S5 ENVIRONMENTAL

BUSHFIRE HAZARD ASSESSMENT AND MANAGEMENT PLAN

569-605 Old North Road, Corymbia

Client:	CPS Technology & Infrastructure Pty Ltd
Reference:	S525006_BHAMP_v1.1
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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.

Abbreviations

AS 3959-2018	*Australian Standard 3959-2018 Construction of Buildings in Bushfire-prone Areas*
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BMP	Bushfire Management Plan
BRC	Bushfire Resilient Communities (The State of Queensland 2017)
CFA	Country Fire Authority
CMB	City of Moreton Bay
DES	Department of Environment and Science
DNRME	Department of Natural Resources, Mines and Energy
FFDI	Forest Fire Danger Index
IPZ	Inner Protection Zone
MBRC	Moreton Bay Regional Council
NCC	National Construction Code
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 was commissioned by CPS Technology & Infrastructure Pty Ltd, on behalf of their client, to undertake a Bushfire Hazard Assessment and Management Plan as supporting documentation for a Development Application for a Material Change of Use (MCU) application related to the construction of a telecommunications tower and associated infrastructure, at 569-605 Old North Road, Corymbia, refer to Table 1.

The aim of this BHAMP is to undertake a site-specific bushfire hazard assessment, determine any set back required between the proposed development and hazardous vegetation.

Table 1. Site Description

Street Address	569-605 Old North Road, Corymbia	RPD	Lot 1 on RP197793
LGA	City of Moreton Bay (CMB)	Area	19,560 m^2
Zone	Emerging Community	Local Plan	Caboolture West – Green Network and Urban Living Next Generation Sub-precinct
Current State	Lot 1 on RP197793, the *Old North Road Reserve – Bellmere*, herein referred to as the 'subject site', is a slender Lot located west of Caboolture in the Moreton Bay Region. The subject site is currently in an agricultural area that has been earmarked for future urban expansion. Old North Road runs parallel with the western boundary and Bellmere Road along the northern boundary. Vegetation in the northern third of the subject site has been historically modified and largely cleared with regrowth acacias and invasive grasses prominent. The southern two -thirds of the subject site are steeply sloping with a small rocky drainage line falling to a minor east-west running waterway located within the southern extent of the site. Vegetation in the southern portion of the site is remnant open eucalyptus forest. Given the narrowness of the lot, edge effects are apparent throughout most areas.		
Proposed Development	The proposed development is for a MCU for a telecommunications tower facility, the proposed location of which is shown in Figure 1. below. The facility will comprise a fenced compound containing a 35 m high, concrete monopole to which antennas are mounted at the top, and ancillary equipment on the ground in an enclosed equipment shelter. The shelter and monopole have been designed to a BAL-FZ fire resistance rating (refer to Appendix D). Refer to Figure 2. for an extract of the proposed telecommunications tower.		

Potentially Hazardous Vegetation	Post development, potentially hazardous vegetation is situated to the north, west and south of the proposed infrastructure compound. Following ground-truthing within the subject site this vegetation was determined to reflect non-remnant vegetation, and the regional ecosystems (RE) 12.11.18 and 12.3.11, 12.3.14. These regional ecosystems are described as: RE 12.11.18: *Eucalyptus molucccana* woodland +/- *Eucalyptus citriodora* subsp. *variegata, E. tereticornis, E. siderophloia* or *E. crebra, E. longirostrata, C.intermedia, E. carnea,* on metamorphics +/- interbedded volcanics. *Equivalent to Vegetation Hazard Class (VHC) 13.1*; and RE 12.3.11 *Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia* open forest on alluvial plains usually near coast. Contains palustrine. *Equivalent to Vegetation Hazard Class (VHC) 16.1*; and RE 12.3.14 *Eucalyptus crebra +/- Eucalyptus tereticornis, Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics. *Equivalent to Vegetation Hazard Class (VHC) 16.2*.

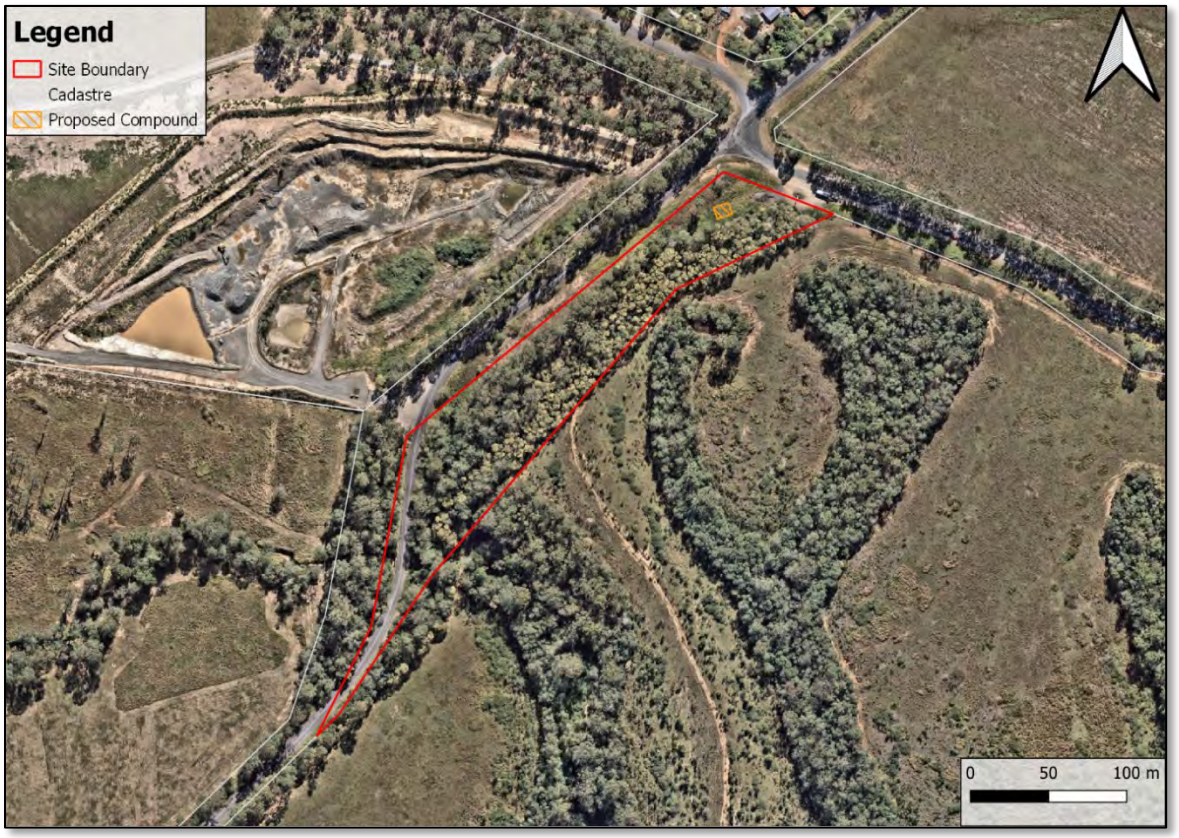


Figure 1. Site Aerial and Proposed Location (source: Nearmap, date: 23/05/2025)

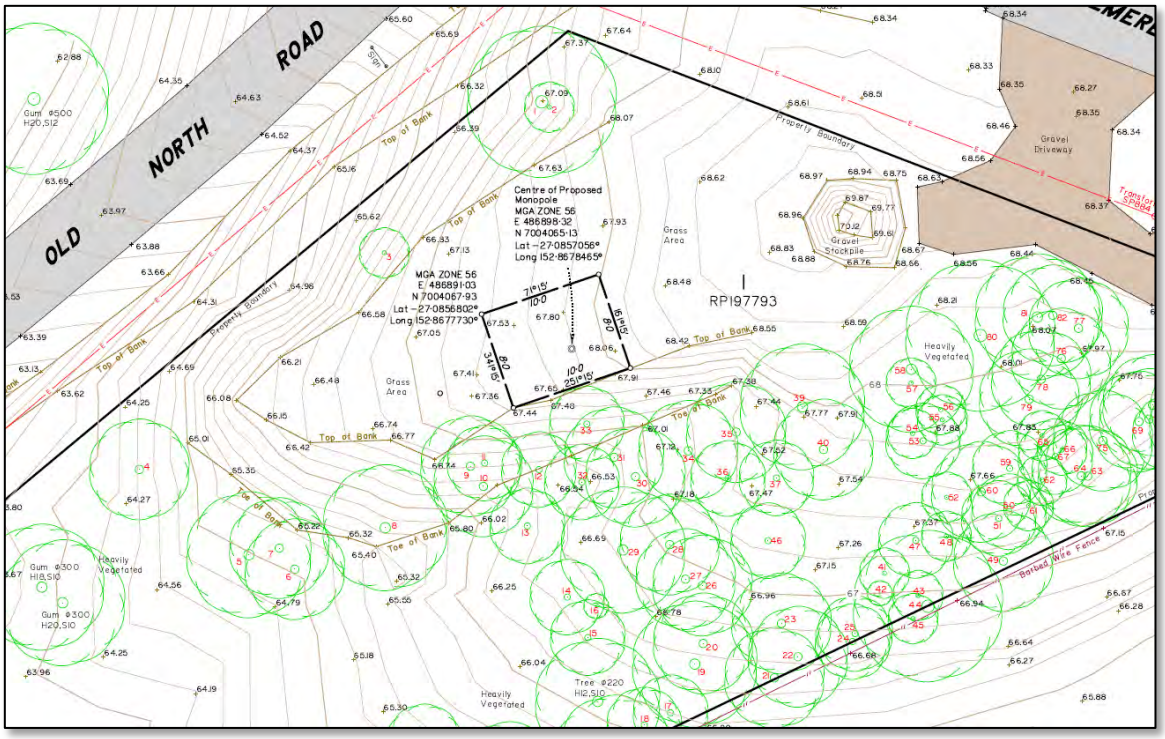


Figure 2. Location Plan (source: Saunders Havill, Dwg.12703 S 01 DT B, No. A, 12/11/2025)

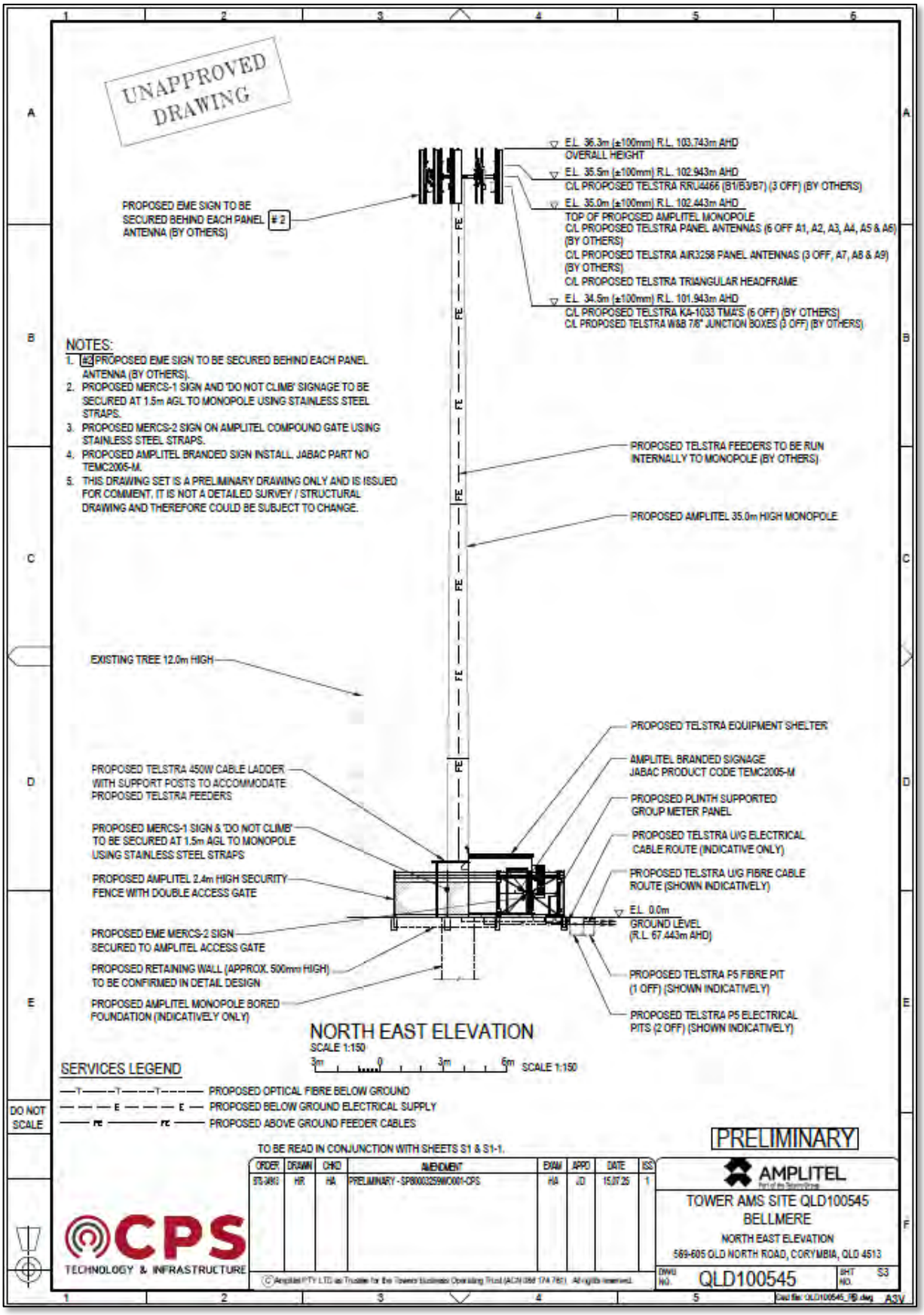


Figure 3. Tower Design (source: Amplitel/CPS, dwg no. QLD100545, Issue 1. 15/07/2025)

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 off these areas.

The *Moreton Bay Regional Council Planning Scheme 2016*, Version 7.1, implements the Bushfire Risk Performance outcomes in their Zone and Development Codes, which acts as a development constraint within the City of Moreton Bay (CMB). It is understood that the *Planning Scheme V7* has incorporated the SPP: *Safety and Resilience to Hazards (Natural Hazards, Risk and Resilience – Bushfire Prone Areas)* although there is variation between the mapping. As such the SPP bushfire hazard mapping, as well as CMB's Bushfire hazard overlay, were consulted to determine the preliminary bushfire hazard ratings of the site and locality (within 150 m), refer to Figure 4 and Figure 5.

Both the CMB and SPP bushfire hazard overlays have mapped swathes of vegetation throughout the 150 m assessment area and within the subject site as medium potential bushfire intensity, with the potential impact buffer comprising the balance of the investigation area, although the shape of the hazardous areas differs between the two.

Due to potentially hazardous vegetation being mapped within and around the proposed development site, a site-specific bushfire assessment has been undertaken to determine the actual hazard of the site.

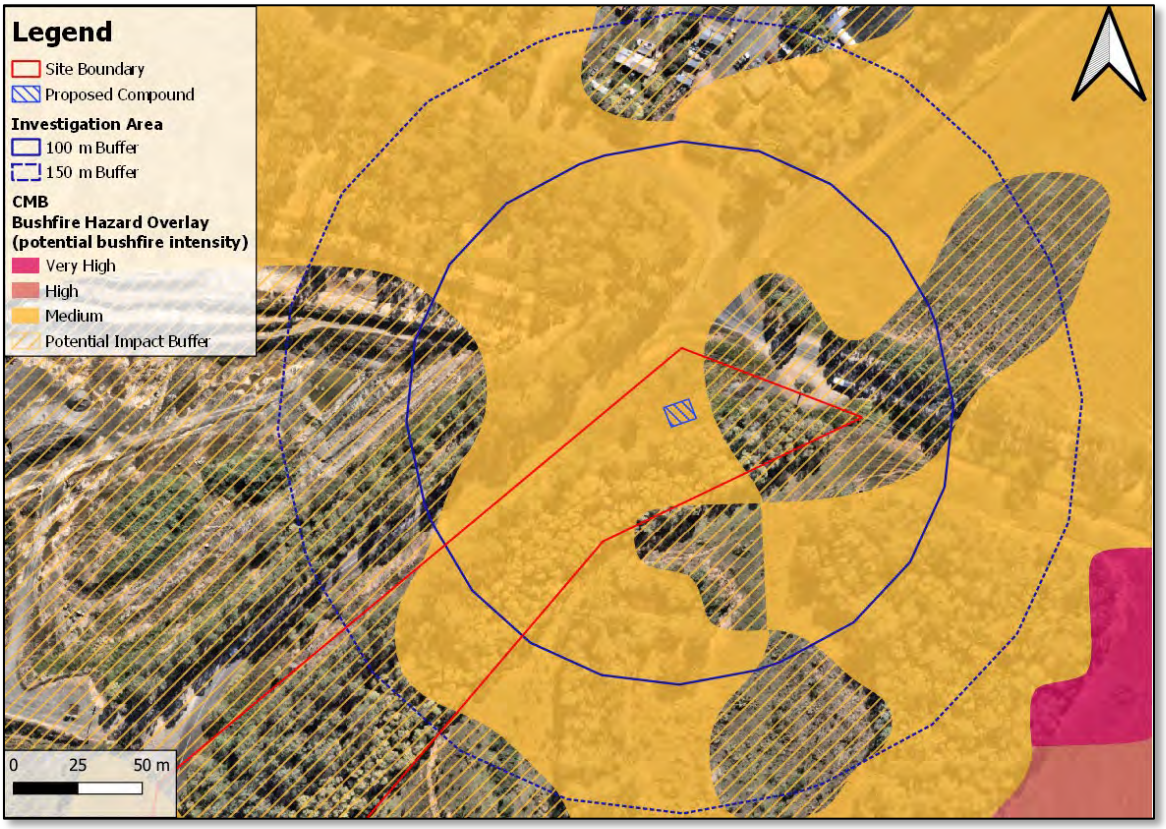


Figure 4. CMB Bushfire Hazard Mapping within and in Proximity to the Site

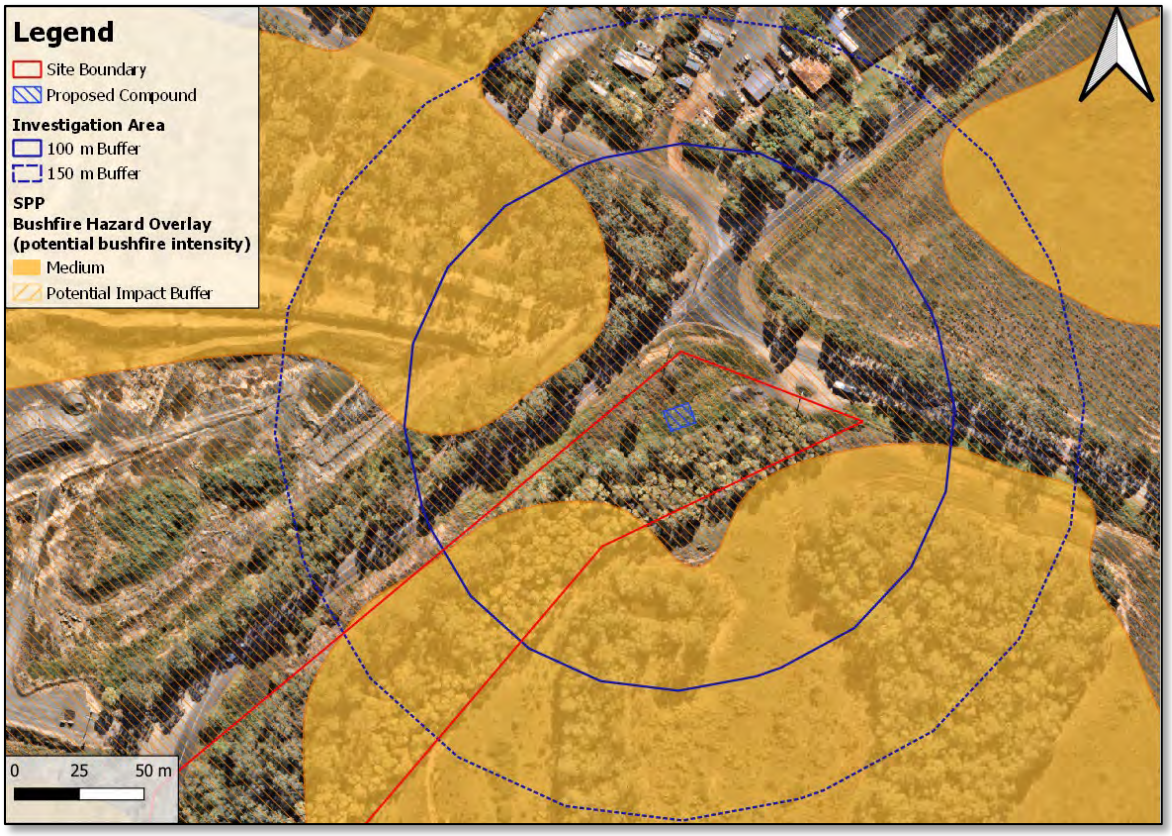


Figure 5. SPP Bushfire Hazard Mapping within and in Proximity to the Site

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 (< 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 *Construction of Buildings in Bushfire-prone Areas*. This Method 2 calculates the radiant heat exposure for a proposed development by determining the minimum distance between hazardous vegetation and the development to each Radiant Heat Flux level, with this calculation reflecting the level of bushfire risk for a proposed development (see Table 4).

To determine the radiant heat exposure for the proposed development, the online Flamesol Minimum Distance Calculator (FPA, 2023) was used to determine the setbacks to hazardous vegetation to understand the radiant heat exposure for the proposed development.

Inputs for the radiant heat exposure assessment used for the purposes of this assessment are the parameters as summarised in Table 5.

Table 4. BAL and Radiant Heat Exposure

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

Table 5. Parameter inputs for Method 2 from AS3959-2018

Parameter	AS Method 2(b)
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 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 the hazardous vegetation and the site.
Flame Width	Flame width is assumed to be 100 m (AS 3959-2018) unless a short-fire run. Refer to Section 3.4 for the methodology for calculating short flame 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 6 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 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 150 m 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* (TSoNSW (NSW RFS), 2019b) is adopted.

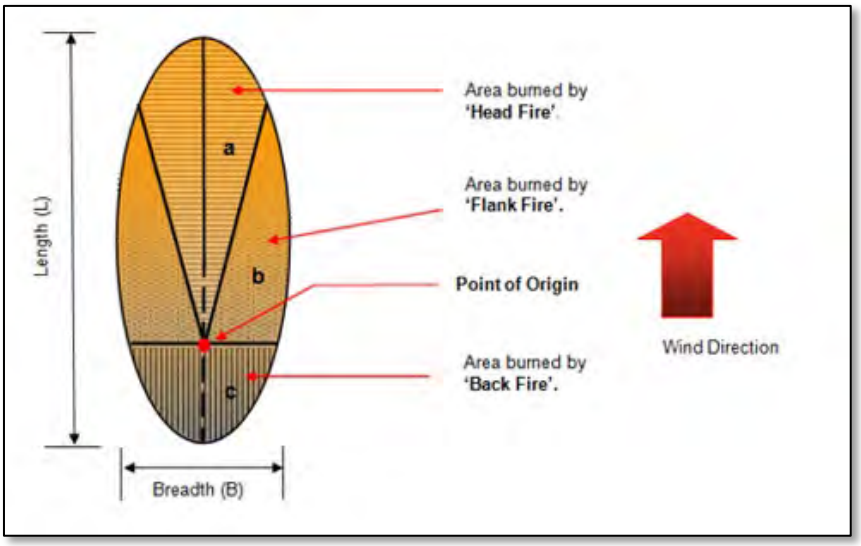


Figure 6. Schematic Diagram of Simple Elliptical Fire Growth Model (Van Wagner 1969) from NSW Rural Fire Surface (2019b)

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

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

Short Flame Run was not utilised for this assessment as the vegetation is highly connected to vegetation within the broader landscape and the narrow corridors of denser hazardous vegetation to the north, west and south are within a matrix of continuous fuel.

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 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 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.

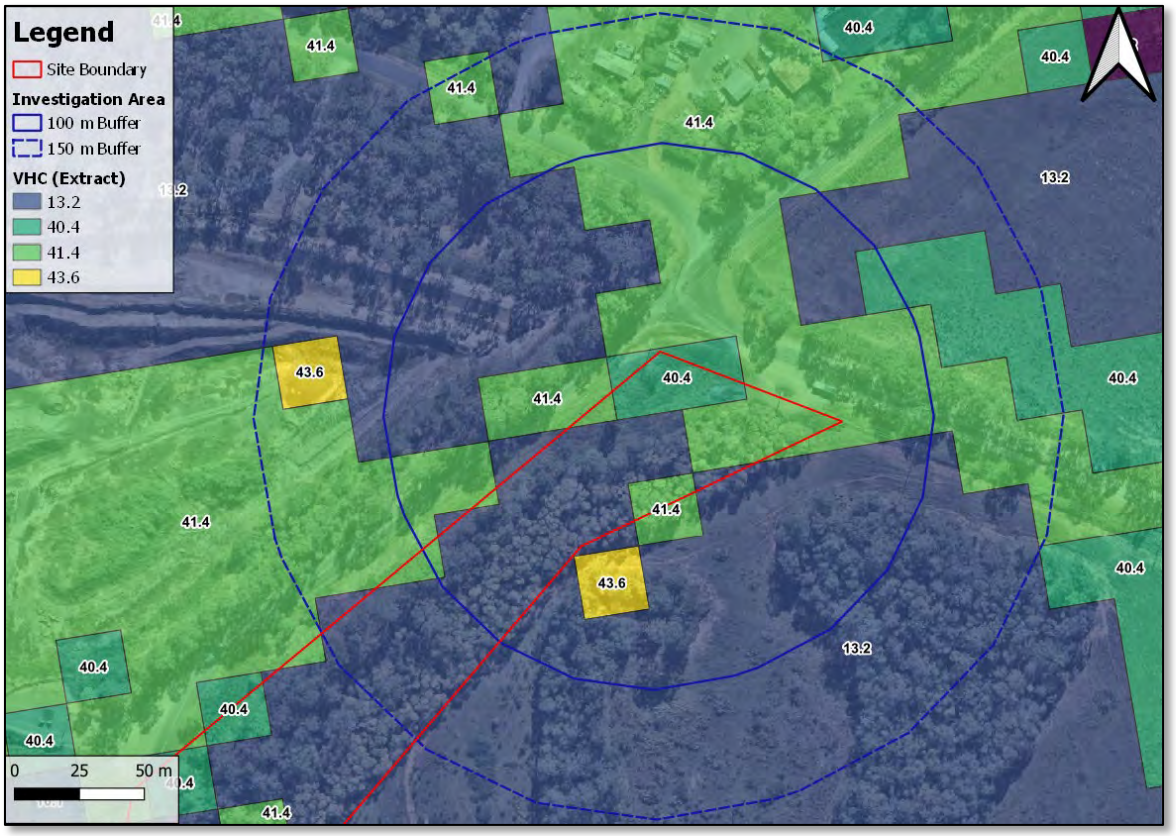


Figure 7. Extract of Vegetation Hazard Classes from QSpatial

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 18th June, 2025 and subsequently undertook a Reliability Assessment in accordance with BRC comparing available bushfire and vegetation mapping with on-ground conditions. The reliability assessment incorporated a comprehensive review of available aerial mapping of the site, including a 150 m buffered area, external to the proposed development.

The site is mapped largely as VHC 13.2 '*dry to moist eucalypt woodlands on undulating metamorphics and granite*' with patches of VHC 40.4 *'continuous low grass or tree cover'* and VHC 41.4 *'discontinuous low grass or tree cover*'. Post development, the compound area and a 10 metre buffer area around it will be maintained in a low fuel state and has therefore been modified to VHC 42.6 '*nil to very low vegetation cover*' to reflect this. VHC 41.4 has been mapped existing cleared area in the north of the site which is utilised for parking as it will be maintained for access, with VHC 41.4 extended out of the road and residential property to the north-west of Jackson Road, which reflects the State mapping. The balance of the site within the investigation area has been ground-truthed as non-remnant vegetation, however it is unmaintained, and as such the State mapped VHC 13.2 has been retained. The grazing land to the south and south-east is State mapped as VHC 13.2, at the time of the inspection had a short ground cover outside of the patches of dense remnant vegetation, the grazed areas have been modified to VHC 40.4, because although it is currently short there may be periods where it is unmanaged, the patches of vegetation have also been modified to VHC 13.1 '*dry to moist eucalypt open forests on undulating metamorphics and granite*' to reflect their density

and canopy height which is more in line with remnant vegetation as opposed to the non-remnant which is present through the investigation area in the subject site. A dam is located within one of these patches and has been assigned VHC 43.6 '*water bodies or very low vegetation cover*'.

The gravel pit on northern side of Old North Road is State mapped as VHC 41.4 and has been modified to VHC 42.6 due to the paucity of vegetation. The agricultural land north of Bellmere Road is State mapped VHC 13.2, which may reflect a previous condition this land is cleared and modified to VHC 40.4. Roadside vegetation has also largely been modified to VHC 40.4 from VHC 41.4 as only a narrow margin is maintained, with the balance being unmaintained with long grass and west of Old North Road having a corridor of trees. The vegetation north of the gravel pit has been modified to VHC 40.4 where the understorey is well maintained and retains the mapped VHC 13.2 where the canopy becomes slightly denser.

The VHC mapping has, therefore, been modified to reflect the on-ground conditions more accurately, and to reflect the post-development state of the subject site and locality (see Figure 8). As spatially indicated in Figure 8, the modified VHCs have been restricted to a 150 m buffer from the subject site, as the more distant areas are not relevant for the purposes of this Bushfire Hazard Assessment.

Plates 1 to 8 below show the various areas and communities existing across the site and throughout the assessment area.



Plate 1. View from entrance area through to the proposed development area.



Plate 2. View north-west to the intersection of Bellmere Road and Old North Road from the roadside parking area which is also the entrance into the subject site.



Plate 3. Non remnant vegetation in the vicinity of the proposed development area, largely *Acacia spp*. Assigned VHC 13.2.



Plate 4. Alternate view of the non-remnant vegetation in the vicinity of the proposed development area.



Plate 5. South-east of the proposed development (VHC 40.4 and VHC 13.1).



Plate 6. South-west of the proposed development (VHC 40.4 and VHC 13.1).



Plate 7. North-west of the proposed development, north of Old North Road, maintained understorey (VHCs 40.4 and 13.2).



Plate 8. North-east of the proposed development, north of Bellmere Road (VHC 40.4).

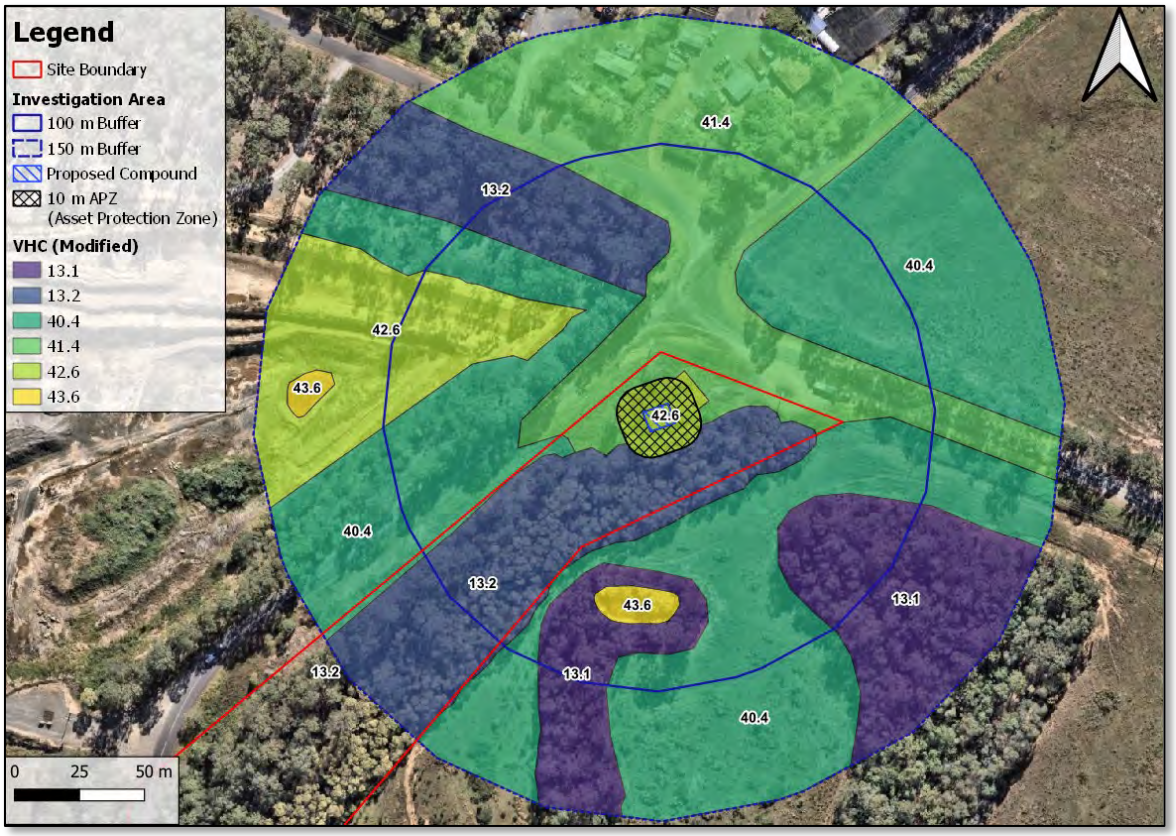


Figure 8. Ground-truthed and Post-development Vegetation Hazard Classes

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 * Total (t/ha)
13.1	Dry to moist eucalypt open forests on undulating metamorphics and granite	Continuous	21.8
13.2	Dry to moist eucalypt woodlands on undulating metamorphics and granite	Continuous	14.4
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
43.6	Water bodies or very low vegetation cover	Discontinuous	0

*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.

4.1.4 Modification of Potential Intensity of Small Patches and Corridors

Following the rasterization of the continuous VHCs as outlined above (i.e., VHC 13.1, 13.2 and 40.4), S5 Environmental have investigated the application of the processing stages described in Table 3, and determined that in this instance, they do not apply to the development footprint and assessment area. Refer to Figure 9 to 12, which illustrate the processing stages. Although corridors are created through this process as shown on Figure 11, their connectivity with continuous fuel has seen this connection reinstated as shown on Figure 12.



Figure 9. Shrinking of patches of continuous fuel at the interface with non-continuous fuel

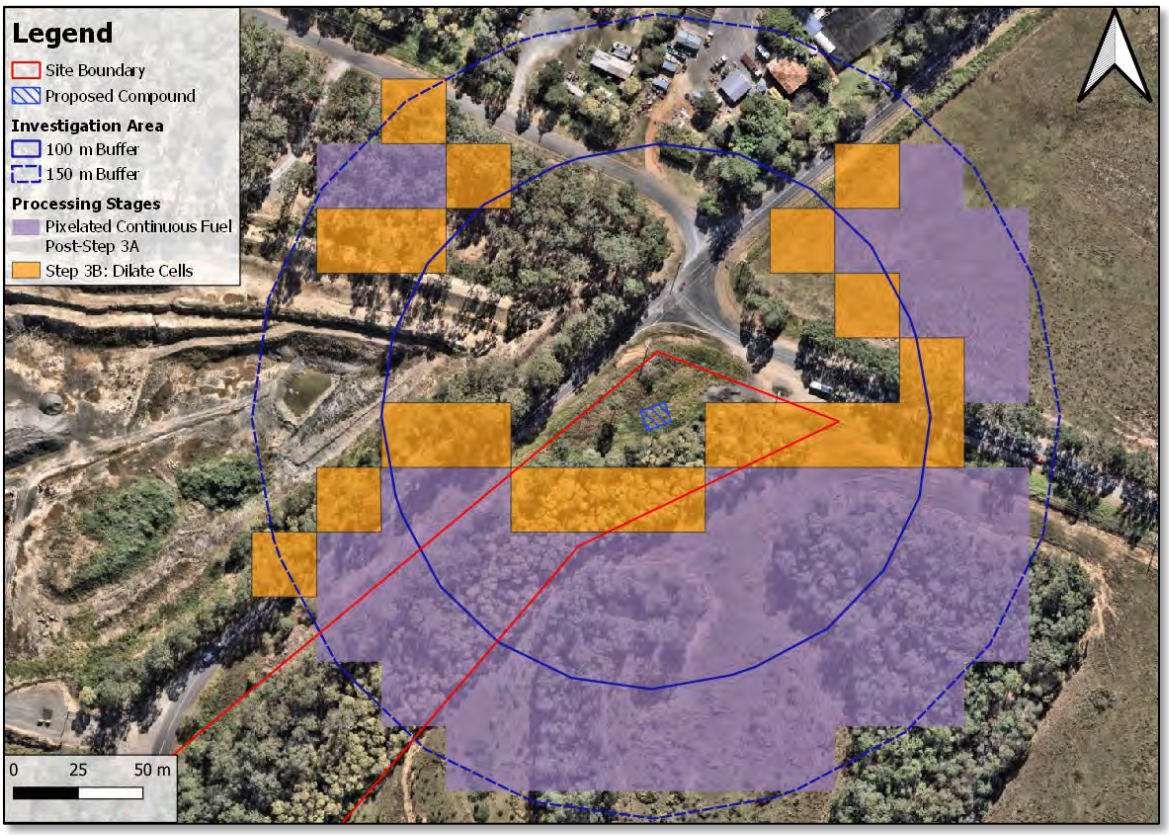


Figure 10. Step 3b – Dilation of residual continuous fuel patches



Figure 11. Finalised pixelated hazardous vegetation within the assessment area



Figure 12. 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 was determined to be slightly downslope, with steeper downslopes related to the vegetation to the west and south (refer Figure 13).

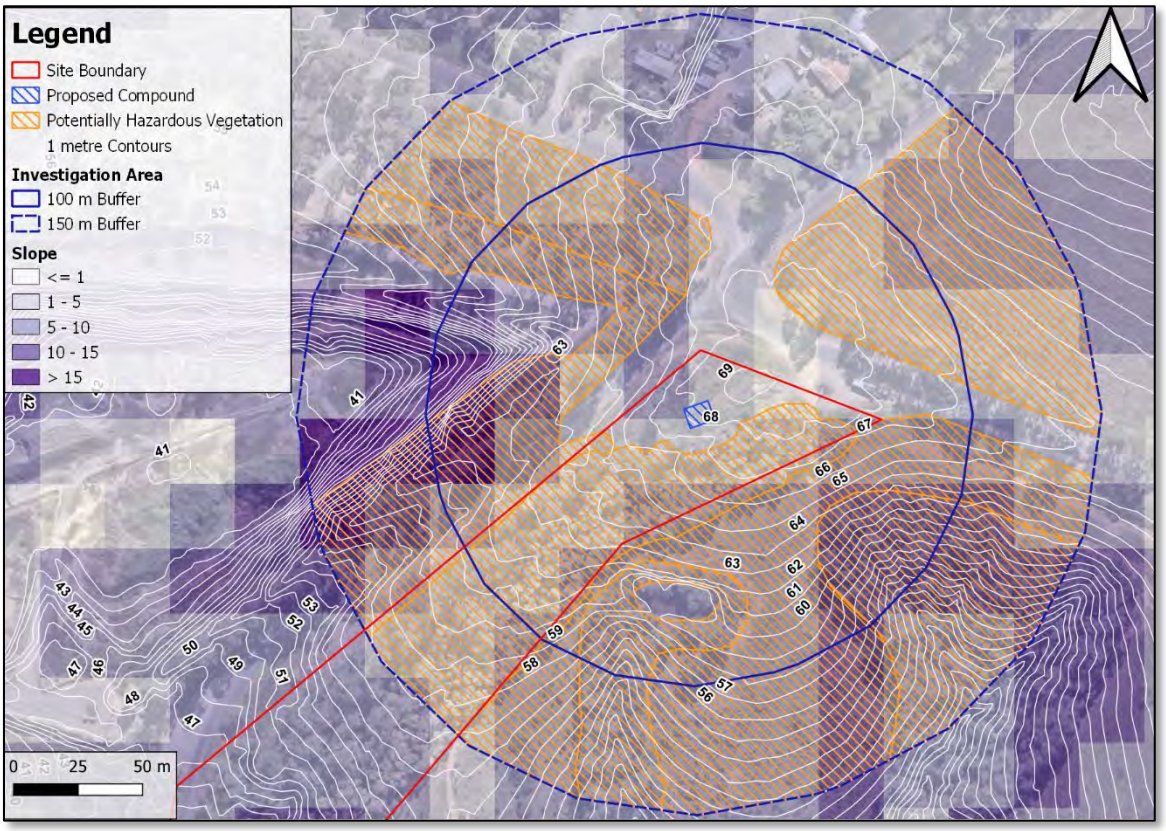


Figure 13. Slope within and in Proximity to the Proposed Development

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

4.1.7 Final PFLI

A final PFLI for patches of hazardous vegetation (determined in Section 4.1) has been calculated using the PFLI equation in Section 3.1. Based on this PFLI calculation, patches of vegetation to the north and south were mapped to contain areas of medium potential bushfire intensity (i.e., 4,000 – 20,000 kW/m), associated with VHC 13.2. Patches of vegetation associated with VHC 13.1 to the south were mapped to as high potential bushfire intensity (20,000 – 40,000 kW/m), and areas of vegetation mapped as VHC 40.4 have been mapped to contain low potential bushfire intensity (< 4,000 kW/m) and therefore, are not considered to be hazardous vegetation (see Section 4.2). Refer to Figure 14.

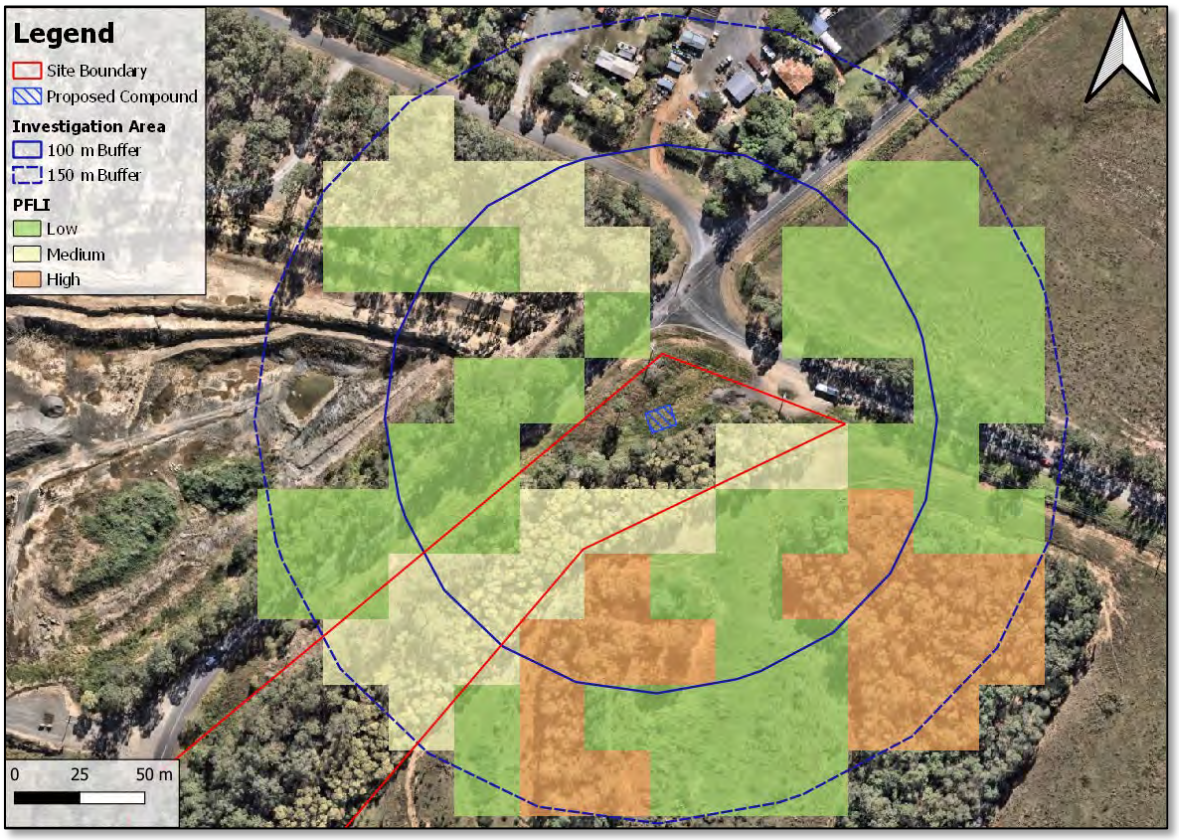


Figure 14. Potential Fire Line Intensity

4.2 Hazardous Vegetation

Vegetation mapped as VHC 13.2 to the north and south, and small patches of VHC 13.1 to the south-east and south-west of the proposed development, were determined to be the hazardous vegetation within the assessment area (refer to Figure 15). The patches of VHC 40.4 are of low potential fire line intensity and are therefore excluded from further assessment. As the hazardous vegetation is within 100 m of the proposed compound, the proposed telecommunication compound and pole are therefore within a Bushfire Prone Area. As such, a radiant heat exposure assessment has been conducted to determine the radiant heat flux the compound and pole may be exposed to.



Figure 15. Hazardous Vegetation

5.0 RADIANT HEAT EXPOSURE ASSESSMENT

This radiant heat exposure 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, south-west and south-east of the development area (refer to Figure 14). A Method 2 assessment in accordance with AS3959-2018 utilising the online Flamesol Minimum Distance Calculator was undertaken to determine the required setbacks (see Table 7 and Figure 16 and 17). The two patches of VHC 9.1 to the south-west (*patch 2*) and south-east (*patch 2*) of the patch of VHC 9.2 immediately adjacent to the proposed compound area, were also assessed for setbacks despite being separated by hazardous vegetation, due to their slope and higher fuel loads and subsequently greater setbacks. 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)	Equivalent Bushfire Attack Level (BAL)	Distance from Hazardous Vegetation				
		North	South-West	South-West Patch 2	South-East	South-East Patch 2
10	-	32.8 m	35.8 m	68 m	33.7 m	73.5 m
12.5	12.5	27.4 m	30 m	59.3 m	28.2 m	64.4 m
19	19	19.1 m	21 m	44.9 m	19.7 m	49.2 m
29	29	12.9 m	14.2 m	32.9 m	13.3 m	36.5 m
40	40	9.5 m	10.4 m	25.4 m	9.8 m	28.4 m
> 40	FZ	< 9.5 m	< 10.4 m	< 25.4 m	< 9.8 m	< 28.4 m

Based on the results of the radiant heat exposure assessment, the proposed telecommunication development, as assessed with a 10 m Asset Protection Zone surrounding the compound, will potentially be exposed to a radiant heat flux of greater than 40 kW/m^2 (equivalent to BAL-FZ) along its southern boundary. The tower and equipment shelter have been assessed as having an exposure of 40 kW/m^2 (equivalent to BAL-40). Accordingly, a Bushfire Management Plan has been prepared and presented in Section 6.0.

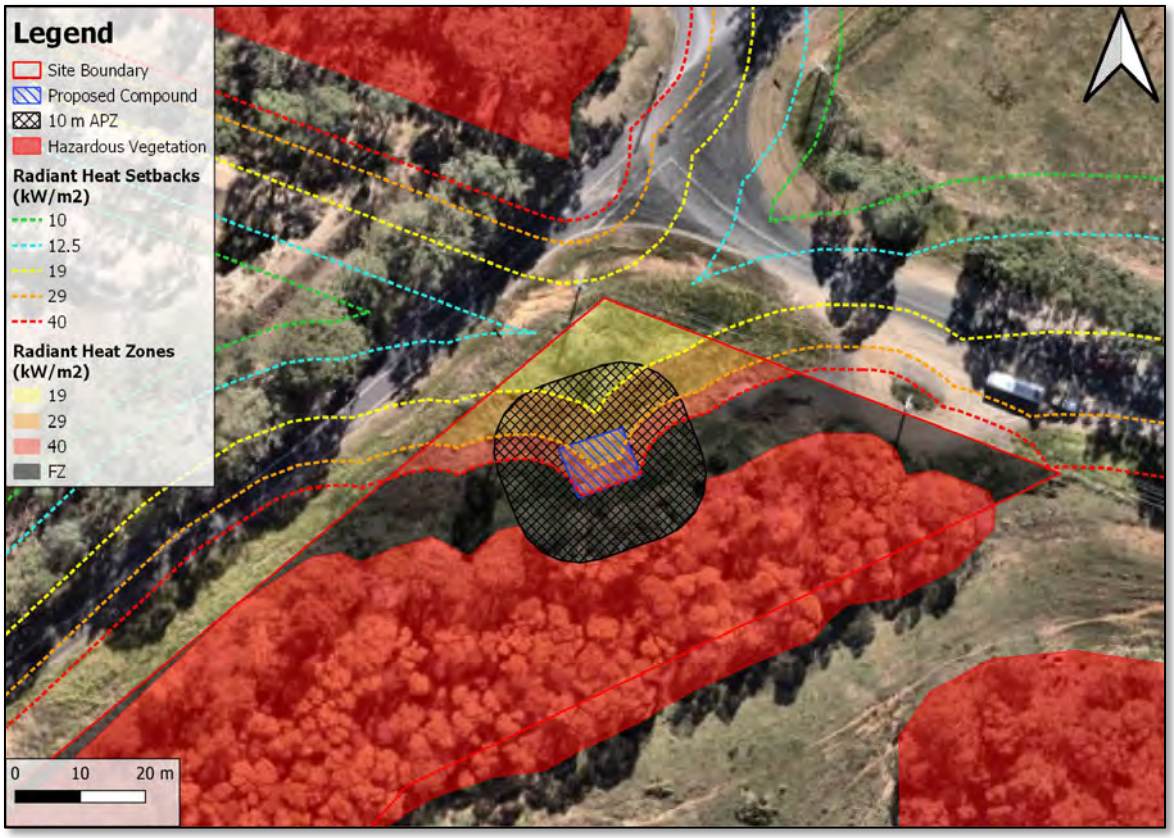


Figure 16. Radiant Heat Flux Setbacks

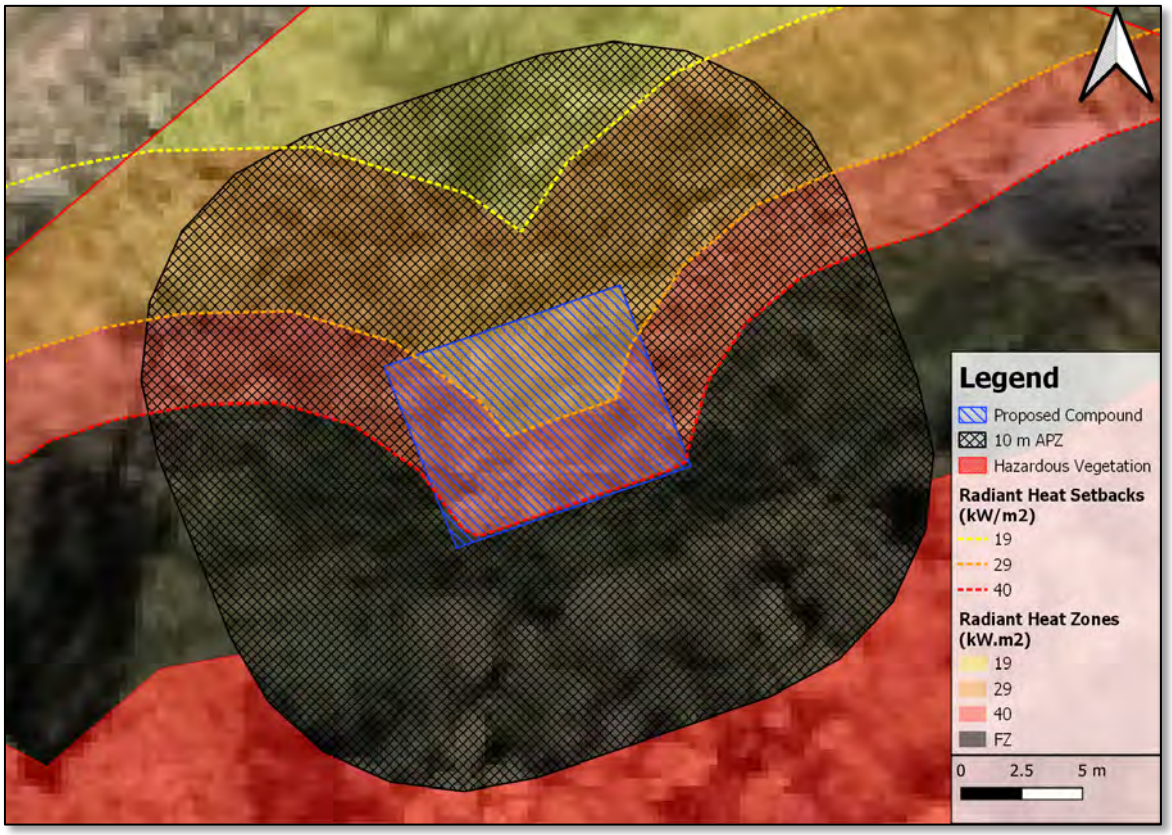


Figure 17. Radiant Heat Flux Setbacks - Compound

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 18, below.

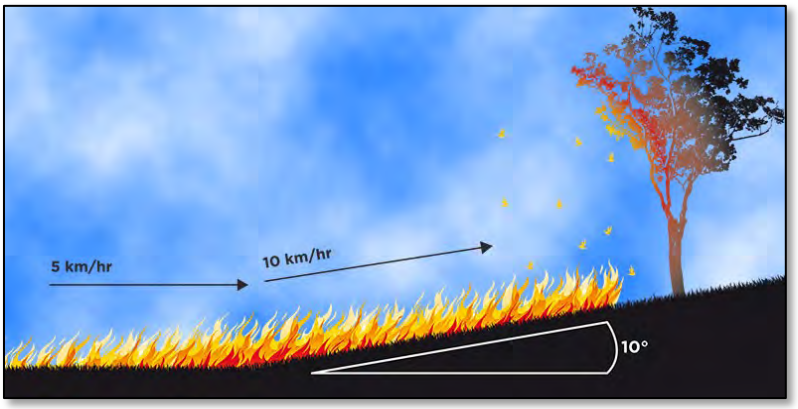


Figure 18. Effects of Topography on Bushfire (source: Country Fire Authority)

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.

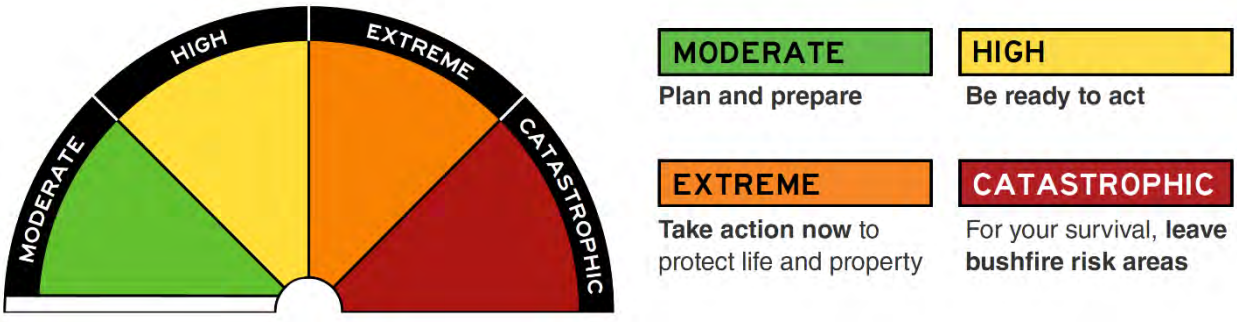


Figure 19. Australian Fire Danger Rating System (source: AFAC, 2025)

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 20. 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 21. 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 development will be directly off Bellmere Road to the east via a roadside parking area. In line with Section 6.3.5. Access into the site and in front of any gates or access points should be maintained as a clearway at all times.

Siting of Development

The proposed development when assessed with a 10 m Asset Protection Zone, is situated within an area of Low Potential Fire Line Intensity (i.e., > 4,000 kW/m). The southern boundary of the compound will be exposed to a radiant heat flux of greater 40 kW/m^2, and the pole and equipment shelter, a maximum radiant heat flux of 40 kW/m^2. Setbacks were modelled utilising the Flamesol Minimum Distance Calculator (refer to Appendix B). The siting of the development is unlikely to expose the proposed development to an unacceptable level of bushfire risk, given its non-habitable nature.

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.

As this development is for telecommunications infrastructure, habitable structures (i.e., Class 1, 2, 3) are not proposed. The equipment shelter is building class 10(a).

S5 Environmental understand that the proposed development will be constructed out of materials which are highly resistant to bushfire exposure with the shelter and pole both designed to a fire resistance level of BAL-FZ, details regarding these construction materials and rating have been provided by CPS Technology & Infrastructure Pty Ltd and are attached as Appendix D.

6.3.3 Firefighting Infrastructure

The subject site is not expected to be connected to a reticulated water supply network which is expected to be in compliance with the provisions outlined in the SEQ Water Supply, Sewage Design and Construction Code and CMB requirements, as applicable to the type of development.

6.3.4 Bushfire Emergency

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

The Rocksberg Moorina Rural Fire Brigade is located approximately 5.5 km (by road) to the south of the subject site. The contact details for the Rocksberg Moorina Rural Fire Brigade are:

- Address: 1026 Caboolture River Road, Moorina QLD 4506
- Phone: 0497 833 421

The Caboolture Fire and Rescue Station is located approximately 12.1 km (by road) to the east of the subject site. The contact details for the Caboolture Fire and Rescue Station are:

- Address: 54 Lower King Street, Caboolture QLD 4510
- Phone: (07) 5498 3347

6.3.5 Vegetation Management and Landscaping

Asset Protection Zone (APZ)

As the proposed development is for a telecommunications facility, it is not subject to the same bushfire exposure requirements as habitable structures. However, being a telecommunication facility, it is considered essential infrastructure and therefore, should be designed in to ensure communication capabilities are not compromised during bush fire emergencies. S5 Environmental understand that the materials the equipment shelter and tower/pole are to be constructed out of are highly flame, ember and radiant heat resistant, and are designed and rated to withstand BAL FZ exposure which will aid in the preservation of the facility in a bushfire event.

An Asset Protection Zone (APZ) is recommended to reduce the potential bushfire risk to the proposed facility. The NSW Rural Fire Service (NSW, 2012 and 2019a) have provided guidance on bushfire mitigation measures for telecommunication facilitates and infrastructure projects of the like, recommending a minimum APZ of 10 metres around infrastructure that supports telecommunication services (excluding road access, power to the site and fencing). The radiant heat assessment has considered the APZ in calculations. Note that the APZ does not further improve the radiant heat the facility will be exposed to, to improve radiant heat exposure, additional vegetation would be required.

The APZ should be maintained in a surface fuel and elevated fuel-free state with minimal canopy cover, commensurate with an inner-protection zone (IPZ) and and free from surface and elevated fuel loads. The APZ has been illustrated below in Figure 22. This will create a defendable space and minimise the direct flame contact and radiant heat exposure the proposed development will be exposed to. General recommendations for the proposed APZ area:

- Contains a maximum of canopy cover of 15%;
- Canopy between individual trees should be separated by a minimum of 2 to 5 m;
- Mature trees should not touch or overhang the infrastructure;
- Lower limbs of any trees with in the APZ, up to 2 m from the ground, must be removed;
- Preference given to smooth barked and evergreen trees;
- No mid-storey vegetation (shrubs etc);
- Ground cover and grasses should be maintained to no more than 10 cm in height; and
- Dry fuel, Leaves and debris should be monitored and removed on a regular basis.

Approximately 14 trees (trees 3, 9 – 13 and 30 - 35) are located within the APZ and must be selectively cleared to meet the recommendations for an APZ (refer to S525006_VMP_001-007(B)). Management of additional trees outside the APZ that overhang infrastructure must also be considered.

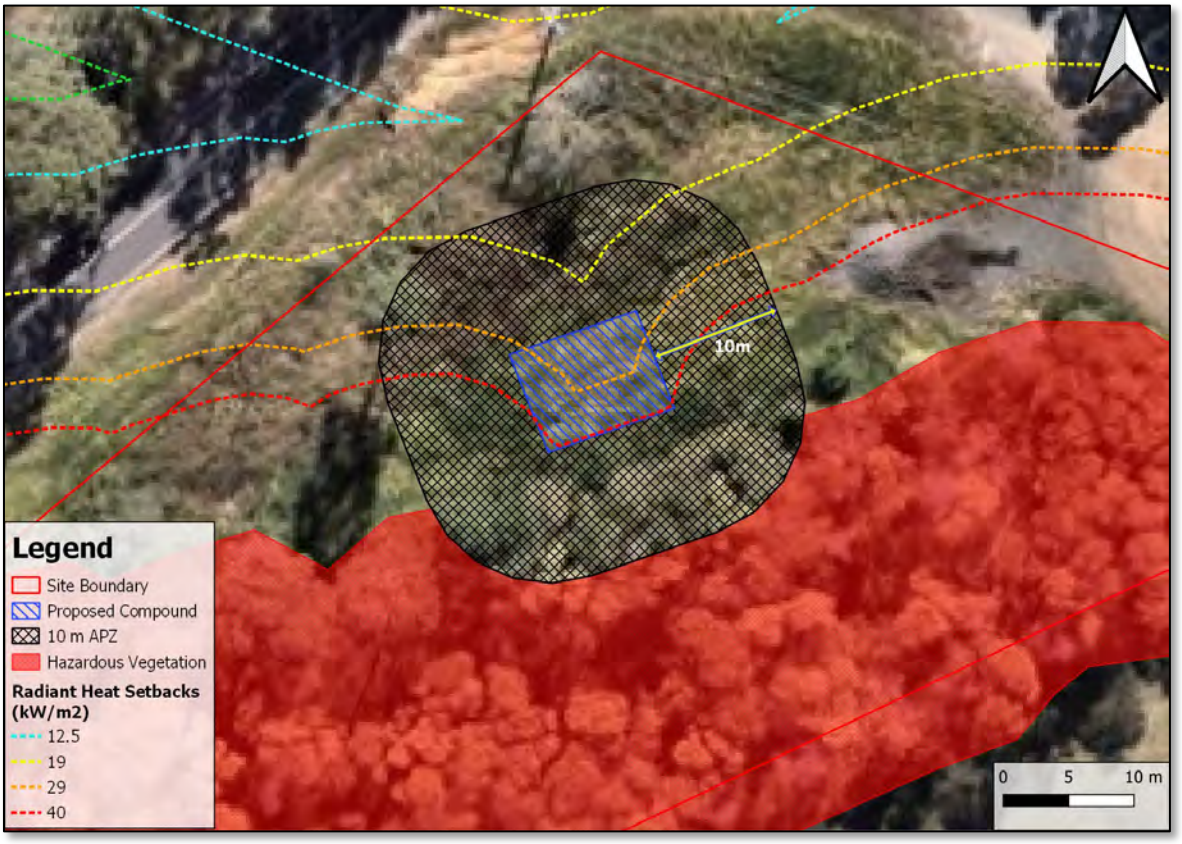


Figure 22. Proposed Asset Protection Zone

Fencing

Fencing associated with the development of the telecommunications tower, is to be constructed using non-flammable materials. Dependent on type of fencing utilised and its location, fencing may assist in further protecting infrastructure from ember attack, flames and radiant heat.

7.0 CONCLUSION

This Bushfire Hazard Assessment concluded that the proposed development will be located within an area of Low PFLI (i.e., < 4,000 kW/m) when assessed with a 10m Asset Protection Zone around the proposed compound. It is however, located within 100 m of potentially hazardous vegetation to the north, west and south. The AS3959-2018 Method 2 radiant heat flux exposure assessment determined that the proposed development will be exposed to a radiant heat flux of greater than 40 kW/m^2 and the pole and infrastructure shelter being exposed to a maximum radiant heat flux of 40 kW/m^2.

Whilst it is acknowledged that the proposed telecommunications facility is not subject to the same bushfire requirements as habitable structures, telecommunication sites are considered essential infrastructure which should not be compromised in the event of a bushfire. S5 Environmental have prepared a site-specific Bushfire Management Plan to support the development application for the proposed telecommunications facility and recommend specific bushfire mitigation measures such as a 10 m APZ, and the utilisation of highly flame-resistant construction materials to ensure the risks to people, infrastructure and property is acceptable and minimised.

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

8.0 REFERENCES

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APPENDIX A

CMB Bushfire Hazard Code Response

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS
Green Network Precinct Requirements for Assessment - Bushfire Hazard - ***Requirements for Accepted Development*** *Note - For the purposes of section 12 of the Building Regulation 2006, land identified as very high potential bushfire intensity, high potential bushfire intensity, medium potential bushfire intensity or potential impact buffer on the Bushfire hazard area overlay map is the 'designated bushfire hazard area'. AS 3959-2009 Construction of buildings in bushfire hazard area applies within these areas.* *Note - The bushfire hazard area provisions do not apply where a development envelope recognising and responding to this constraint has been identified and approved by Council as part of a reconfiguration of lot, development approval or approved Bush Fire Management Plan in this and previous planning schemes.* https://eplan.moretonbay.qld.gov.au/planningscheme/rules/0/159/0/0/87		
RAD 47	Building and structures have contained within the site: a) A separation from classified vegetation of 20m or the distance required to achieve a bushfire attack level (BAL) at the building, roofed structure or fire fighting water supply of no more than 29, whichever is the greater; b) A separation from low threat vegetation of 10m or the distance required to achieve a bushfire attack level (BAL) at the building, roof structure or fire fighting water supply of no more than 29, whichever is the greater; c) A separation of no less than 10m between a fire fighting water supply extraction point and any classified vegetation, buildings and other roofed structures; d) An area suitable for a standard fire fighting appliance to stand within 3m of a fire fighting water supply extraction point; and e) An access path suitable for use by a standard fire fighting appliance having a formed width of at least 4m, a cross-fall of no greater than 5%, and a longitudinal gradient of no greater than 25%; i. to, and around, each building and other roofed structures; and ii. to each fire fighting water supply extraction point. Note - The meaning of the terms classified vegetation and low threat vegetation as well as the method of calculating the bushfire attack level are as described in Australian Standard AS3959.	The proposed infrastructure has been designed to a BAL-FZ fire resistance rating (refer to Appendix D). With a 10 m APZ, the pole and equipment shelter will achieve a setback where it may be exposed to a radiant heat exposure of 40 kW/m^2. The developer is to ensure the access and water supply requirements are met as part of the design process.
RAD 48	The length of driveway:	The developer is to ensure the access requirements are met as part of the design process.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS
	a) To a public road does not exceed 100m between the most distant part of a building used for any purpose other than storage and the nearest part of a public road; b) Has a maximum gradient no greater than 12.5%; c) Have a minimum width of 3.5m; d) Accommodate turning areas for fire fighting appliances in accordance with Qld Fire and Emergency Services' Fire Hydrant and Vehicle Access Guideline.	
RAD 49	a) A reticulated water supply is provided by a distributer retailer for the area or, where not connected to a reticulated water supply, on-site fire fighting water storage containing not less than 10,000 litres (tanks with fire brigade tank fittings, swimming pools) is provided and located within 10m of buildings and structures. b) Where a swimming pool is the nominated on-site fire fighting water storage source, vehicle access to within 3m of that water storage source is provided. c) Where a tank is the nominated on-site fire fighting water storage source, it includes: i. a hardstand area allowing medium rigid vehicle (15 tonne fire appliance) access within 6m of the tank; ii. fire brigade tank fittings, comprising 50mm ball valve and male camlock coupling and, if underground, an access hole of 20mm (minimum) to accommodate suction lines.	The developer is to ensure the water supply requirements are met as part of the design process.
RAD 50	d) Development does not involve the manufacture or storage of hazardous chemicals.	Complies. Development does not involve the manufacture or storage of hazardous chemicals.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS
Green Network Precinct Bushfire Hazard https://eplan.moretonbay.qld.gov.au/planningscheme/rules/0/159/0/0/87		
PO60 Development: a. Minimises the number of buildings and people working and living on a site exposed to bushfire risk; b. Ensures the protection of life during the passage of a fire front; c. Is located and designed to increase the chance of survival of buildings and structures during a bushfire; d. Minimises bushfire risk from build up of fuels around buildings and structures.	E60 Buildings and structures have contained within the site: a. A separation from classified vegetation of 20m or the distance required to achieve a bushfire attack level (BAL) at the building, roofed structure or fire fighting water supply of no more than 29, whichever is the greater; b. A separation from low threat vegetation of 10m or the distance required to achieve a bushfire attack level (BAL) at the building, roofed structure or fire fighting water supply of no more than 29, whichever is the greater; c. A separation of no less than 10m between a fire fighting water supply extraction point and any classified vegetation, buildings and other roofed structures; d. An area suitable for a standard fire fighting appliance to stand within 3m of a fire fighting water supply extraction point; and e. An access path suitable for use by a standard fire fighting appliance having a formed width of at least 4m, a cross-fall of no greater than 5%, and a longitudinal gradient of no greater than 25%: i. to, and around, each building and other roofed structure; and ii. to each fire fighting water supply extraction point. Note - The meaning of the terms classified vegetation and low threat vegetation as well as the method of calculating the bushfire attack level are as described in Australian Standard AS 3959	Complies PO60 a) The development comprises a telecommunications pole and equipment shelter located inside a fenced compound, permanent on-site personnel do not form part of the operation of the facility. b & c): A site-specific Bushfire Hazard Assessment and Bushfire Management Plan has been undertaken for the proposed development. Access and egress onto Bellmere road to the north-east provides direct and clear access to the compound (*approximately 43 m between the road and compound*). For emergency services and personnel that may be working at the facility. The location is adjacent to the intersection with Old North Road and allows for movement in multiple directions. d) A 10 m Asset Protection Zone has been prescribed around the fenced compound as part of the BMP and is required to be maintained in a very low fuel state in perpetuity. Where applicable it is recommended that hydrant infrastructure and access complies with QFD '*Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots*'.
PO61	E61 A length of driveway:	Complies PO61

Development and associated driveways and access ways: a. Avoid potential for entrapment during a bushfire; b. Ensure safe and effective access for emergency services during a bushfire; c. Enable safe evacuation for occupants of a site during a bushfire.	a. To a road does not exceed 100m between the most distant part of a building used for any purpose other than storage and the nearest part of a public road; b. Has a maximum gradient no greater than 12.5%; c. Have a minimum width of 3.5m; d. Accommodate turning areas for fire fighting appliances in accordance with *Qld Fire and Emergency Services' Fire Hydrant and Vehicle Access Guideline*.	The development comprises a telecommunications pole and equipment shelter located inside a fenced compound, permanent on-site personnel do not form part of the operation of the facility. Access and egress onto Bellmere road to the north-east provides direct and clear access to the compound (*approximately 43 m between the road and compound*). For emergency services and personnel that may be working at the facility. The location is adjacent to the intersection with Old North Road and allows for movement in multiple directions. Refer to Town Planner or Engineer: Where applicable it is recommended that driveways and access comply with QFD '*Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots*'.
PO62 Development provides adequate water supply for fire-fighting purposes.	E62 a. A reticulated water supply is provided by a distributer retailer for the area or, where not connected to a reticulated water supply, on-site fire fighting water storage containing not less than 10,000 litres (tanks with fire brigade tank fittings, swimming pools) is provided and located within 10 m of buildings and structures; b. Where not connected to a reticulated water supply or a pressure and flow stated above is not available, on-site fire fighting water storage containing not less than 10,000 litres (tanks with fire brigade tank fittings, swimming pools) is located within 10m of buildings and structures. c. Where a swimming pool is the nominated on-site fire fighting water storage source, vehicle access is provided to within 3m of that water storage source. d. Where a tank is the nominated on-site fire fighting water storage source, it includes: i. a hardstand area allowing medium rigid vehicles (15 tonne fire appliance) access within 6m of the tank;	Developer to ensure the proposed development complies with Council requirements.

	ii. fire brigade tank fittings, comprising 50mm ball valve and male camlock coupling and, if underground, an access hole of 200mm (minimum) to accommodate suction lines.	
PO63 Development: a. Does not present unacceptable risk to people or environment due to the impact of bushfire on dangerous goods or combustible liquids; b. Does not present danger or difficulty to emergency services for emergency response or evacuation. Editor's note - Unacceptable risk is defined as a situation where people or property are exposed to a predictable hazard event that may result in serious injury, loss of life, failure of community infrastructure, or property damage.	E63 Development does not involve the manufacture or storage of hazardous chemicals.	Complies. Development does not involve the manufacture or storage of hazardous chemicals.

APPENDIX B

Flamesol Inputs and Outputs

Summary of Input Parameters for Hazardous Vegetation to the North

Parameter	Input	Note
FFDI	55	Source: QFD MapViewer.
Surface Fuel Load	12.8 t/ha	Surface and Near Surface Fuel Load – QFD VHC 9.2
Overall Fuel Load	14.4 t/ha	Total Fuel Load – QFD VHC 9.2
Effective Slope	1.58°	Slope under the hazardous vegetation is downslope.
Site Slope	1.36°	Downslope between the proposed development and hazardous vegetation.
Flame Temperature	1,200 K	Standard input in accordance with the BRC.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

FLAMESOL
FPA AUSTRALIA

Calculated October 22, 2025, 2:40 pm (MDc v.4.9)

S525006 - North

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	55	Rate of spread	0.9399999999999999 km/h
Vegetation Classification	Forest	Flame length	7.85 m
Understorey fuel load	12.8 t/ha	Flame angle	67.36 °, 73.36 °, 79.36 °, 82.36 °, 83.36 ° & 86.36 °
Total fuel load	14.4 t/ha	Elevation of receiver	3.39 m, 3.45 m, 3.4 m, 3.24 m, 3.12 m & 1.96 m
Vegetation height	n/a	Fire intensity	7,009 kW/m
Effective slope	1.58 °	Transmissivity	0.877, 0.864, 0.843, 0.821, 0.8080000000000001 & 0.745
Site slope	1.36 °	Viewfactor	0.4046, 0.2983, 0.2008, 0.1358, 0.1103 & 0.0299
Flame width	100 m	Minimum distance to < 40 kW/m²	9.5 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	12.9 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	27.4 m
		Minimum distance to < 10 kW/m²	32.8 m

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

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

Parameter	Input	Note
FFDI	55	Source: QFD MapViewer.
Surface Fuel Load	12.8 t/ha	Surface and Near Surface Fuel Load – QFD VHC 9.2
Overall Fuel Load	14.4 t/ha	Total Fuel Load – QFD VHC 9.2
Effective Slope	3.82°	Slope under the hazardous vegetation is downslope.
Site Slope	5.73°	Downslope between the proposed development and hazardous vegetation.
Flame Temperature	1,200 K	Standard input in accordance with the BRC.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

FLAMESOL
FPA AUSTRALIA

Calculated October 23, 2025, 4:05 pm (MDc v.4.9)

S525006 - South-West

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	55	Rate of spread	1.09 km/h
Vegetation Classification	Forest	Flame length	8.869999999999999 m
Understorey fuel load	12.8 t/ha	Flame angle	70.73 °, 77.73 °, 82.73 °, 85.73 °, 86.73 ° & 90.73 °
Total fuel load	14.4 t/ha	Elevation of receiver	3.13 m, 2.9 m, 2.29 m, 1.41 m, 0.83 m & 0 m
Vegetation height	n/a	Fire intensity	8,180 kW/m
Effective slope	3.82 °	Transmissivity	0.874, 0.859, 0.837, 0.8139999999999999, 0.802 & 0.741
Site slope	5.73 °	Viewfactor	0.4072, 0.3003, 0.2028, 0.1373, 0.1115 & 0.0301
Flame width	100 m	Minimum distance to < 40 kW/m²	10.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	14.2 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	21 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	30 m
		Minimum distance to < 10 kW/m²	35.8 m

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

Summary of Input Parameters for Hazardous Vegetation to the South-West Patch 2

Parameter	Input	Note
FFDI	55	Source: QFD MapViewer.
Surface Fuel Load	19.4 t/ha	Surface and Near Surface Fuel Load – QFD VHC 9.1
Overall Fuel Load	21.8 t/ha	Total Fuel Load – QFD VHC 9.1
Effective Slope	12.51°	Slope under the hazardous vegetation is downslope.
Site Slope	1°	Minimum site slope utilised.
Flame Temperature	1,200 K	Standard input in accordance with the BRC.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

FLAMESOL
FPA AUSTRALIA

Calculated October 22, 2025, 3:19 pm (MDc v 4.9)

S525006 - South-West Patch 2

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	55	Rate of spread	3.03 km/h
Vegetation Classification	Forest	Flame length	22.34 m
Understorey fuel load	19.4 t/ha	Flame angle	63 °, 68 °, 72 °, 75 °, 77 ° & 83 °
Total fuel load	21.8 t/ha	Elevation of receiver	9.51 m, 9.779999999999999 m, 9.84 m, 9.75 m, 9.69 m & 8.56 m
Vegetation height	n/a	Fire intensity	34,189 kW/m
Effective slope	12.51 °	Transmissivity	0.838, 0.8159999999999999, 0.791, 0.769, 0.76 & 0.706
Site slope	1 °	Viewfactor	0.4253, 0.3171, 0.2147, 0.145, 0.1176 & 0.0316
Flame width	100 m	Minimum distance to < 40 kW/m²	25.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	32.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	44.9 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	59.3 m
		Minimum distance to < 10 kW/m²	68 m

Flamesol Calculator Outputs for Required Setbacks from Hazardous Vegetation to the South-West Patch 2

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

Parameter	Input	Note
FFDI	55	Source: QFD MapViewer.
Surface Fuel Load	12.8 t/ha	Surface and Near Surface Fuel Load – QFD VHC 9.2
Overall Fuel Load	14.4 t/ha	Total Fuel Load – QFD VHC 9.2
Effective Slope	2.2°	Slope under the hazardous vegetation is downslope.
Site Slope	1°	Minimum site slope utilised.
Flame Temperature	1,200 K	Standard input in accordance with the BRC.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

FLAMESOL
FPA AUSTRALIA

Calculated October 22, 2025, 2:42 pm (MDc v.4.9)

S525006 - South-East

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	55	Rate of spread	0.98 km/h
Vegetation Classification	Forest	Flame length	8.109999999999999 m
Understorey fuel load	12.8 t/ha	Flame angle	67 °, 73 °, 78 °, 82 °, 83 ° & 86 °
Total fuel load	14.4 t/ha	Elevation of receiver	3.56 m, 3.64 m, 3.62 m, 3.52 m, 3.44 m & 2.58 m
Vegetation height	n/a	Fire intensity	7,315 kW/m
Effective slope	2.2 °	Transmissivity	0.876, 0.863, 0.842, 0.819, 0.806 & 0.744
Site slope	1 °	Viewfactor	0.4066, 0.2996, 0.2012, 0.136, 0.1105 & 0.0299
Flame width	100 m	Minimum distance to < 40 kW/m²	9.800000000000001 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	13.3 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	19.7 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	28.2 m
		Minimum distance to < 10 kW/m²	33.7 m

Flamesol Calculator Outputs for Required Setbacks from Hazardous Vegetation to the South-East

Summary of Input Parameters for Hazardous Vegetation to the South-East Patch 2

Parameter	Input	Note
FFDI	55	Source: QFD MapViewer.
Surface Fuel Load	19.4 t/ha	Surface and Near Surface Fuel Load – QFD VHC 9.1
Overall Fuel Load	21.8 t/ha	Total Fuel Load – QFD VHC 9.1
Effective Slope	14.49°	Slope under the hazardous vegetation is downslope.
Site Slope	1°	
Flame Temperature	1,200 K	Standard input in accordance with the BRC.
Flame Width	100 m	Standard input, in accordance with AS 3959-2018.

FLAMESOL
FPA AUSTRALIA

Calculated October 22, 2025, 2:43 pm (MDc v 4.9)

S525006 - South-East Patch 2

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	55	Rate of spread	3.47 km/h
Vegetation Classification	Forest	Flame length	25.23 m
Understorey fuel load	19.4 t/ha	Flame angle	61 °, 66 °, 70 °, 73 °, 75 ° & 81 °
Total fuel load	21.8 t/ha	Elevation of receiver	11.03 m, 11.52 m, 11.85 m, 12.06 m, 12.18 m & 12.46 m
Vegetation height	n/a	Fire intensity	39,194 kW/m
Effective slope	14.49 °	Transmissivity	0.832, 0.8100000000000001, 0.785, 0.764, 0.755 & 0.701
Site slope	0 °	Viewfactor	0.429, 0.3195, 0.2164, 0.1459, 0.1184 & 0.0318
Flame width	100 m	Minimum distance to < 40 kW/m²	28.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	36.5 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	49.2 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	64.40000000000001 m
		Minimum distance to < 10 kW/m²	73.5 m

Flamesol Calculator Outputs for Required Setbacks from Hazardous Vegetation to the South-East Patch 2

APPENDIX C

Slope Calculations

Project: 569 - 605 Old North Road, Corymbia
Number: S525006

S5 ENVIRONMENTAL

BUSHFIRE SLOPE CALCULATOR

North

Effective Slope					Site Slope				
Direction	Downslope				Direction	Downslope			
Top Elevation	67	m			Top Elevation	68	m		
Bottom Elevation	66	m	Slope %	2.75%	Bottom Elevation	67	m	Slope %	2.38%
Distance	36.3	m	**Slope (°)**	**1.58**	Distance	42.1	m	**Slope (°)**	**1.36**

South-West

Effective Slope					Site Slope				
Direction	Downslope				Direction	Downslope			
Top Elevation	67	m			Top Elevation	68	m		
Bottom Elevation	61	m	Slope %	6.66%	Bottom Elevation	67	m	Slope %	10.00%
Distance	90.1	m	**Slope (°)**	**3.82**	Distance	10	m	**Slope (°)**	**5.73**

South-West Patch 2

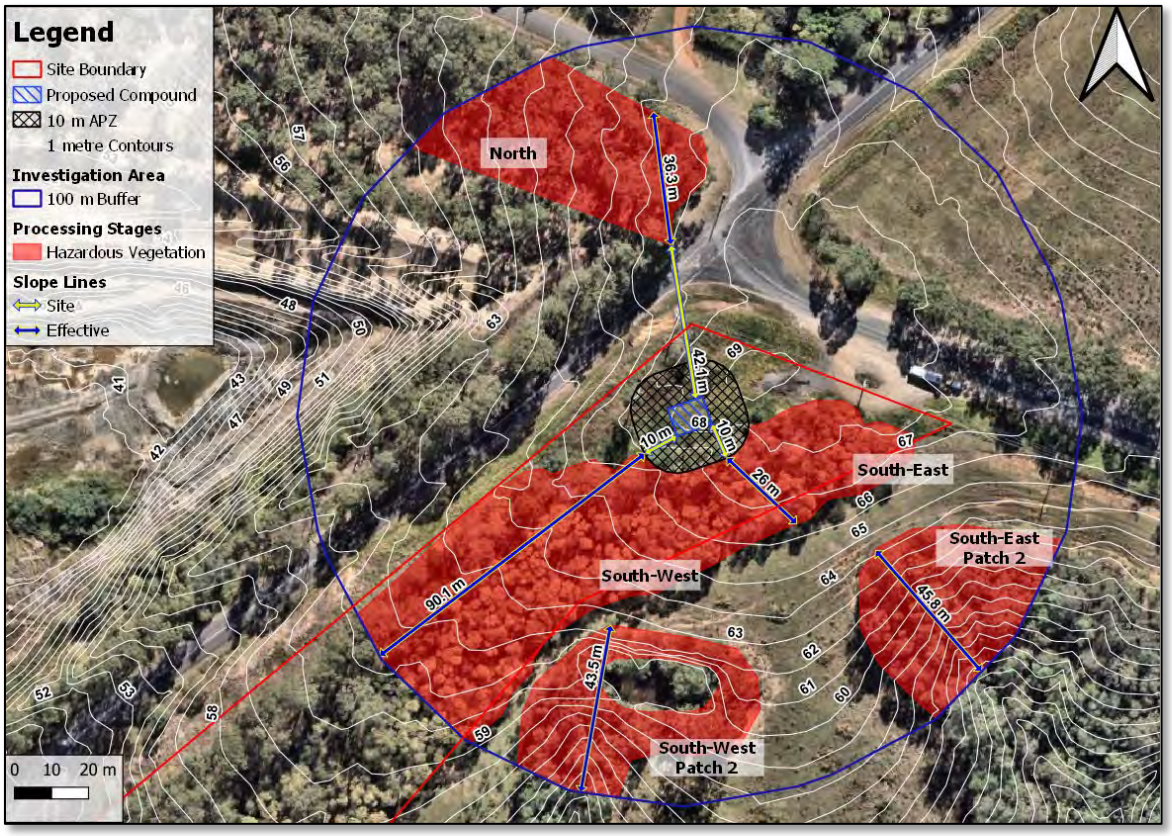
Effective Slope				
Direction	Downslope			
Top Elevation	62	m		
Bottom Elevation	52	m	Slope %	21.83%
Distance	45.8	m	**Slope (°)**	**12.51**

South-East

Effective Slope					Site Slope				
Direction	Downslope				Direction	Downslope			
Top Elevation	68	m			Top Elevation	68	m		
Bottom Elevation	67	m	Slope %	3.85%	Bottom Elevation	68	m	Slope %	0.00%
Distance	26	m	**Slope (°)**	**2.20**	Distance	10	m	**Slope (°)**	**0.00**

South-East Patch 2

Effective Slope				
Direction	Downslope			
Top Elevation	64	m		
Bottom Elevation	53	m	Slope %	25.29%
Distance	43.5	m	**Slope (°)**	**14.49**


Legend
Site Boundary
Proposed Compound
10 m APZ
1 metre Contours
Investigation Area
100 m Buffer
Processing Stages
Hazardous Vegetation
Slope Lines
Site
Effective
North
South-East
South-East Patch 2
South-West
South-West Patch 2
36.3m
42.1m
10m
10m
26m
90.1m
43.5m
43.8m
0 10 20 m

APPENDIX D

Rocla Pole and Shelter Information