Land and environment consultants

4 October 2021

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Russell Dunster
Development Manager
AV Jennings Properties Limited
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Subject: Bushfire attack level assessment for Cadence Estate, stages 3a, 3b and 3c - 145 Binnies Road and 143-163 Daleys Road, Ripley, 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 Cadence Estate, stages 3a, 3b and 3c (**stages 3a, 3b and 3c**) - 145 Binnies Road and 143-163 Daleys Road, Ripley (**the site**), properly described as lots 349 and 336/S3173.

The subdivision plan for Cadence Estate and stages 3a, 3b and 3c is provided at Appendix 1.

The site is identified as a transitional bushfire risk area by the Ipswich Planning Scheme 2006 *Bushfire risk areas overlay map* and is a 'designated bushfire prone area' under Section 12 of the Queensland *Building Regulation 2006.* As a result, provisions of the *Building Code of Australia* (2019) (**BCA**) and the *Queensland Development Code* (**QDC**) that apply to a designated bushfire prone area apply to any building assessment work within the site.

Future residential dwellings within stages 3a, 3b and 3c 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 3a, 3b and 3c, identifies sections of AS 3959-2018 which are relevant to their design and construction and provides recommendations for landscaping around buildings and within the site.

2 Method

A walkover the site was performed by LEC on 5 February 2019 and involved assessing vegetation hazard classes (**VHC**) and the slope of land within 100 metres (**m**) of the site, including stages 3a, 3b and 3c.

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 north, south and west elevations of stages 3a, 3b and 3c is continuous open forest vegetation which correlates with VHC 10.1 *Spotted gum open forests* (**VHC 10.1**). VHC 10.1 is defined as classified vegetation in AS 3959-2018.

Land within 100 m of the east elevation of stages 3a, 3b and 3c is developed land within the site which correlates with the exclusion criteria for low threat vegetation and non-vegetated areas defined in clause 2.2.3.2(e) of AS 3959-2018 and is excluded from the BAL assessment.

Land with VHC 10.1 to the north, south and west of stages 3a, 3b and 3c are shown in Photographs 1-3.

Photograph 1 VHC 10.1 on north elevation

Photograph 2 VHC 10.1 on south elevation

Photograph 3 VHC 10.1 on west elevation

The severe fire weather map on the Queensland Fire and Emergency Services online mapping system indicates the 5% annual exceedance probability forest fire danger index (**FFDI**) for the site is 58. We have used this FFDI for the BAL assessment as it more accurately reflects 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 10.1 which is the dominant vegetation influencing bushfire behaviour on the north, south and west elevations of stages 3a, 3b and 3c. Model inputs and calculations are provided in Appendix 2.

The BAL rating of lots in this report is based on 2 scenarios being:

a) VHC 10.1 is cleared from the northern and southern boundaries of the site in accordance with the vegetation clearing proposal provided at Appendix 3 (**Scenario a**); and

b) VHC 10.1 is cleared from the northern boundary of the site in accordance with the vegetation clearing proposal provided at Appendix 3 and occurs up to the southern boundary of the site (**Scenario b**).

BAL contours over stages 3a, 3b and 3c, based on the above mentioned scenarios are shown in Figures 1-2 and the BAL ratings of lots stages 3a, 3b and 3c are summarised in Table 1.

Lot 157 is a drainage reserve and a BAL rating is not relevant to this lot. Therefore, it is not listed in Table 1.

Table 1 BAL ratings of lots in stages 3a, 3b and 3c

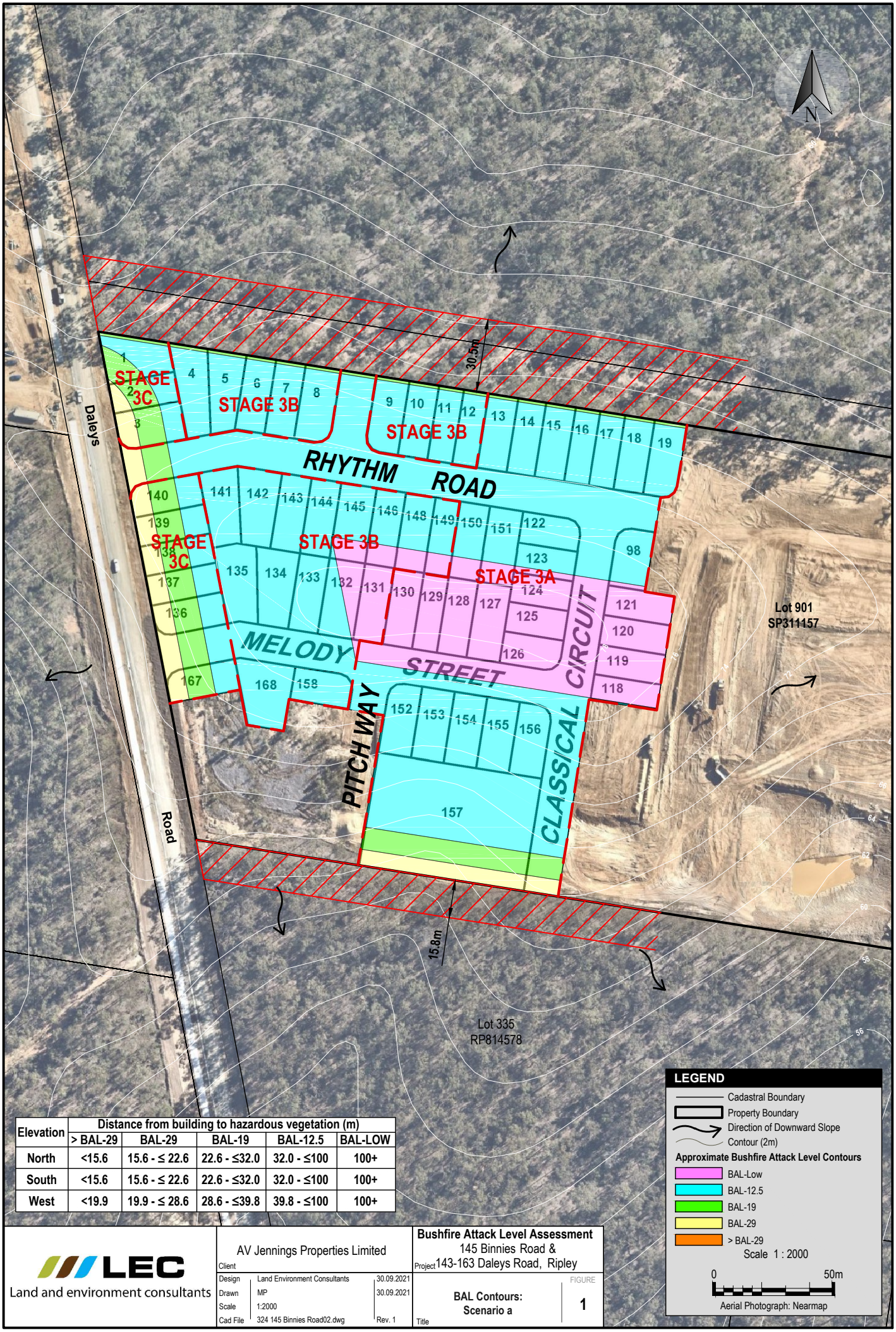
BAL-LOW	BAL-12.5	BAL-19	BAL-29	> BAL-29 (No building envelope
Scenario a – refer to Figure 1				
118-121 and 124-131	4-19, 98, 122-123, 132-135, 141-146, 148-156, 158 and 168	1	2-3, 136-140 and 167	-
Scenario b – refer to Figure 2				
120-121 and 124-125	4-19, 98, 122-123, 126-135, 141-146, 148-156, 158 and 168	1	2-3, 136-140 and 167	-

With regards to the BAL ratings for Scenario a and Scenario b in Table 1, there is potential for a reduction in construction requirements on some elevations of the residential dwellings on lots 1-3, 136-140 and 167 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.

Building design and construction specifications for BAL-LOW to BAL-29 are provided in the following sections of AS 3959-2018:

- BAL-LOW – section 4;
- BAL-12.5 - sections 3 and 5;
- BAL-19 – sections 3 and 6; and
- BAL-29 – sections 3 and 7.



Elevation	Distance from building to hazardous vegetation (m)				
	> BAL-29	BAL-29	BAL-19	BAL-12.5	BAL-LOW
North	<15.6	15.6 - ≤ 22.6	22.6 - ≤32.0	32.0 - ≤100	100+
South	<15.6	15.6 - ≤ 22.6	22.6 - ≤32.0	32.0 - ≤100	100+
West	<19.9	19.9 - ≤ 28.6	28.6 - ≤39.8	39.8 - ≤100	100+

LEGEND

- Cadastral Boundary
- Property Boundary
- Direction of Downward Slope
- Contour (2m)

Approximate Bushfire Attack Level Contours

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

Scale 1 : 2000

0 50m

Aerial Photograph: Nearmap

LEC
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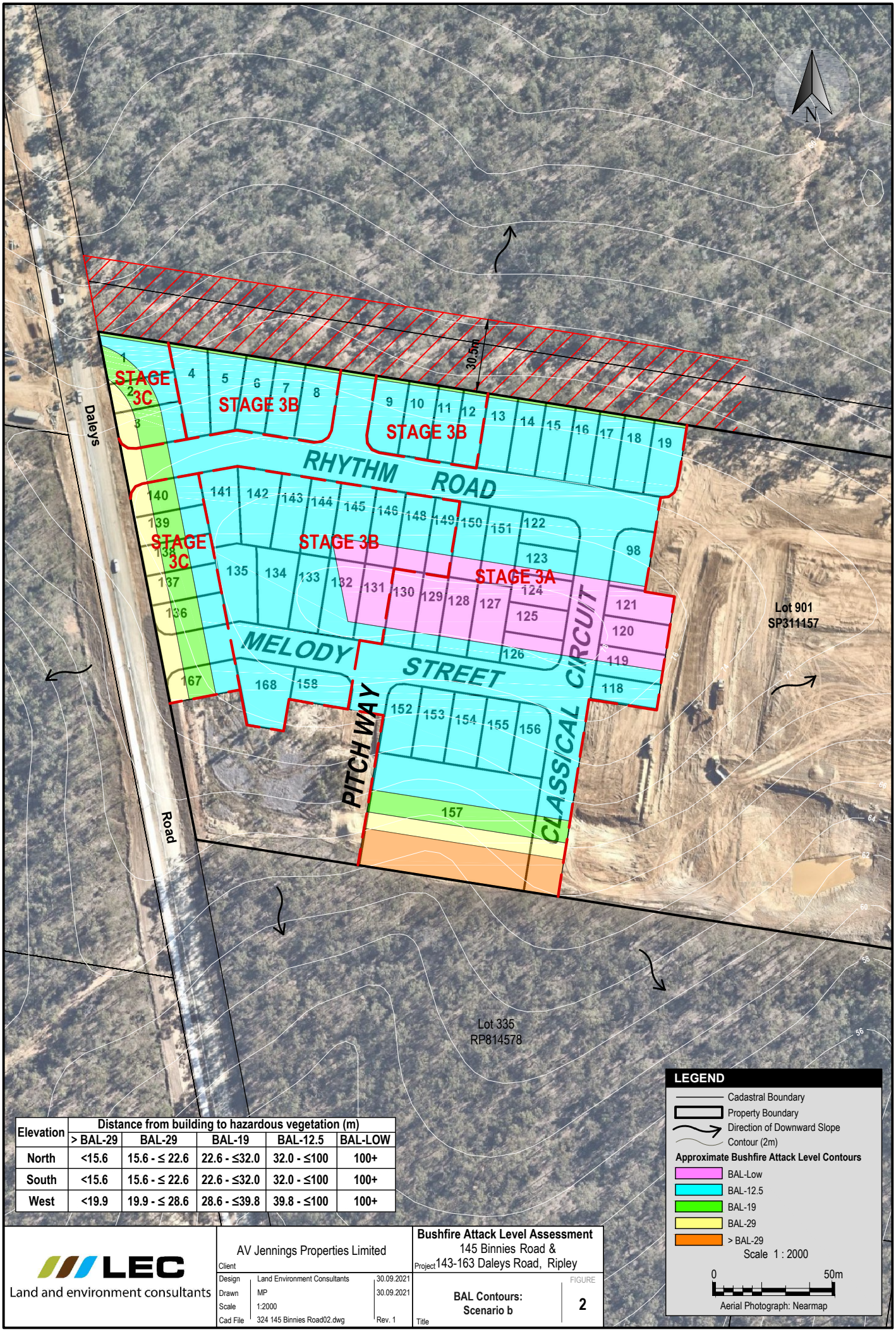
Client	AV Jennings Properties Limited	
Project	**Bushfire Attack Level Assessment** 145 Binnies Road & 143-163 Daleys Road, Ripley	
Design	Land Environment Consultants	30.09.2021
Drawn	MP	30.09.2021
Scale	1:2000	
Cad File	324 145 Binnies Road02.dwg	Rev. 1
Title	**BAL Contours: Scenario a**	FIGURE 1



Elevation	Distance from building to hazardous vegetation (m)				
	> BAL-29	BAL-29	BAL-19	BAL-12.5	BAL-LOW
North	<15.6	15.6 - ≤ 22.6	22.6 - ≤32.0	32.0 - ≤100	100+
South	<15.6	15.6 - ≤ 22.6	22.6 - ≤32.0	32.0 - ≤100	100+
West	<19.9	19.9 - ≤ 28.6	28.6 - ≤39.8	39.8 - ≤100	100+

LEGEND

- Cadastral Boundary
- Property Boundary
- Direction of Downward Slope
- Contour (2m)

Approximate Bushfire Attack Level Contours

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

Scale 1 : 2000

0 50m

Aerial Photograph: Nearmap

LEC Land and environment consultants

Client	AV Jennings Properties Limited	Project	Bushfire Attack Level Assessment 145 Binnies Road & 143-163 Daleys Road, Ripley
Design	Land Environment Consultants	30.09.2021	
Drawn	MP	30.09.2021	
Scale	1:2000		FIGURE
Cad File	324 145 Binnies Road02.dwg	Rev. 1	2
Title	BAL Contours: Scenario b		

5 Landscaping

Landscaping within stages 3a, 3b and 3c 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 3a, 3b and 3c based on 2 scenarios of vegetation retention/management adjoining the site. It also identifies the BAL rating and corresponding building design and construction specifications under AS 3959-2018 for each lot based on the 2 scenarios.

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) 2019, *National Construction Code Series, Building Code of Australia Class 2 to Class 9 Buildings, Volume 1,* Australian Government and States and Territories of Australia, February 2019

Australian Building Codes Board (ABCB) 2019, *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

Land and Environment Consultants Pty Ltd (LEC) 2019, *Bushfire management plan – 145 Binnies Road and 143-163 Daleys Road,* prepared for AV Jennings Properties Limited, 23 May 2019

Queensland Government (QG) 2019, *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 5 December 2019

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

Norris Clarke & O'Brien Pty Ltd
Licensed Surveyors
Town Planners
Development Consultants
Level 1 - Aldi Centre, 12 Bishop Street
Kelvin Grove QLD 4059
07 3012 0000 fax: 07 3012 0099
email: info@ncob.com.au
ACN 056 870 770 ABN 15 056 870 770

N

LEGEND:
- Stage Boundary
- 1A Stage Number

NOTES:
1. Drawn to scale on an A1 sheet.
2. Contour Interval: 0.5m
3. All dimensions and areas are subject to ICC approval and confirmation by survey.

Issue	Revision	Int	Date
X	Stage Boundary amended 3A/3B/3C	BRD	26/07/2021
W	Stage Boundary amended 3C/3D	BRD	26/05/2021
V	Stage Boundary amended 2A/3D	BRJ	27/01/2021
U	Lots 39-54 Boundaries amended	BRJ	24/09/2020
T	Lots 280 & 281 amended, Emt C in Lot 280 added, Stage boundaries amended	BRJ	15/09/2020
S	Lots 266-271 & Gravel Access Hatching Removed	JEW	4/03/2020
R	Staging & Lots Update	JEW	12/12/2019
Q	Minor Update	SDS	27/08/2019
P	Lot Layout and Stage Boundaries Amended	SDS	31/07/2019
O	Road Names & Lot 254 Updated	JEW	24/06/2019
N	Stage 1A/1C Minor Amendment	JEW	13/03/2019
M	Stage 1A/1B Minor Amendment	JEW	5/11/2018
L	Road 1 Intersection	JEW	18/10/2018
K	Updated Layout	JEW	16/10/2018
J	Detention modified and Park Added	JEW	4/05/2018
I	Updated layout	JKC	15/03/2018
H	Updated Layout	JKC	8/03/2018
G	Design Review only - Not Actioned	JKC	14/02/2018
F	Minor Update	JKC	14/02/2018
E	Updated Layout	DJL	15/12/2017
D	Updated Layout	JKC	8/12/2017
C	Updated Layout	JKC	30/11/2017
B	Updated Layout	JKC	29/11/2017

Title:
Plan of Proposed Subdivision of Lots 1 - 323 Staging Plan
(Cancelling Lots 336 & 349 on S3173)

Client: AV JENNINGS

Locality:	RIPLEY		
Local Gov:	ICC	Prepared By:	JKC
Surveyed By:		Approved:	SWM
Date Created:	27/11/2017	Scale:	1:1500
Comp File:			
Plan No:	**08070_002_PRO**		

A1

Appendix 2 Bushfire attack level assessment

Bushfire attack from the north and south

- Forest fire danger index - 58
- Vegetation – VHC 10.1 *Spotted gum dominated open forest*
- Overall fuel load – 20.8 t/ha[1]
- Surface fuel load – 20.8 t/ha[1]
- Slope – 3^0 down slope
- Site slope –0^0 slope
- Flame width – 100 m

Notes 1 surface and overall fuel loads for VHC 10.1 taken from *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019)

FPA AUSTRALIA | FLAMESOL

Calculated February 11, 2019, 3:22 pm (MDc v.4.8)

J19006 (N, S1)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	58	Rate of spread	1.78 km/h
Vegetation classification	Forest	Flame length	14.07 m
Surface fuel load	20.8 t/ha	Flame angle	50 °, 60 °, 69 °, 75 °, 76 ° & 82 °
Overall fuel load	20.8 t/ha	Elevation of receiver	4.8 m (user defined value)
Vegetation height	n/a	Fire intensity	19,135 kW/m
Effective slope	3 °	Transmissivity	0.874, 0.856, 0.83, 0.804, 0.791 & 0.728
Site slope	0 °	Viewfactor	0.597, 0.4425, 0.3005, 0.204, 0.1658 & 0.045
Flame width	100 m	Minimum distance to < 40 kW/m²	11.69999999999997 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	15.59999999999996 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	22.60000000000005 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	32.00000000000018 m
		Minimum distance to < 10 kW/m²	38.00000000000027 m

Bushfire attack from the west

- Forest fire danger index - 58
- Vegetation – VHC 10.1 *Spotted gum dominated open forest*
- Overall fuel load – 20.8 t/ha[1]
- Surface fuel load – 20.8 t/ha[1]
- Slope – 8^0 down
- Site slope –0^0
- Flame width – 100 m

Notes 1 surface and overall fuel loads for VHC 10.1 taken from *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019)

Calculated February 6, 2019, 4:14 pm (MDc v.4.8)

J19006 (W1)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	58	Rate of spread	2.51 km/h
Vegetation classification	Forest	Flame length	18.83 m
Surface fuel load	20.8 t/ha	Flame angle	44 °, 56 °, 67 °, 72 °, 74 ° & 81 °
Overall fuel load	20.8 t/ha	Elevation of receiver	4.8 m (user defined value)
Vegetation height	n/a	Fire intensity	27,019 kW/m
Effective slope	8 °	Transmissivity	0.87, 0.847, 0.8169999999999999, 0.79, 0.776 & 0.718
Site slope	0 °	Viewfactor	0.601, 0.448, 0.3055, 0.2079, 0.1687 & 0.0457
Flame width	100 m	Minimum distance to < 40 kW/m²	15.09999999999996 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	19.90000000000001 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	28.60000000000014 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	39.8000000000003 m
		Minimum distance to < 10 kW/m²	46.8000000000004 m

Appendix 3 Vegetation clearing proposal

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mail@bennettandbennett.com.au
Surveying, Town Planning & Spatial Services
GOLD COAST | BRISBANE | SUNSHINE COAST | IPSWICH
www.bennettandbennett.com.au

Proposed width to clear vegetation to reduce bushfire risk
to BAL-12.5 from bdy = 32.0m
less POD rear setback = (1.5m)
Therefore, width of clearing required to reduce BAL to 12.5 on bldg envel. = 30.5m

Proposed width to clear vegetation to reduce bushfire risk
from bdy = 30.6m
less Rd width = (17.0m)
less POD setback for Terrace lots = (2.5m)
Therefore, width of clearing required to reduce BAL to 12.5 on bldg envel. = 11.1m

Proposed width to clear vegetation to reduce bushfire risk
to BAL-12.5 from bdy = 32.0m
less Rd width = (15.0m)
less POD side setback = (1.2m)
Therefore, width of clearing required to reduce BAL to 12.5 on bldg envel. = 15.8m

Proposed width to clear vegetation to reduce bushfire risk adjacent to
Lot 282 = 32.0m

LEGEND:
- Stage Boundary
- 1A Stage Number

NOTES:
1. Drawn to scale on an A1 sheet.
2. Contour Interval: 0.5m
3. All dimensions and areas are subject to ICC approval and confirmation by survey.

Issue	Revision	Int	Date
Q	Minor Update	SDS	27/08/2019
P	Lot Layout and Stage Boundaries Amended	SDS	31/07/2019
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F	Minor Update	JKC	14/02/2018
E	Updated Layout	DJL	15/12/2017
D	Updated Layout	JKC	8/12/2017
C	Updated Layout	JKC	30/11/2017
B	Updated Layout	JKC	29/11/2017

Title:
Plan of Proposed Subdivision of Lots 336 & 349 on S3173
Staging Plan
(Lots 1-303)

Client: **AV JENNINGS**

Locality:	RIPLEY		
Local Gov:	ICC	Prepared By:	JKC
Surveyed By:		Approved:	SWM
Date Created:	27/11/2017	Scale:	1:1500
Comp File:			
Plan No:	**08070_002_PRO**		

A1

Scale 1:1500
0m 50 100 150 200 250