BUSHFIRE ATTACK LEVEL

FOR
FUTURE DWELLINGS

AT STAGE 14
BILLY'S LOOKOUT
TERALBA

Prepared by:

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Site Details:	Stage 14 at Billy's Lookout, Teralba
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Prepared for:	McCloy Teralba
Reference No.	Teralba - McCloy
Document Status & Date:	September 2018

Disclaimer

Not withstanding the precautions adopted within this report, it should always be remembered that bushfires burn under a wide range of conditions. An element of risk, no matter how small always remains, and although the standard 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.

Executive Summary

This report provides an assessment of the Bushfire Attack Level (BAL) at Stage 14 within Billy's Lookout, Teralba in accordance with AS3959 (2009) *Construction of Buildings in Bushfire Prone Areas* Appendix A - Method 1 and Appendix B - Detailed Method 2. This report and mapping are not to be used to place wholesale restrictions on lots reflecting the resulting BAL mapping presented within. Future development of surrounding stages may result in lower BALs than detailed in this report.

This BAL report has shown that any future dwellings within the site will be able to meet the requirements of both AS3959-2009 and the addendum to Appendix 3 of Planning PBP 2006 (NSW Rural Fire Service NSW).

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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Disclaimer:

The BALs as depicted within this report and mapping have been determined by management of vegetation to the east and south where land will be cleared for future stages. It should be noted that conditions may change over time that may result in different BALs for the lots.

Although every care has been taken in the preparation of this BAL Report, McCloy Teralba and the author accept no responsibility in errors in this report or damaged resulting from the information. It should be noted that upon lodgement of a Development Application (DA) with Council or Rural Fires Service they may recommend additional construction requirements (BALs).

Terms & Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419 -2005	Australian Standard – Fire Hydrant Installations
AS3959-2009	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPL Map	Bush Fire Prone Land Map
BPMs	Bush Fire Protection Measures
EPA Act	*NSW Environmental Planning and Assessment Act 1979*
FDI	Fire Danger Index
FMP	Fuel Management Plan
ha	hectare
IPA	Inner Protection Area
LMCC	Lake Macquarie City Council
LGA	Local Government Area
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection 2006
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation

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TABLES

FIGURES

1 INTRODUCTION

Firebird ecoSultants Pty Ltd has been engaged by Teralba McCloys Pty Ltd to undertake a Bushfire Attack Level (BAL) report for Stage 14 at Billy's Lookout, Teralba hereafter referred to as the "site". Refer to Appendix A for Sales Plan.

This BAL report assess the application of Australian Standard AS3959-2009 'Construction of Buildings on Bushfire Prone Land' and Appendix 3 of Planning for Bushfire Protection 2006 (PBP, 2006).

AS3959 (2009) Appendix A – Method 1 and Appendix B - Detailed Method 2 has been used in this assessment. Assessment Method 2 provides for a site specific and accurate determination of the hypothetical radiant heat flux levels a bushfire could be expected to generate under certain environmental conditions. Assessment Method 2 is an approved methodology for bushfire risk assessment as per AS3959 – 2009.

This report has been prepared to provide guidance to prospective purchasers of what Bushfire Attack Levels (BALs) may be required for future dwellings within the site.

1.1 Site Particulars

Locality: Stage 14 at Billy's Lookout, Teralba

LGA: Lake Macquarie City Council (LMCC)

Forest Danger Index: 100

Current Land Use: Approved subdivision

2 METHODOLOGY

The Australian Standard for assessing the BAL and providing the detailed requirements for construction has been reviewed and amended with the latest version being adopted for use in bushfire prone areas of NSW in May 2010. This version is titled AS 3959-2009 'Construction of Buildings in Bushfire Prone Areas' (standards Australia 2009, incorporating amendment 1 (November 2009) and amendment 2 (February 2011), with amendment 2 being used in this assessment.

In addition, the NSW method of determining the bushfire attack level, found in Appendix 3 of the document 'Planning for Bushfire Protection 2006' (NSW Rural Fire Service 2006) has also been reviewed and amended to come into line with the process within AS 3959. Therefore, in NSW the methodology with AS 3959 is to be used to determine the bushfire attack level.

AS3959 (2009) Appendix A – Method 1 and Appendix B - Detailed Method 2 has been used in this BAL assessment. Assessment. Method 2 provides for a site specific and accurate determination of the hypothetical radiant heat flux levels a bushfire could be expected to generate under certain environmental conditions.

2.1 Vegetation Assessment

Vegetation surveys and vegetation mapping carried out on the site has been undertaken as follows:

- Aerial Photograph Interpretation to map vegetation cover and extent.
- Confirmation of the vegetation assemblage typology present via a site inspection.

2.2 Slope Assessment

Slope assessment has been undertaken as follows:

- Aerial Photograph Interpretation in conjunction with analysis of electronic contour maps with a contour interval of 10m.
- On site confirmation of slope measurements.

3 SITE ASSESSMENT

A site inspection was undertaken on the site. The following assessment has been undertaken in accordance with the requirements of PBP (RFS, 2006) and AS3959-2009.

3.1 Vegetation and Slope Assessment

An assessment of the slope affecting the bushfire behaviour was undertaken for a distance of 100m from the edge of the lot boundaries in the direction of the bushfire hazard. The slopes leading away from the site have been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site. Refer to Table 1 for Vegetation and Slope Assessment.

Table 1 –Vegetation & Slope Assessment

Direction from Site	Vegetation Classification	Effective Slope
North	Vegetation classified as open forest occurs adjacent to the site	7 Degrees Upslope
East	Land managed as an APZ until such time that development occurs	N/A
South	Vegetation classified as open forest occurs greater than 68 m away from the site	Downslope 0-5 degrees
West	Land managed as an APZ until such time that development occurs	N/A

4 BUSHFIRE ATTACK ASSESSMENT

4.1 Bushfire Attack Assessment

To determine the bush fire attack and required Bushfire Attack Level (BAL) for the proposed subdivision the following steps were followed:

1. Determination of the vegetation types within 100m of the site, as assessed in section 3 of this report.
2. Determination of the distance between the vegetation and future dwellings has been assessed in section 4.2 of this report.
3. Determination of the effective slope as assessed in section 3 of this report.
4. A FDI of 100 was determined for LMCC LGA.

4.2 Determination of Bushfire Attack Levels

The results from the above steps were used to calculate the required BAL in accordance with both Method 1 and Method 2 of AS 3959 – 2009. Method 2 provides for a site specific and accurate determination of the hypothetical radiant heat flux levels a bushfire could be expected to generate under certain environmental conditions. Assessment Method 2 is an approved methodology for bushfire risk assessment as per AS3959 – 2009.

The results from this bush fire attack assessment are detailed below in Table 4-1– Bushfire Attack Level (BAL) Assessment and Figure 4-1 Bushfire Attack Level Map refer to Appendix B for Bushfire Attack Calculations used for the Open Forest to the north of the site. Method A was used for vegetation to the south.

Table 4-1: Bushfire Attack Level Assessment

Lot Number	Vegetation Type within 100m & Direction from future dwellings	Average Slope of Land (degrees)	Separation Distance from Identified Vegetation	Bushfire Attack Level (BAL)	Construction Section
Lot 1401	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix

Lot Number	Vegetation Type within 100m & Direction from future dwellings	Average Slope of Land (degrees)	Separation Distance from Identified Vegetation	Bushfire Attack Level (BAL)	Construction Section
					3
Lot 1402	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1403	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1404	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1405	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3

Lot Number	Vegetation Type within 100m & Direction from future dwellings	Average Slope of Land (degrees)	Separation Distance from Identified Vegetation	Bushfire Attack Level (BAL)	Construction Section
Lot 1406	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1407	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1408	Open Forest to the north	Upslope 7 degrees	18-25m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1409	Open Forest to the north	Upslope 7 degrees	26-47m	BAL-19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
			48-100m	BAL-12.5	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1410	Open Forest to the north	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect

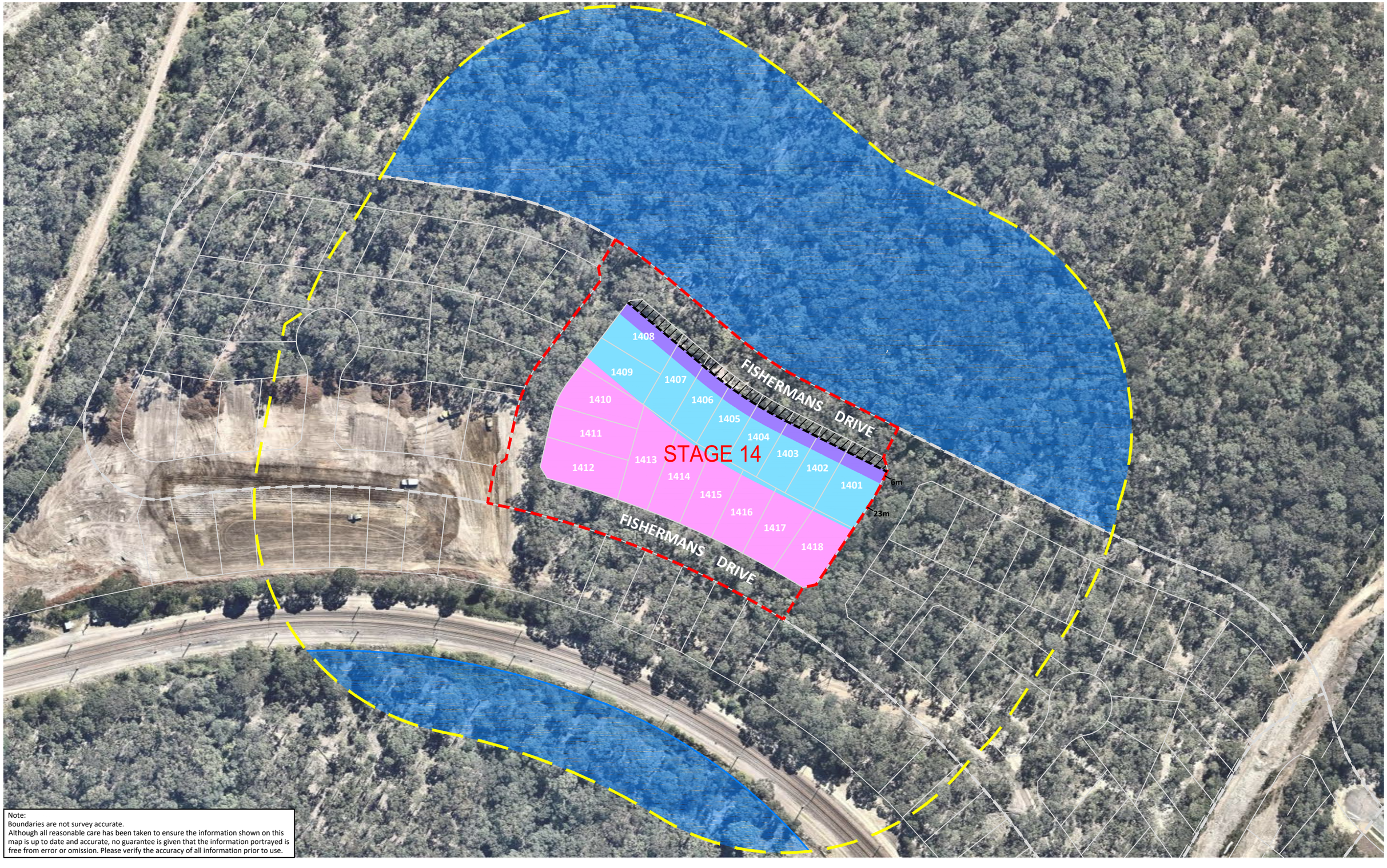
Lot Number	Vegetation Type within 100m & Direction from future dwellings	Average Slope of Land (degrees)	Separation Distance from Identified Vegetation	Bushfire Attack Level (BAL)	Construction Section
					A3.7 of PBP Addendum Appendix 3
Lot 1411	Open Forest to the north	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1412	Open Forest to the north and south	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1413	Open Forest to the north and south	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1414	Open Forest to the north and south	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1415	Open Forest to the north and south	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1416	Open Forest to the north	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1417	Open Forest to the north	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
Lot 1418	Open Forest to the north	Upslope 7 degrees	48-100m	BAL 12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix

Lot Number	Vegetation Type within 100m & Direction from future dwellings	Average Slope of Land (degrees)	Separation Distance from Identified Vegetation	Bushfire Attack Level (BAL)	Construction Section
					3

*To Note: The construction requirements for the next lower BAL than that determined for the site may be applied to an elevation of the building where the elevation is not exposed to the source of the bushfire attack. An elevation is deemed to be not exposed to the source of bushfire attack if all the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the building. However, this does not apply to BAL-12.

No BALs applies to any future dwelling built greater than 100m from the Open Forest.

This report and mapping are not to be used to place wholesale restrictions on lots reflecting the resulting BAL mapping presented within. Building location and design will influence the application of the required BALs. For example, a lot indicated as being affected by BAL-29 may have those facades that are not exposed to the bushfire threat constructed to a lower BAL (i.e. BAL-19), reducing the costs of construction and providing more flexibility in choice of external building materials. Refer to Appendix B for Summary of AS3959-2009 Construction Standards and Appendix C for Additional Building Requirements.



Note:
Boundaries are not survey accurate.
Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 4-1: BUSHFIRE ATTACK LEVELS

CLIENT	McCloys Pty Ltd
SITE DETAILS	Stage 14 Billy's Lookout Teralba
DATE	11 October 2017

Legend

- Subject Site
- 100m Buffer
- 5m Setback
- Open Forest
- BAL 29
- BAL 19
- BAL 12.5

NORTH

0 25 50 75

SCALE 1500 @ A3

PIXELDRAFTING

Ref No 2198

Firebird ecoSultants Pty Ltd
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Level 1, 146 Hunter Street, Newcastle NSW 2300
P O Box 354 Newcastle NSW 2300

5 CONCLUSION

This report provides an assessment of the Bushfire Attack Level (BAL) in accordance with AS3959-2009 Construction of Buildings in Bushfire Prone Areas for Stage 14 at Billy's Lookout, Teralba.

This BAL report assess the application of Australian Standard AS3959-2009 'Construction of Buildings in Bushfire Prone Land' and Appendix 3 of Planning for Bushfire Protection 2006 (PBP, 2006).

AS3959 (2009) Appendix B - Detailed Method 2 has been used in this BAL assessment. Assessment Method 2 provides for a site specific and accurate determination of the hypothetical radiant heat flux levels a bushfire could be expected to generate under certain environmental conditions. Assessment Method 2 is an approved methodology for bushfire risk assessment as per AS3959 – 2009.

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Disclaimer:
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6 BIBLIOGRAPHY

NSW Rural Fire Service (RFS) 2006. Planning for Bushfire Protection: A guide for Councils, Planners, Fire Authorities, Developers and Home Owners. Australian Government Publishing Service, Canberra.

Standards Australia. 2009. Construction of buildings in bushfire-prone Ares, AS3959, Third Edition 2009, Incorporating Amendment 1, Standards Australia International Ltd Sydney

APPENDIX A SALE PLAN

FISHERMANS DRIVE

ZEPHYR AVENUE

BREAM ROAD

1408 611.4m²
1407 479m²
1406 466m²
1405 469.2m²
1404 478.9m²
1403 454.8m²
1402 460.6m²
1401 639.9m²
1409 461m²
1410 525.5m²
1411 513.6m²
1412 602.9m²
1413 600.9m²
1414 547.9m²
1415 512.7m²
1416 493.3m²
1417 517m²
1418 604.7m²

1311 1310 1309 1312 1314 1313 1315 131

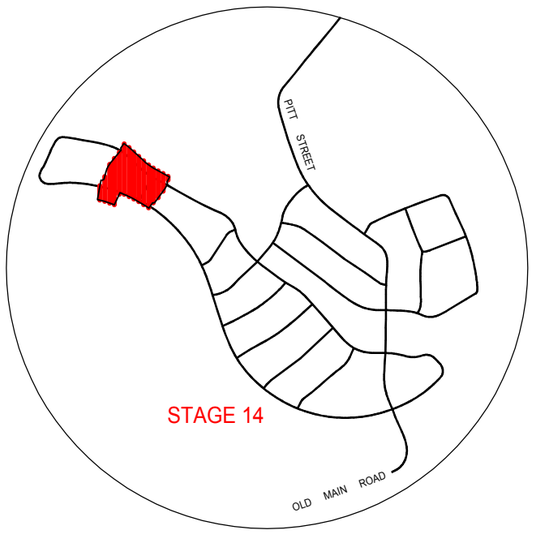
FUTURE STAGE

DRAINAGE RESERVE

FUTURE STAGE

1332

LOCALITY PLAN



(A) - EASEMENT TO DRAIN WATER 2 WIDE

(B) - RESTRICTION ON THE USE OF LAND 0.7 WIDE

PROPOSED SEWER LINE

McCLOYGROUP

SALE PLAN FOR BILLY'S LOOKOUT STAGE 14

BILLY'S LOOKOUT EST. 2015 LAKE MACQUARIE

APPENDIX B BUSHFIRE ATTACK CALCULATIONS

NBC Bushfire Attack Assessment Report V3.0

AS3959 (2009) Appendix B - Detailed Method 2

Print Date: 19/02/2019 **Assessment Date:** 24/09/2018

Site Street Address: Billys Lookout, Teralba

Assessor: Sarah Jones; Firebird Eco

Local Government Area: Lake Macquarie **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Vegetaation to the north

Vegetation Information

Vegetation Type:	Forest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	7 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	25	**Overall Fuel Load(t/ha):**	35
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	18

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K)**	1090

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	7.17
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	33468
Radiant Heat(kW/m2):	28.82	**Flame Angle (degrees):**	62
Flame Length(m):	16.23	**Maximum View Factor:**	0.446
Rate Of Spread (km/h):	1.85	**Inner Protection Area(m):**	12
Transmissivity:	0.849	**Outer Protection Area(m):**	6

Run Description:	Vegetation to the north		
Vegetation Information			
Vegetation Type:	Forest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	7 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	25	**Overall Fuel Load(t/ha):**	35
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	26
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K)**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100
Program Outputs			
Category of Attack:	MODERATE	**Peak Elevation of Receiver(m):**	7.63
Level of Construction:	BAL 19	**Fire Intensity(kW/m):**	33468
Radiant Heat(kW/m2):	18.81	**Flame Angle (degrees):**	70
Flame Length(m):	16.23	**Maximum View Factor:**	0.301
Rate Of Spread (km/h):	1.85	**Inner Protection Area(m):**	17
Transmissivity:	0.822	**Outer Protection Area(m):**	9