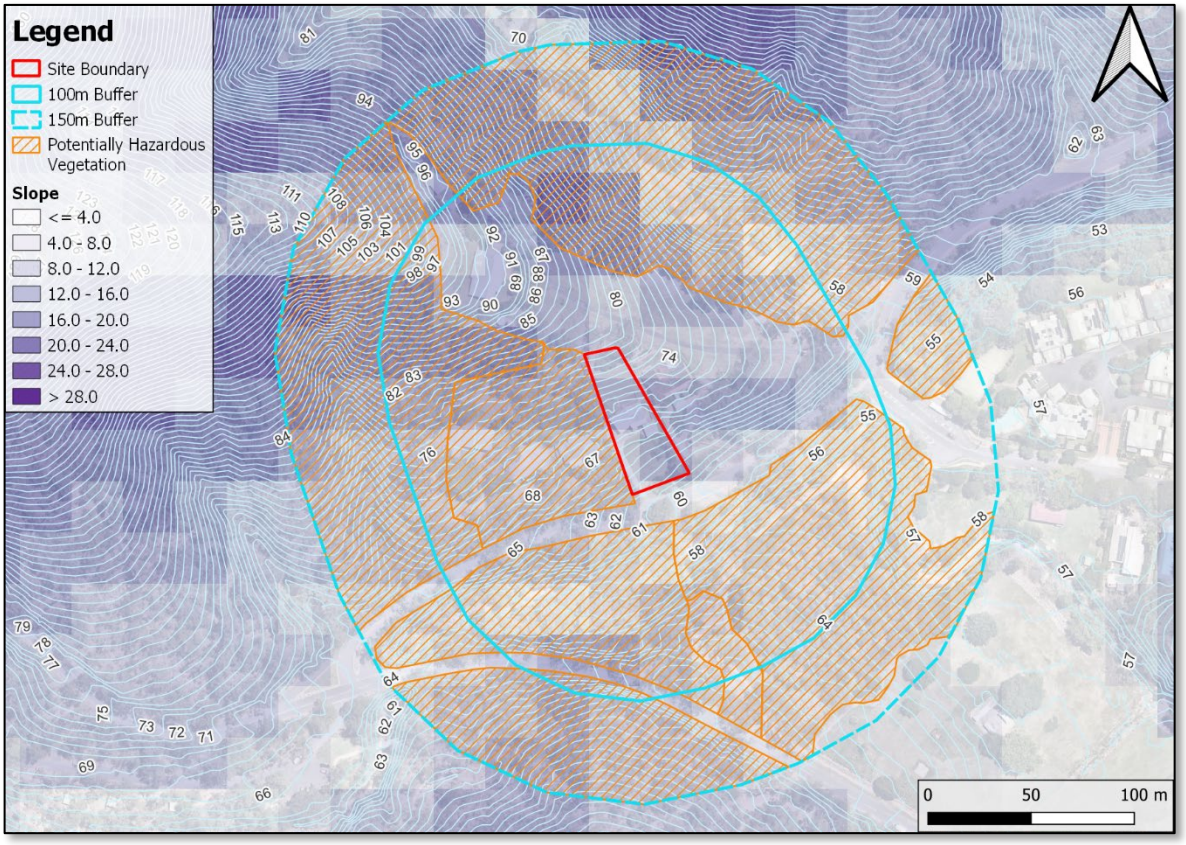


Figure 14. Slope within and in Proximity to the Proposed Development

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 several combinations of relative humidity, air temperature, wind speed as well as long- and short-term drought effects.

The QFD BRC MapViewer indicates that the site-specific Forest Fire Danger Index (FFDI) for the subject site is **55**.

4.1.7 Final PFLI

A calculation of the Potential Fire Line Intensity (PFLI) was undertaken using the PFLI equation in **Section 3.1**, for the potentially hazardous vegetation identified in **Section 4.1**. Based on this PFLI calculation, the vegetation to the north-east and north-west of the proposed development has high and very high potential bushfire intensity (i.e., 20,000 to 40,000 kW/m and > 40,000+ kW/m), associated with VHC 10.1. Vegetation associated with VHC 10.1 to the south-west of the proposed development also has high potential bushfire intensity (i.e., 20,000 to 40,000 kW/m), whilst vegetation associated with VHC 9.2 to the south-east of the proposed development has medium potential bushfire intensity (i.e. 4,000 to 20,000 kW/m) Vegetation associated with VHC 40.4 to the west and south of the proposed development was determined to be of low potential bushfire intensity (i.e. < 4,000 kW/m). Refer to **Figure 15**.

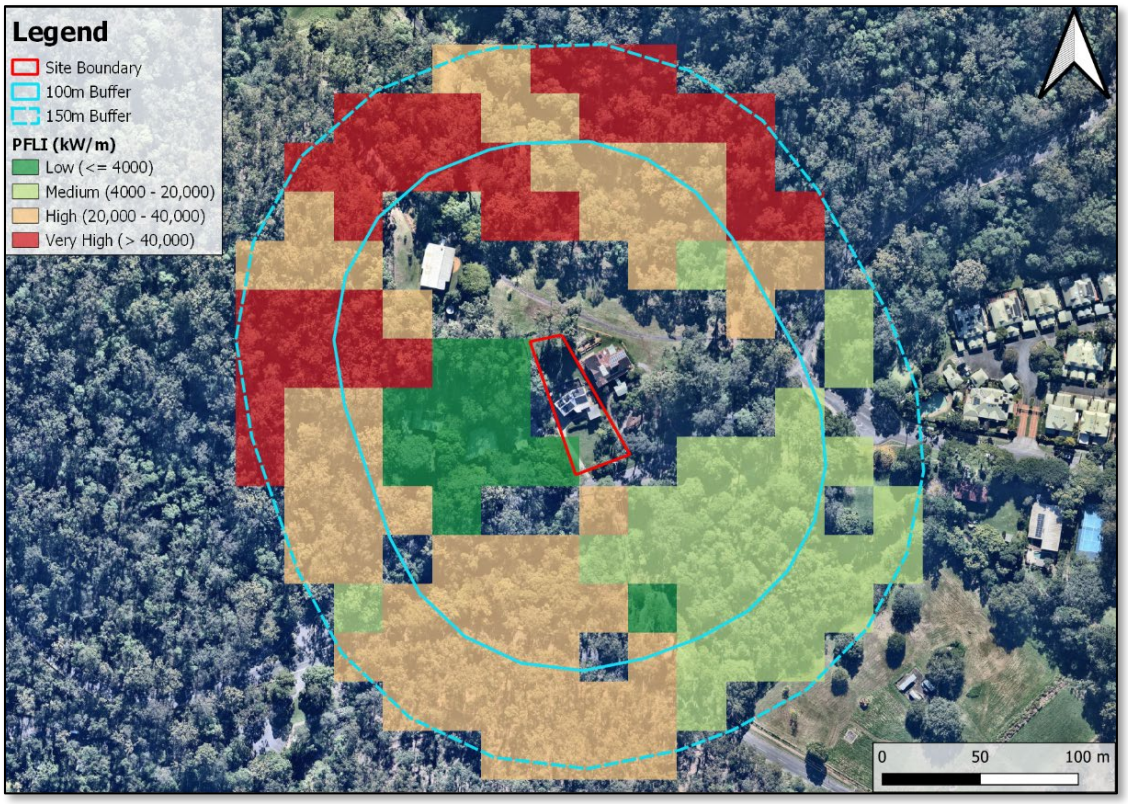


Figure 15. Potential Fire Line Intensity

4.2 Hazardous Vegetation

Vegetation mapped as VHC 9.2 to the south-east and vegetation mapped as VHC 10.1 to the north-east, north-west and south-west of the proposed development area was determined to be the hazardous vegetation within the assessment area. As this vegetation is within 100 m of the proposed development area, the proposed residential subdivision, it is therefore within a Bushfire Prone Area. As such, a Bushfire Attack Level (BAL) assessment has been conducted to determine the radiant heat flux future Lots may be exposed to. Refer to **Figure 16**.



Figure 16. Hazardous Vegetation within 100 m of the Development Area

5.0 BUSHFIRE ATTACK LEVEL ASSESSMENT

This 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 north-east, north-west, south-east and south-west of the development area (refer to **Figure 16**). A Method 2 assessment in accordance with AS3959:2018 utilising the Flamesol Minimum Distance Calculator was undertaken to determine the required setbacks from the hazardous vegetation (see **Table 7** and **Figure 17** and **Figure 18**). Refer to **Appendix B** for inputs and outputs from the Flamesol Minimum Distance Calculator.

Table 7. Summary of Setbacks and Radiant Heat Exposure for the Proposed Development

Radiant Heat Exposure (kW/m^2)	BAL	Distance from Hazardous Vegetation to the:			
		North-east	North-west	South-east	South-west
-	Low	100 m	100 m	100 m	100 m
12.5	12.5	49 m	23.1 m	27.5 m	27.2 m
19	19	36.2 m	15.9 m	19.1 m	18.9 m
29	29	25.8 m	10.9 m	12.8 m	12.7 m
40	40	19.4 m	8.1 m	9.4 m	9.4 m
> 40	FZ	< 19.4 m	< 8.1 m	< 9.4 m	< 9.4 m



Figure 17. BAL Setbacks over Proposed Development



Figure 18. Applicable BAL Zones over Proposed Development

Based on the results of the radiant heat exposure assessment, Lot 10 achieves a maximum radiant heat exposure of 29 kW/m^2, equivalent to BAL 29, although it may accommodate a BLE that will achieve BAL 19. Lot 11 has a maximum radiant heat exposure of 12.5 kW/m^2, equivalent to BAL 12.5 and Lot 12 has a maximum radiant heat exposure of 19 kW/m^2, equivalent to BAL 19. Refer to **Table 8**.

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 be straddle BAL contours, the highest BAL the structure is in, is the applicable BAL for construction purposes.

Table 8. BAL Requirements for Proposed Lots

Lot/s	Applicable BAL Rating
10	29 *Can accommodate a BLE to achieve BAL 19.*
11	12.5
12	19

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 12**, below.

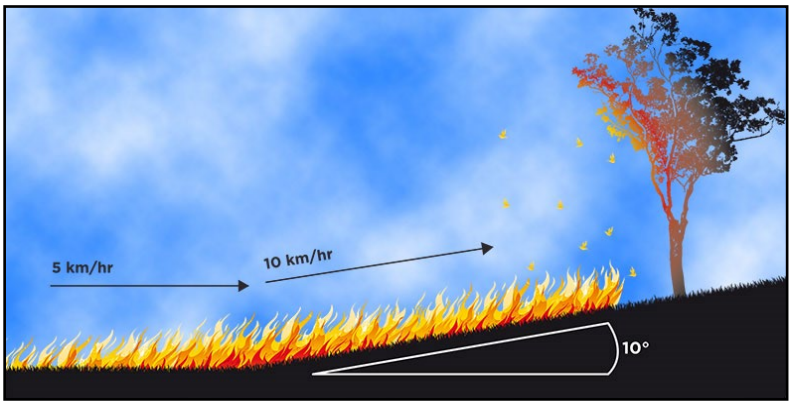


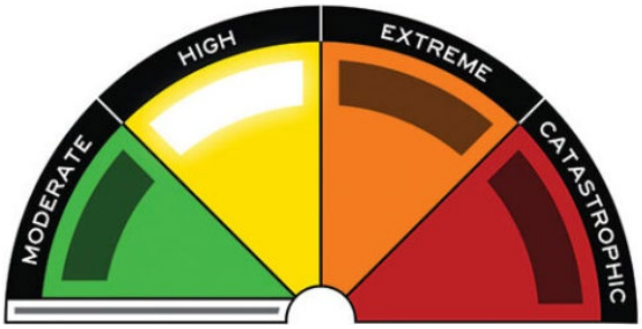
Figure 19. Effects of Topography on Bushfire (source: Country Fire Authority)

2) 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 19**).

3) 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.



MODERATE	HIGH
Plan and prepare.	**Be ready to act.**
Most fires can be controlled.	Fires can be dangerous.
› Stay up to date and be ready to act if there is a fire.	› There's a heightened risk. Be alert for fires in your area. › Decide what you will do if a fire starts. › If a fire starts, your life and property may be at risk. The safest option is to avoid bush fire risk areas.
EXTREME	**CATASTROPHIC**
Take action now to protect your life and property.	**For your survival, leave bush fire risk areas.**
Fires will spread quickly and be extremely dangerous.	If a fire starts and takes hold, lives are likely to be lost.
› These are dangerous fire conditions. › Check your bush fire plan and that your property is fire ready. › If a fire starts, take immediate action. If you and your property are not prepared to the highest level, go to a safer location well before the fire impacts. › Reconsider travel through bush fire risk areas.	› These are the most dangerous conditions for a fire. › Your life may depend on the decisions you make, even before there is a fire. › Stay safe by going to a safer location early in the morning or the night before. › Homes cannot withstand fires in these conditions. You may not be able to leave and help may not be available.

NO RATING: On days when there's minimal risk, the white bar meaning 'No Rating' will be used. Report any fires to 000.

Figure 20. 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.

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

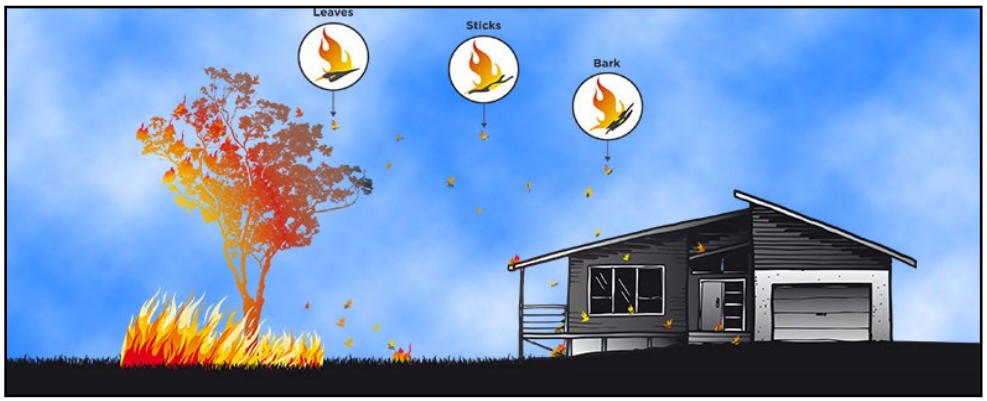


Figure 21. Ember Attack (source: Country Fire Authority)

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 21**, below). The most common cause of loss of human life is via radiant heat (CFA, 2018).



Figure 22. Radiant Heat (source: Country Fire Authority)

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.

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.

6.3.1 Layout Design

Access and Egress

Access to the proposed residential subdivision will be achieved directly off Simpsons Road to the south via the proposed easement along the western boundary. S5 Environmental recommend the S5 Environmental recommend the driveway be constructed to the 'private access roads or driveways' design requirements as outlined in *Table 8.2.5.3.C* '*Road design requirements for emergency vehicle access*', within of Section 8.2.5 Bushfire Overlay Code and the QFD '*Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots*', to be confirmed by the Project Town Planner or Engineer.

Simpsons Road and the surrounding road network, is considered suitable to carry emergency fire-fighting appliances, provide emergency evacuation and to prevent entrapment during a bushfire.

Siting of Development

The proposed residential development is sited within an area of Low Potential Fire Line Intensity (> 4,000 kW/m^2). These setbacks were modelled utilising the Flamesol BAL Minimum Distance Calculator (refer to **Appendix B**). The siting of the development is considered to ensure the proposed development is exposed to an acceptable level of bushfire risk.

6.3.2 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.

S5 Environmental recommend that advice from an architect, building certifier or builder may be required to meet the applicable construction requirements required for the applicable BAL rating.

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.

6.3.3 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).

6.3.4 Bushfire Emergency

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

The Ashgrove Fire and Rescue Station is located approximately 4 km (by road) to the north-east of the subject site. The contact details for the Ashgrove Fire and Rescue Station are:

- Address: 515 Waterworks Road, Ashgrove QLD 4060
- Phone: (07) 3366 0258

A decision to leave in the event of a bushfire in the locality must be made early particularly given the proximity of the Mt Coot-tha precinct as surrounding roads may be impacted by fire.

The QFD recommend taking steps to prepare for bushfire, this includes a prepared home and preparing a Bushfire Survival Plan to assist with making decisions in the event of a fire. Information and resources on creating your plan can be found on the QFD website at https://www.fire.qld.gov.au/prepare/bushfire/prepare-for-bushfires.

6.3.5 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 be maintained at or below 10 cm in height, trees should not overhang the roofline of buildings or touch walls or other elements, and plants greater than 10 cm in height at maturity should not be placed directly in front of a window or other glass features. 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.

7.0 CONCLUSION

This Bushfire Hazard Assessment concluded that the proposed development is within 100m of potentially hazardous vegetation to the north-east, north-west, south-east and south-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 29 kW/m^2, equivalent to BAL 29. 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 A**.

8.0 REFERENCES

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APPENDIX A

BCC Bushfire Hazard Overlay Code Response

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 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 will achieve a maximum radiant heat flux exposure of 29 kW/m^2, equivalent to a BAL 29 rating. Lots can accommodate BLEs that will achieve a maximum of BAL 19.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
exceeding amounts specified in Table 8.2.5.3.D: iv. does not extend beyond the bounds of the existing development footprint; v. does not increase the GFA by 10% or 100m^2, whichever is the greater; vi. does not involve a new use on the site; vii. 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 Assessment Guidelines prepared by the Australian Institute of Disaster Resilience.	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: 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.	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
	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; 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.	**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 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%;	**N/A** Development is a RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	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. 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;	**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	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
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.	**AO3.2** 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	
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:	**N/A** Development is a RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	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 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	**AO7** Development, for which sufficient reticulated water supply is not available, provides:	**N/A** Development is a RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
freely accessible for fire-fighting purposes at all times.	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.		
Additional performance outcomes and acceptable outcomes for all development in Biodiversity areas overlay if on a site larger than 2,500 m^2			
PO8 Development through the siting, design, and construction of buildings, access routes and fire maintenance trails, and ongoing site management:	**AO8** Development locates building protection zones as shown on Figure b and Figure c, driveways and access routes and any fire maintenance trails:	**N/A** Subject site does not contain Biodiversity areas overlay	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
a. provides effective separation from sources of bushfire risk; b. responds to the bushfire risk in that location; c. maintains the safety and protection of people and property over time; d. 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.	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.		
Section B—If for assessable development other than ROL			
PO9 Development: a. provides for safe and efficient evacuation and emergency services access to the site during a bushfire; b. does not concentrate large numbers of people or locate significant worker or resident populations in an area of bushfire hazard; c. avoids locating the following uses in an area of bushfire hazard:	**AO9.1** Development: **a.** does not increase the number of people living, working on or visiting the site by more than 10%; or **b.** increasing the number of people living, working on or visiting the site, or vulnerable uses, difficult to evacuate 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.	**N/A** Development is a RoL	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
i. vulnerable uses; ii. difficult to evacuate uses; iii. 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.			
	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: a. an extension to existing premises which increases the number of people living, working on or visiting the site by more than 10%; b. the introduction of vulnerable, difficult to evacuate or assembly uses.	**N/A** Development is a RoL	
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:	**AO10** Development for storage or handling of hazardous chemicals:	**N/A** – S5 Environmental understand the proposed development is for a residential development and will not include	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
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; b. excessive danger or difficulty to emergency services for emergency response or evacuation.	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 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.	the storage or handling of hazardous chemicals.	
Additional performance outcomes and acceptable outcomes for essential community infrastructure			
PO11 Development for essential community infrastructure is located, designed and sited to:	**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	**N/A** – Proposed development will not include essential community infrastructure.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
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; d. mitigate the impacts on the community and environment from the effects of a bushfire on the development.	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; iv. enable people and property to be defended safely and effectively from a bushfire.		
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	**N/A** – Proposed development will not include essential community infrastructure.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	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; iv. 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.		
Additional performance outcomes and acceptable outcomes if for landscaping or a park landscape plan is a requirement for development			
PO13 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.	AO13 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.	Complies – S5 Environmental have made landscaping recommendations within the BMP which will ensure onsite vegetation is maintained within a low fuel state and predominantly utilises low-fuel vegetation species.	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
	Note—The requirements of a building protection zone are shown in Figure b and Figure c.		
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; 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.	**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.	
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 proposed development is considered to comprise a reasonable level of additional lots, being a small subdivision of 1 into	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
		3 lots. The development is not considered to materially increase the number of persons living or working within the area by a significant amount. The maximum radiant heat flux the proposed development will be exposed to is 29 kW/m^2, equivalent to BAL 29. Lots can accommodate a BLE which will achieve a BAL rating no greater than 19.	
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; 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.	**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%; 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.	**Complies** Lot 11 will be exposed to a maximum radiant heat flux of 12.5 kW/m^2, equivalent to BAL 12.5. Lot 12 will be exposed to a maximum radiant heat flux of 19 kW/m^2, equivalent to BAL 19. Lot 10 will be exposed to a maximum radiant heat flux of 29 kW/m^2, equivalent to BAL 29, however, it can accommodate a BLE to achieve BAL 19. Therefore, the residential subdivision will achieve a maximum radiant heat flux of 29 kW/m^2. A Bushfire Management Plan has been provided outlining landscaping recommendations for	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS	COUNCIL USE ONLY
		future lot owners to ensure the development is kept in a low-fuel state. Proposed lots are not located on a gradient greater than 15% and are located on south-facing slopes.	
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.	Complies – Performance Outcome. Lot 10 has direct access onto Simpsons Road; the remainder are via an internal easement. Lots are not directly adjoining hazardous vegetation. The internal driveway to the dwellings will be designed and constructed in accordance with Table 8.2.5.3.C of the *Brisbane City Plan 2014* to ensure that it will be capable of supporting fire-fighting appliances. The internal driveway is approximately 43m long and therefore distance from road frontage to future habitable buildings in Lots 11 and 12 is less than 70m.	
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:	N/A New roads are not part of the proposed development.	

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.	a. Table 8.2.5.3.C; or b. an approved bushfire management plan.		
	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.	N/A New roads are not part of the proposed development.	

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.	Complies. 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.		

APPENDIX B

Flamesol Inputs and Outputs

Summary of Input Parameters for Hazardous Vegetation to the North-east

Parameter	Input	Note
FFDI	56	Source: QFD MapViewer.
Surface Fuel Load	19.3 t/ha	Surface and Near Surface Fuel Load – QFD VHC 10.1.This is in line with BCC's Technical Bushfire Guide for the calculation of understorey or surface fuel loads.
Overall Fuel Load	20.8 t/ha	Total Fuel Load – QFD VHC 10.1.
Effective Slope	7.93 º	Hazardous vegetation is downslope of the proposed development.
Site Slope	4.77 º	Hazardous vegetation is downslope of the proposed development.
Flame Temperature	1,200 K	Standard input in accordance with BRC and the BCC Technical Assessment Guide.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

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Calculated July 30, 2026, 11:48 am (MDc v.4.9)

457 Simpsons Rd Bardon NORTH-EAST

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	56	Rate of spread	2.24 km/h
Vegetation Classification	Forest	Flame length	17.06 m
Understorey fuel load	19.3 t/ha	Flame angle	67.77 °, 73.77 °, 77.77 °, 80.77 °, 81.77 ° & 87.77 °
Total fuel load	20.8 t/ha	Elevation of receiver	6.28 m, 6.04 m, 5.31 m, 4.33 m, 3.7 m & 0 m
Vegetation height	n/a	Fire intensity	24,089 kW/m
Effective slope	7.93 °	Transmissivity	0.85, 0.829, 0.804, 0.781, 0.77 & 0.718
Site slope	4.77 °	Viewfactor	0.4207, 0.3114, 0.2112, 0.1429, 0.116 & 0.0311
Flame width	100 m	Minimum distance to < 40 kW/m²	19.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	25.8 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	36.2 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	49 m

Flamesol Calculator Outputs for Required Setbacks to the North-east

Summary of Input Parameters for Hazardous Vegetation to the North-west

Parameter	Input	Note
FFDI	56	Source: QFD MapViewer.
Surface Fuel Load	19.3 t/ha	Surface and Near Surface Fuel Load – QFDVHC 10.1.
Overall Fuel Load	20.8 t/ha	Total Fuel Load – QFD VHC 10.1.
Effective Slope	-12.03 º	Hazardous vegetation is upslope of the proposed development.
Site Slope	-9.17 º	Hazardous vegetation is upslope of the proposed development.
Flame Temperature	1,200 K	Standard input in accordance with BRC and the BCC Technical Assessment Guide.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

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Calculated August 14, 2026, 2:01 pm (MDc v.4.9)

457 Simpsons Rd Bardon NORTH-WEST

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	56	Rate of spread	0.56 km/h
Vegetation Classification	Forest	Flame length	6.17 m
Understorey fuel load	19.3 t/ha	Flame angle	59 °, 65 °, 70 °, 73 °, 74 ° & 77 °
Total fuel load	20.8 t/ha	Elevation of receiver	3.96 m, 4.57 m, 5.48 m, 6.68 m, 7.45 m & 14.74 m
Vegetation height	n/a	Fire intensity	6,077 kW/m
Effective slope	-12.03 °	Transmissivity	0.883, 0.871, 0.854, 0.833, 0.82 & 0.754
Site slope	-9.17 °	Viewfactor	0.4015, 0.2953, 0.1991, 0.134, 0.1087 & 0.0296
Flame width	100 m	Minimum distance to < 40 kW/m²	8.1 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	10.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	15.9 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	23.1 m
		Minimum distance to < 10 kW/m²	27.8 m

Flamesol Calculator Outputs for Required Setbacks to the North-west

Summary of Input Parameters for Hazardous Vegetation to the South-east

Parameter	Input	Note
FFDI	56	Source: QFD MapViewer.
Surface Fuel Load	14.9 t/ha	Surface and Near Surface Fuel Load – QFD VHC 9.2.
Overall Fuel Load	17.2 t/ha	Total Fuel Load – QFD VHC 9.2.
Effective Slope	-1.47 º	Hazardous vegetation is upslope of the proposed development.
Site Slope	5.46 º	Hazardous vegetation is downslope of the proposed development.
Flame Temperature	1,200 K	Standard input in accordance with BRC and the BCC Technical Assessment Guide.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

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Calculated July 30, 2026, 11:45 am (MDc v.4.9)

457 Simpsons Rd Bardon SOUTH-EAST

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	56	Rate of spread	0.9 km/h
Vegetation Classification	Forest	Flame length	7.94 m
Understorey fuel load	14.9 t/ha	Flame angle	70.46 °, 77.46 °, 82.46 °, 86.46 °, 87.46 ° & 90.46 °
Total fuel load	17.2 t/ha	Elevation of receiver	2.83 m, 2.64 m, 2.11 m, 1.33 m, 0.82 m & 0 m
Vegetation height	n/a	Fire intensity	8,039 kW/m
Effective slope	-1.47 °	Transmissivity	0.877, 0.863, 0.843, 0.82, 0.807 & 0.745
Site slope	5.46 °	Viewfactor	0.4039, 0.2989, 0.2009, 0.1358, 0.1105 & 0.03
Flame width	100 m	Minimum distance to < 40 kW/m²	9.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	12.8 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	19.1 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	27.5 m

Flamesol Calculator Outputs for Required Setbacks to the South-east

Summary of Input Parameters for Hazardous Vegetation to the South-west

Parameter	Input	Note
FFDI	56	Source: QFD MapViewer.
Surface Fuel Load	19.3 t/ha	Surface and Near Surface Fuel Load – QFD VHC 10.1.
Overall Fuel Load	20.8 t/ha	Total Fuel Load – QFD VHC 10.1.
Effective Slope	-6.66 º	Hazardous vegetation is upslope of the proposed development.
Site Slope	2.86 º	Hazardous vegetation is downslope of the proposed development.
Flame Temperature	1,200 K	Standard input in accordance with BRC and the BCC Technical Assessment Guide.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

FLAMESOL
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Calculated July 30, 2026, 11:43 am (MDc v.4.9)

457 Simpsons Rd Bardon SOUTH-WEST

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	56	Rate of spread	0.81 km/h
Vegetation Classification	Forest	Flame length	7.82 m
Understorey fuel load	19.3 t/ha	Flame angle	68.86 °, 74.86 °, 79.86 °, 83.86 °, 84.86 ° & 87.86 °
Total fuel load	20.8 t/ha	Elevation of receiver	3.17 m, 3.13 m, 2.9 m, 2.52 m, 2.26 m & 0 m
Vegetation height	n/a	Fire intensity	8,802 kW/m
Effective slope	-6.66 °	Transmissivity	0.877, 0.864, 0.844, 0.821, 0.808 & 0.746
Site slope	2.86 °	Viewfactor	0.4035, 0.2997, 0.2013, 0.1359, 0.1103 & 0.0299
Flame width	100 m	Minimum distance to < 40 kW/m²	9.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	12.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	18.9 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	27.2 m

Flamesol Calculator Outputs for Required Setbacks to the South-west

APPENDIX C

Slope Lines and Calculations

Project: 457 Simpsons Road, Bardon
Number: S526142

S5 ENVIRONMENTAL

BUSHFIRE SLOPE CALCULATOR

Vegetation to the South-west

Effective Slope					Site Slope				
Direction	Upslope				Direction	Downslope			
Top Elevation	61	m			Top Elevation	62	m		
Bottom Elevation	71	m	Slope %	-11.63%	Bottom Elevation	61	m	Slope %	5.00%
Distance	86	m	**Slope (°)**	**-6.66**	Distance	20	m	**Slope (°)**	**2.86**

Vegetation to the South-east

Effective Slope					Site Slope				
Direction	Upslope				Direction	Downslope			
Top Elevation	59	m			Top Elevation	61	m		
Bottom Elevation	61	m	Slope %	-2.56%	Bottom Elevation	59	m	Slope %	9.52%
Distance	78	m	**Slope (°)**	**-1.47**	Distance	21	m	**Slope (°)**	**5.46**

Vegetation to the North-east

Effective Slope					Site Slope				
Direction	Downslope				Direction	Downslope			
Top Elevation	75	m			Top Elevation	78	m		
Bottom Elevation	66	m	Slope %	13.85%	Bottom Elevation	75	m	Slope %	8.33%
Distance	65	m	**Slope (°)**	**7.93**	Distance	36	m	**Slope (°)**	**4.77**

Vegetation to the North-west

Effective Slope					Site Slope				
Direction	Upslope				Direction	Upslope			
Top Elevation	80	m			Top Elevation	76	m		
Bottom Elevation	97	m	Slope %	-20.99%	Bottom Elevation	80	m	Slope %	-16.00%
Distance	81	m	**Slope (°)**	**-12.03**	Distance	25	m	**Slope (°)**	**-9.17**

