25 November 2021

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Subject: Bushfire attack level assessment for Montview Estate, Stages 1 and 1a – 254 Barrams Road, White Rock, Queensland

1   Introduction

Land and Environment Consultants Pty Ltd (**LEC**) was engaged to undertake a 'method 2' bushfire attack level (**BAL**) assessment for future residential dwellings at Montview Estate, Stages 1 and 1a (**stages 1 and 1a**) at 254 Barrams Road, White Rock (**the site**), properly described as lot 108/M3174.

The subdivision plan for Montview Estate and stages 1 and 1a is provided at Appendix 1.

The site is identified as a bushfire prone area by the Queensland State Planning Policy *Bushfire prone area map* and is a 'designated bushfire prone area' under Part 3, Section 7 of the Queensland *Building Regulation 2021.* As a result, provisions of the *Building Code of Australia* (**BCA**) (ABCB 2019a and 2019b) and the *Queensland Development Code* (**QDC**) (QG 2021) that apply to a designated bushfire prone area apply to any building assessment work within the site.

Future residential dwellings within stages 1 and 1a will be BCA class 1a buildings. Compliance with the BCA and QDC requires BCA class 1a buildings that are located within a designated bushfire prone area to be designed and constructed in accordance with BAL construction requirements in the *Australian Standard* (**AS 3959-2018**) *Construction of buildings in bushfire prone areas* to reduce the risk of ignition from bushfire.

This report provides a method 2 BAL assessment of future residential dwellings within stages 1 and 1a, identifies sections of AS 3959-2018 which are relevant to their design and construction and provides recommendations for landscaping around buildings.

2   Method

A walkover the site was performed by LEC on 13 July 2021 and involved assessing vegetation hazard classes (**VHC**) and the slope of land within 100 metres (**m**) of the site, including stages 1 and 1a.

Fuel loads for VHCs were taken from *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'* (QFES 2019).

The Fire Protection Association of Australia *BAL calculator version 4.8* (**BAL calculator**) was used to model the method 2 BAL assessment procedure in Appendix B of AS 3959-2018.

Google Earth and the Queensland Globe were used to validate measurements and observations made during the site assessment.

3   Site assessment

Land within 100 m of the northern and eastern elevations of the residential lots within stages 1 and 1a will be a linear park under the Montview Estate development. The linear park will be rehabilitated or allowed to naturally regenerate and will have vegetation which is consistent with the local pre-clearing regional ecosystem mapping. The vegetation in the linear park will correlate with VHC 16.2 *Eucalyptus dominated woodland on drainage lines and alluvial plains* (**VHC 16.2**) when it reaches a mature state. VHC 16.2 is defined as classified vegetation in AS 3959-2018 and is not excluded from the BAL assessment.

Land within 100 m of the southern elevation of stages 1 and 1a is a grassland paddock with grass > 300 millimetres in height. The vegetation correlates with VHC 40.4 *Continuous low grass or tree cover* (**VHC 40.4**) which is defined as classified vegetation in AS 3959-2018 and is not excluded from the BAL assessment.

Vegetation within 100 m of the western elevation of stages 1 and 1a will be cleared for future stages of the Montview Estate development. Land adjoining this elevation will correlate with the exclusion criteria for non-vegetated areas defined in clause 2.2.3.2(e) of AS 3959-2018 and is excluded from the BAL assessment.

Photographs 1-2 show VHC 16.2 which occurs within 100 m of the northern and eastern elevations of stages 1 and 1a and VHC 40.4 which occurs within 100 m of the southern elevation of stages 1 and 1a.

Photograph 1 VHC 16.2 on northern and eastern elevations

Photograph 2 VHC 40.4 on southern elevation

The severe fire weather map in the Queensland Fire and Emergency Services online mapping system indicates the 5% annual exceedance probability forest fire danger index (**FFDI**) for the site ranges from 57-58. We have used the FFDI value of 58 for the BAL assessment as it more accurately reflects the severe weather conditions at the site than the jurisdictional FFDI input for Queensland in AS 3959-2018 which is 40.

4   Bushfire attack levels

AS 3959-2018 sets out the requirements for the construction of buildings in bushfire prone areas to improve their safety when they are subjected to burning debris, radiant heat or flame contact generated from a bushfire.

BALs are a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts $(kW)/m^2$, and are the basis for establishing the requirements for construction to improve the protection of building elements to attack by bushfire.

The BAL calculator was used to model bushfire attack through VHC 16.2 and VHC 40.4 which are the dominant vegetation types influencing bushfire behaviour on stages 1 and 1a. Model inputs and calculations are provided in Appendix 2.

BAL contours over stages 1 and 1a are shown in Figure 1 and the BAL ratings of lots in stages 1 and 1a are summarised in Table 1.

BAL-LOW	BAL-12.5	BAL-19
lots 30-34 and 86-89	lots 25-29, 83-85, 90-94, 101-120 and 123-132 and 140-145	lots 95-100, 121-122 and 133-139

Table 1 BAL rating of lots

BAL-LOW	BAL-12.5	BAL-19
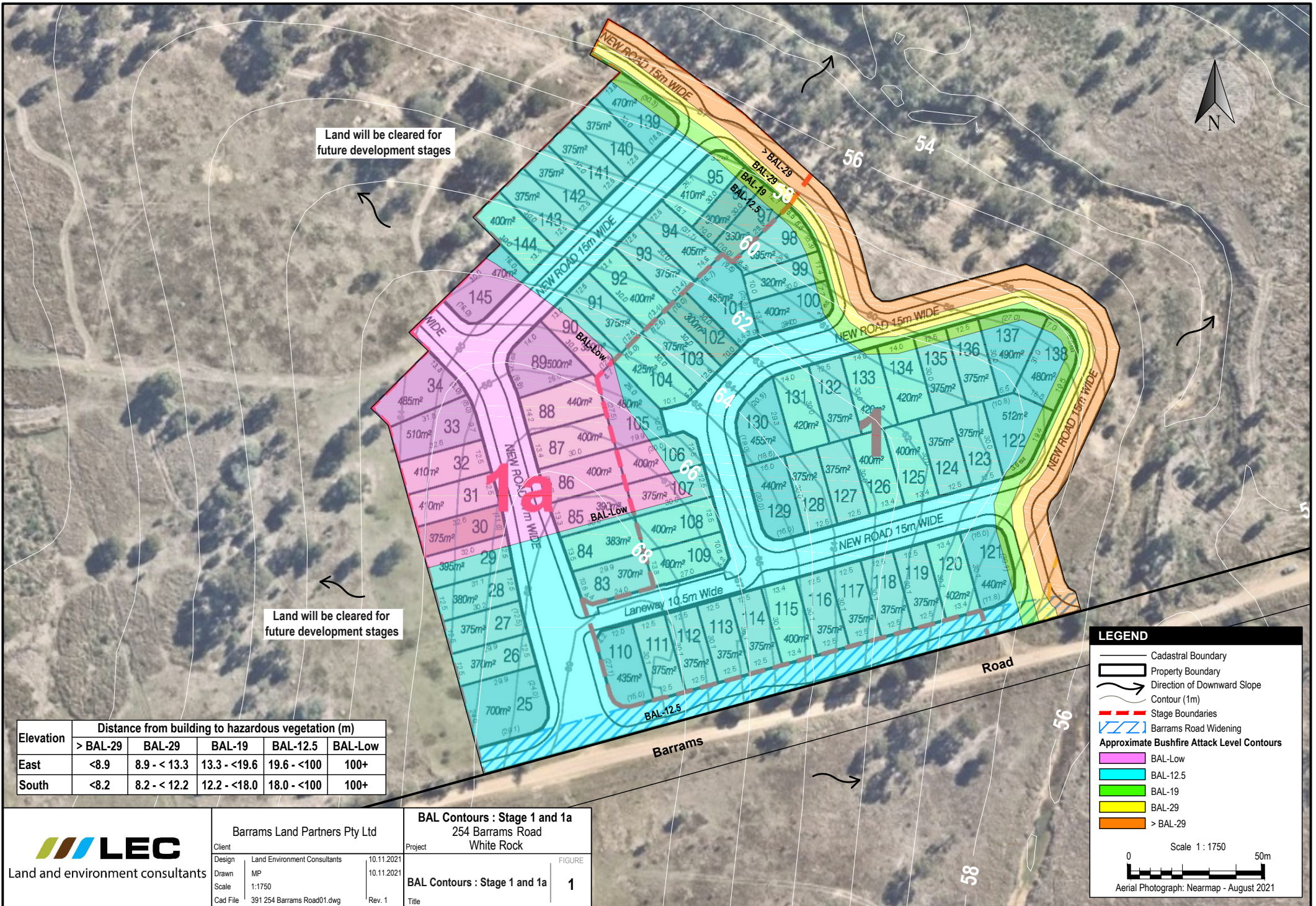
Land will be cleared for future development stages

Land will be cleared for future development stages

Elevation	Distance from building to hazardous vegetation (m)				
	> BAL-29	BAL-29	BAL-19	BAL-12.5	BAL-Low
East	<8.9	8.9 - < 13.3	13.3 - <19.6	19.6 - <100	100+
South	<8.2	8.2 - < 12.2	12.2 - <18.0	18.0 - <100	100+

///LEC
Land and environment consultants

Client	Barrams Land Partners Pty Ltd	
Design	Land Environment Consultants	10.11.2021
Drawn	MP	10.11.2021
Scale	1:1750	
Cad File	391 254 Barrams Road01.dwg	Rev. 1

BAL Contours : Stage 1 and 1a
254 Barrams Road
White Rock

Project

Title

BAL Contours : Stage 1 and 1a

FIGURE

1

LEGEND

————	Cadastral Boundary
▭	Property Boundary
↷→	Direction of Downward Slope
∿	Contour (1m)
▬ ▬ ▬	Stage Boundaries
▨	Barrams Road Widening

Approximate Bushfire Attack Level Contours

▉	BAL-Low
▉	BAL-12.5
▉	BAL-19
▉	BAL-29
▉	> BAL-29

Scale 1 : 1750

0   50m

Aerial Photograph: Nearmap - August 2021

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5   Recommendations

5.1   Shielding

With regards to the BAL ratings in Table 1, there is potential for a reduction in construction requirements on some elevations of the residential dwellings within lots 95-100, 121-122 and 133-139 due to shielding. Clause 3.5 of AS 3959-2018 states:

> Where an elevation is not exposed to the source of bushfire attack, then the construction requirements for that elevation can be reduce to the next lower BAL. However, it shall not reduce below BAL-12.5.

> An elevation is deemed to be not exposed to the source of bushfire attack if all of the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the same building. However it shall not reduce to below BAL-12.5.

> The shielding of an elevation shall apply to all the elements of the wall, including openings, but shall not apply to subfloors or roofs.

5.2   Design and construction

Building design and construction specifications for BAL-LOW, BAL-12.5 and BAL-19 are provided in the following sections of AS 3959-2018:

- BAL-LOW – section 4;
- BAL-12.5 - sections 3 and 5; and
- BAL-19 – sections 3 and 6.

5.3   Landscaping

Landscaping within lots in stages 1 and 1a must be designed and maintained to minimise the potential for it to catch fire and compromise residential dwellings and escape routes from residential dwellings and the site.

The *Bushfire Resilient Building Guidance for Queensland Homes* (QRA 2020) provides appropriate landscape design and maintenance principles for a designated bushfire prone area and is publicly available online.

Simplistically, landscaping should include mown lawn, hardened pathways, low form plants and fire resistant mulch. Shrubs and trees should not be planted adjacent ground floor doors and windows or stairways.

6   Closing

This letter provides a method 2 BAL assessment of lots in stages 1 and 1a. It identifies the BAL rating of each lot in stages 1 and 1a, building design and construction specifications for different BAL ratings and guidance for landscaping within lots in stages 1 and 1a.

Yours sincerely,

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Disclaimer

Notwithstanding the precautions adopted in this report, it should always be remembered that bushfires burn under a range of conditions. An element of risk, no matter how small always remains, and although AS 3959-2018 is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion.

It should be noted that upon lodgement of a development proposal, State Government, council and/or the fire service may recommend additional construction requirements.

Although every care has been taken in the preparation of this report, Land and Environment Consultants Pty Ltd accept no responsibility resulting from the use of the information in this report.

References

Australian Building Codes Board (ABCB) 2019a, *National Construction Code Series, Building Code of Australia Class 2 to Class 9 Buildings, Volumes 1,* Australian Government and States and Territories of Australia, February 2019

Australian Building Codes Board (ABCB) 2019b, *National Construction Code Series, Building Code of Australia Class 1 and Class 10 Buildings, Volume 2,* Australian Government and States and Territories of Australia, February 2019

Queensland Government (QG) 2021, *Queensland Development Code*, accessed online at https://www.business.qld.gov.au/industries/building-property-development/building-construction/laws-codes-standards/queensland-development-code, last updated 3 March 2021

Queensland Fire and Emergency Services (QFES) 2019, *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'*, October 2019

Queensland Reconstruction Authority (QRA) 2020, *Bushfire Resilient Building Guidance for Queensland Homes,* July 2020

Standards Australia Limited (Standards Australia) 2018, *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas*, Fourth edition, November 2018

Appendix 1 Site plan

CLIENT

RP PROPERTY VENTURES PTY. LTD.

PROJECT

PROPOSED RECONFIGURATION LOT 108 ON M3174

(200-218 & 254 Barrams Road, South Ripley)

LOCAL AUTHORITY

ECONOMIC DEVELOPMENT QUEENSLAND

NOTES

(i) This plan was prepared for the purpose and exclusive use of RP PROPERTY VENTURES PTY. LTD. to accompany an application to ECONOMIC DEVELOPMENT QUEENSLAND for approval to reconfigure the land described in this plan and is not to be used for any other purpose or by any other person or corporation.
LandPartners Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention of the terms of this clause or clauses (ii),(iii) or (iv) hereof.

(ii) The contours shown in this plan are suitable only for the purposes of this application. The accuracy of the contours has not been verified and no reliance should be placed upon such contours for any other purpose other than the purpose of this application for reconfiguration.

(iii) The dimensions, areas, number of lots, size and location of improvements & flood information (if shown) are approximate only and may vary.

(iv) This plan may not be copied unless these notes are included.

SCALE BAR

SCALE 1:2500 @ A3
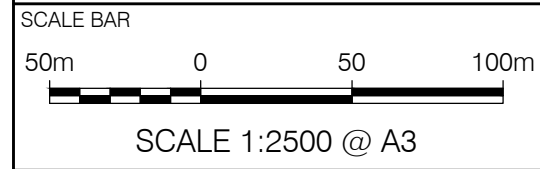
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	STATISTICS							
	STAGE 1	STAGE 1a	STAGE 2	STAGE 3	STAGE 4a	STAGE 4b	STAGE 5	TOTAL
AREA	10.843ha	2.535ha	2.888ha	5.12ha	2.868ha	1.557ha	0.432ha	26.243ha
Villa Lots	1	3	-	-	11	13		28
Courtyard Lots (1)	20	17	8	13	23	5	-	86
Courtyard Lots (2)	10	6	11	27	4	2	-	60
Traditional Lots	10	6	9	13	3	4	-	45
Future Development	-	-	-	-	-	1	1	1
TOTAL	41	32	28	53	41	24	1	220
ROAD 17m	-	165m	-	45m	-	-	-	210m
ROAD 15m	470m	210m	400m	415m	310m	-	-	1805m
ROAD 13m	-	-	-	150m	535m	-	-	685m
Laneway	65m	-	90m	125m	-	-	-	280m
BARRAMS ROAD	285m	195m	-	-	330m	-	-	810m
Barrams Road Widening	0.218ha	0.194ha	-	-	0.138ha	-	-	0.55ha
SW Bio-Basin	0.172ha	-	0.419ha	0.064ha	-	-	-	0.655ha
Local Park	-	-	-	0.5ha	-	-	-	0.5ha
Linear Park	6.24ha	-	0.613ha	1.369ha	-	-	-	8.222ha
Environmental Protection	1.178ha	-	-	-	-	-	-	1.178ha

LEGEND

SUBJECT SITE
STAGE BOUNDARY
Q100 FLOODLINE
PROPOSED ROAD WIDENING
25m BUFFER TOP OF BANK
RIPARIAN BUFFER

LEVEL DATUM	AHD	
LEVEL ORIGIN	PSM195337 RL 65.822 (SURVEYED) LIDAR ICC	
CONTOUR INTERVAL	1.0m	
COMPUTER FILE	BRSS7277-000-56-23	
DRAWN	MIS	DATE 2/11/2021
CHECKED	SRS	DATE 2/11/2021
APPROVED	SRS	DATE 2/11/2021
UDN		

BRSS7277-000-58-20

NOTE: ALL DIMENSIONS AND AREAS ON THIS PLAN ARE SUBJECT TO SURVEY AND REQUIREMENTS FOR LODGEMENT OF SURVEY PLANS IN THE DEPARTMENT OF NATURAL RESOURCES, MINES AND ENERGY.

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Appendix 2 Bushfire attack level assessment

Bushfire attack VHC 16.2

- Forest fire danger index - 58
- Vegetation – VHC 16.2 *Eucalyptus dominated woodland on drainage lines and alluvial plains*
- Total fuel load – 21.6 t/ha[2]
- Understorey fuel load – 11.6 t/ha[1]
- Effective slope – 0° slope
- Site slope – 0° slope
- Flame width –100 m

Note   1 Understorey fuel load taken from *Bushfire resilient communities* (QFES 2019)
                 2 10 t/ha added to understorey fuel to determine total fuel load

Calculated August 6, 2021, 1:06 pm (MDc v.4.9)

J21084

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		**Outputs**	
Fire Danger Index	58	Rate of spread	0.8 km/h
Vegetation classification	Woodland	Flame length	7.83 m
Understorey fuel load	11.6 t/ha	Flame angle	54 °, 64 °, 73 °, 78 °, 80 ° & 85 °
Total fuel load	21.6 t/ha	Elevation of receiver	3.17 m, 3.52 m, 3.74 m, 3.83 m, 3.86 m & 3.9 m
Vegetation height	n/a	Fire intensity	9,010 kW/m
Effective slope	0 °	Transmissivity	0.885, 0.874, 0.855, 0.834, 0.822 & 0.75
Site slope	0 °	Viewfactor	0.5848, 0.4349, 0.2907, 0.196, 0.1598 & 0.0438
Flame width	100 m	Minimum distance to < 40 kW/m²	6.6 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	8.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	13.3 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	19.6 m
		Minimum distance to < 10 kW/m²	23.7 m

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

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

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Bushfire attack VHC 40.4

- Forest fire danger index – 58
- Calculated equivalent Grass fire danger index – 82
- Vegetation – VHC 40.4 *Continuous low grass or tree cover*
- Total fuel load – 5 t/ha[1]
- Understorey fuel load – 5 t/ha[1]
- Effective slope – 4° down slope
- Site slope – 0° slope
- Flame width –100 m

Note   1 Understorey fuel load and total fuel load taken from *Bushfire resilient communities* (QFES 2019)

FPA | FLAMESOL

Calculated November 17, 2021, 5:28 pm (MDc v.4.9)

J21084

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		**Outputs**	
Grassland Fire Danger Index	82	Rate of spread	14.04 km/h
Vegetation classification	Grassland	Flame length	7.18 m
Understorey fuel load	5 t/ha	Flame angle	54 °, 64 °, 73 °, 78 °, 80 ° & 85 °
Total fuel load	5 t/ha	Elevation of receiver	2.9 m, 3.22 m, 3.43 m, 3.51 m, 3.53 m & 3.57 m
Vegetation height	n/a	Fire intensity	36,291 kW/m
Effective slope	4 °	Transmissivity	0.887, 0.876, 0.859, 0.839, 0.827 & 0.753
Site slope	0 °	Viewfactor	0.5884, 0.432, 0.2905, 0.1952, 0.1587 & 0.0435
Flame width	100 m	Minimum distance to < 40 kW/m²	6 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	8.199999999999999 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	12.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	18 m
		Minimum distance to < 10 kW/m²	22 m

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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