BUSHFIRE CONSULTANCY AUSTRALIA

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Bush Fire Assessment Report

In relation to a proposed development at:

24-30 Reynolds Road, Londonderry, NSW

This assessment has been prepared and certified by: Matthew Toghill. BPAD certified practitioner FPAA Accreditation No: BPAD31642 Report No: 24Rey-02 Date: 18/02/2021	[redacted]
Architectural plans provided by:	Signature Design & Drafting Reference: 0111-20 Dated: 02.02.2020 (Issue A-5)

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Executive Summary

The purpose of the report is to determine the category of bushfire attack and subsequent construction standard for the proposed new class 1a dwelling and pool at No 24-30 Reynolds Road, Londonderry, NSW.

The site had been identified as 'bush fire prone land' for the purpose of Section 146 of the *Environmental Planning and Assessment Act 1979* and the Legislative requirements for building on bush fire prone lands are applicable.

The proposed development is in infill development as defined within Chapter 7 of *Planning for* Bushfire *Protection 2019* and this report has been prepared in accordance with the requirements of Section 4.14 of the Environment Planning and Assessment Act.

This assessment includes an analysis of the hazard, threat and subsequent risk of the development proposal and provides recommendations that satisfy the Objective and Performance requirements of the Building Code of Australia, Planning for Bushfire Protection 2019 [PBP] and Australian Standard AS3959, 2018.

Following a site assessment, it was determined the distance of the development from the closest hazard would keep the Bushfire Attack Level (BAL) to BAL-12.5, in accordance with the methodology described in PBP. The development also meets performance criteria as set out in chapter 7 of PBP in relation to APZ's, siting and design, construction standards, access and egress requirements, water and utility services and landscaping.

1. Description of the subject property

Property address: Lot 4 DP 25981, No 24-30 Reynolds Road, Londonderry

Local Government Area: Penrith

The development site is a rural residential block with access off Reynolds Road. The following sections 4-8 describe in detail the vegetation, slope, access and egress, availability of water supplies and environmental considerations for the site.

Figure 1: Location of the subject site

2. Development Proposal and Building Classification

The development proposal is for the construction of a new class 1a dwelling.

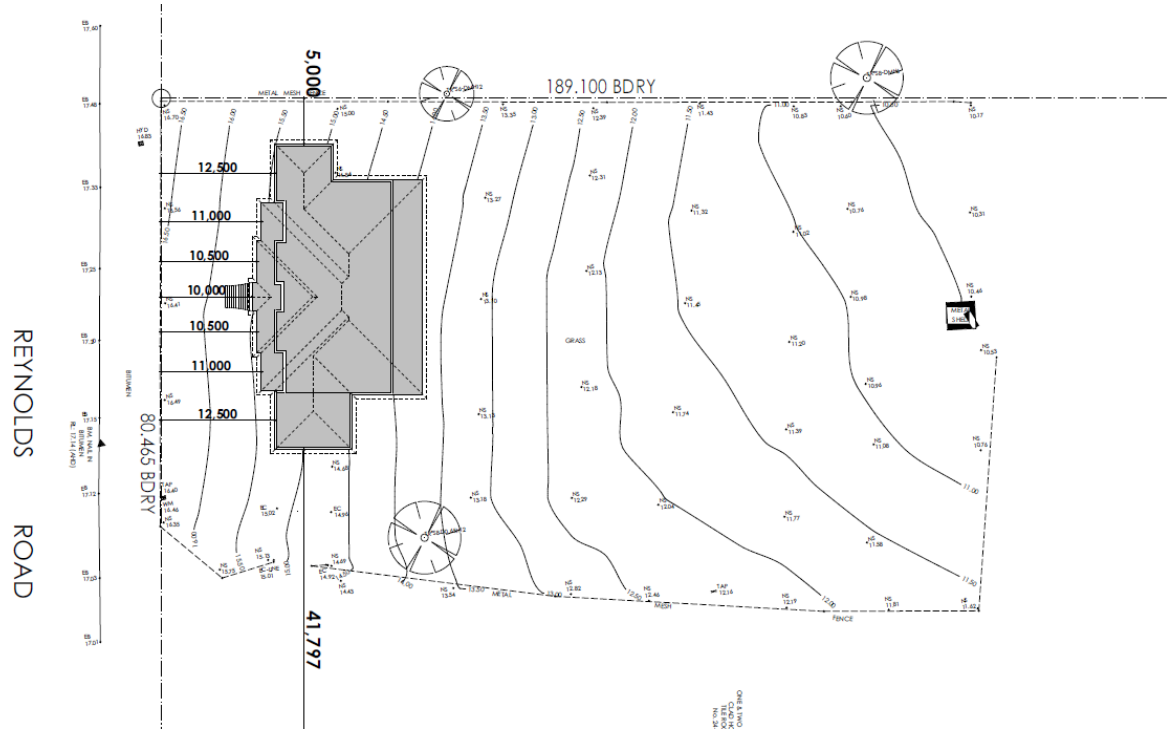


Figure 2: Site plan.

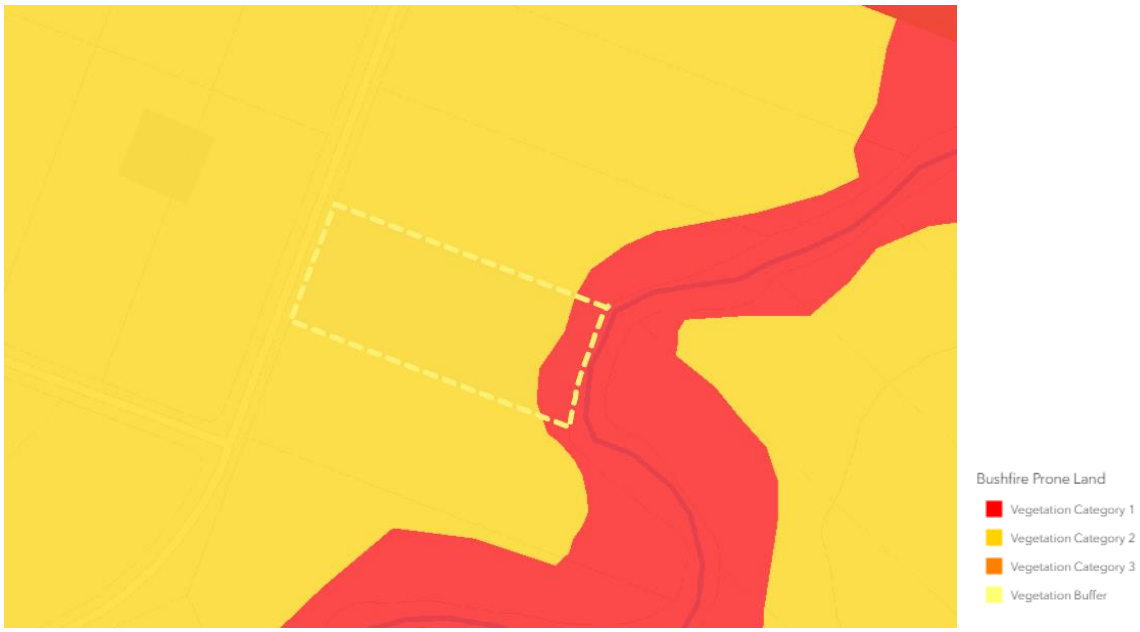


Figure 3: Bushfire prone land map showing the location of the subject site.

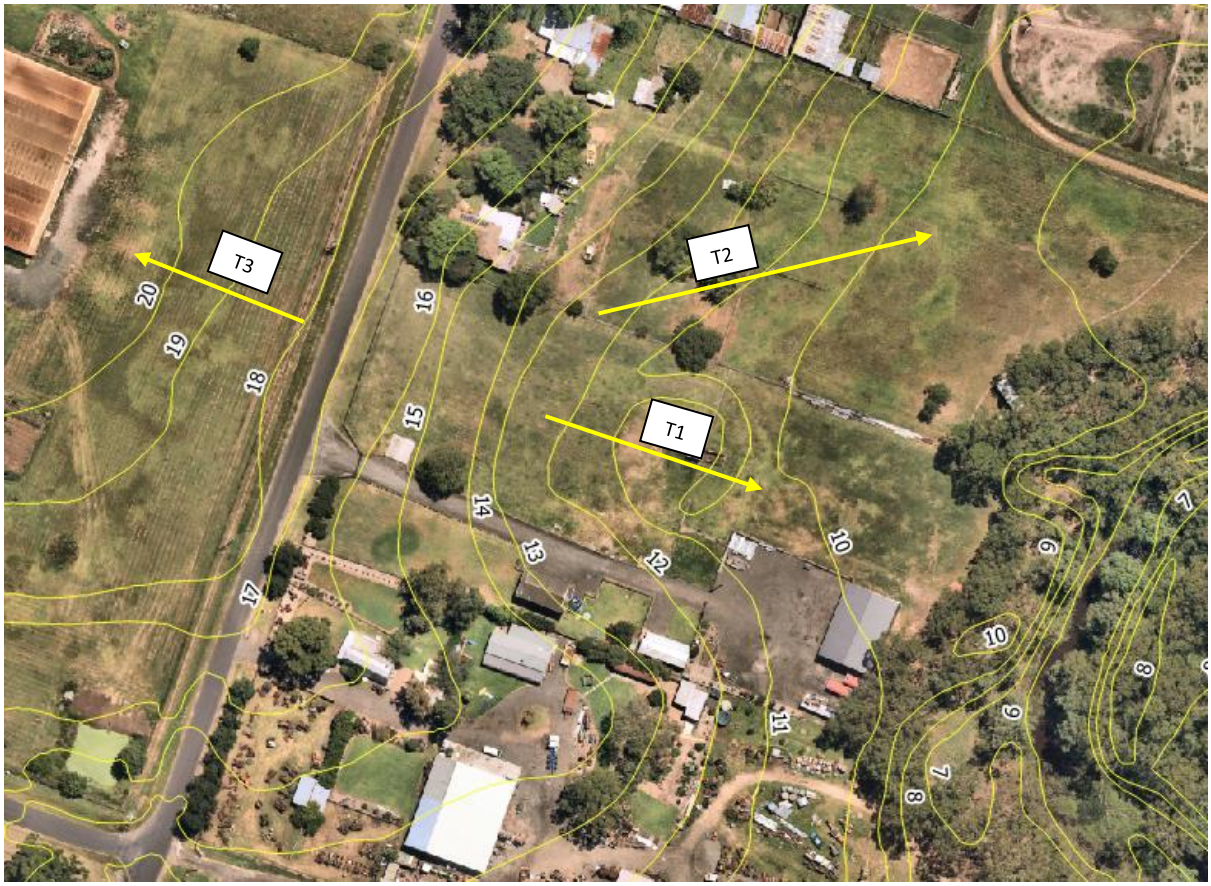
3. Classification of the Vegetation on and surrounding the site

For the purpose of a Bush Fire Risk Assessment, vegetation within 100m of the site is assessed and classified.

In this instance, the site is surrounded by Category 2 vegetation in the form of Grassland. The areas of significance are located on the western side of Reynolds Road, on the adjoining property to the north and the site itself Refer to Figure 4).

Figure 4: Aerial photo showing the location of the subject site and surrounding vegetation.

4. Assessment of effective slope



Legend:

Direction of effective slope

Figure 5: Contour map.

Transect Line	Effective slope
T1	Downslope 2 degrees
T2	Downslope 2 degrees
T3	Upslope 1 degree

5. Access and Egress

The site has direct access to Reynolds Road, which is a public road, access and egress for emergency vehicles appears adequate.

6. Adequacy of water supply

The area has reticulated water supply and hydrants are spaced at a regular distance along Reynolds Road.

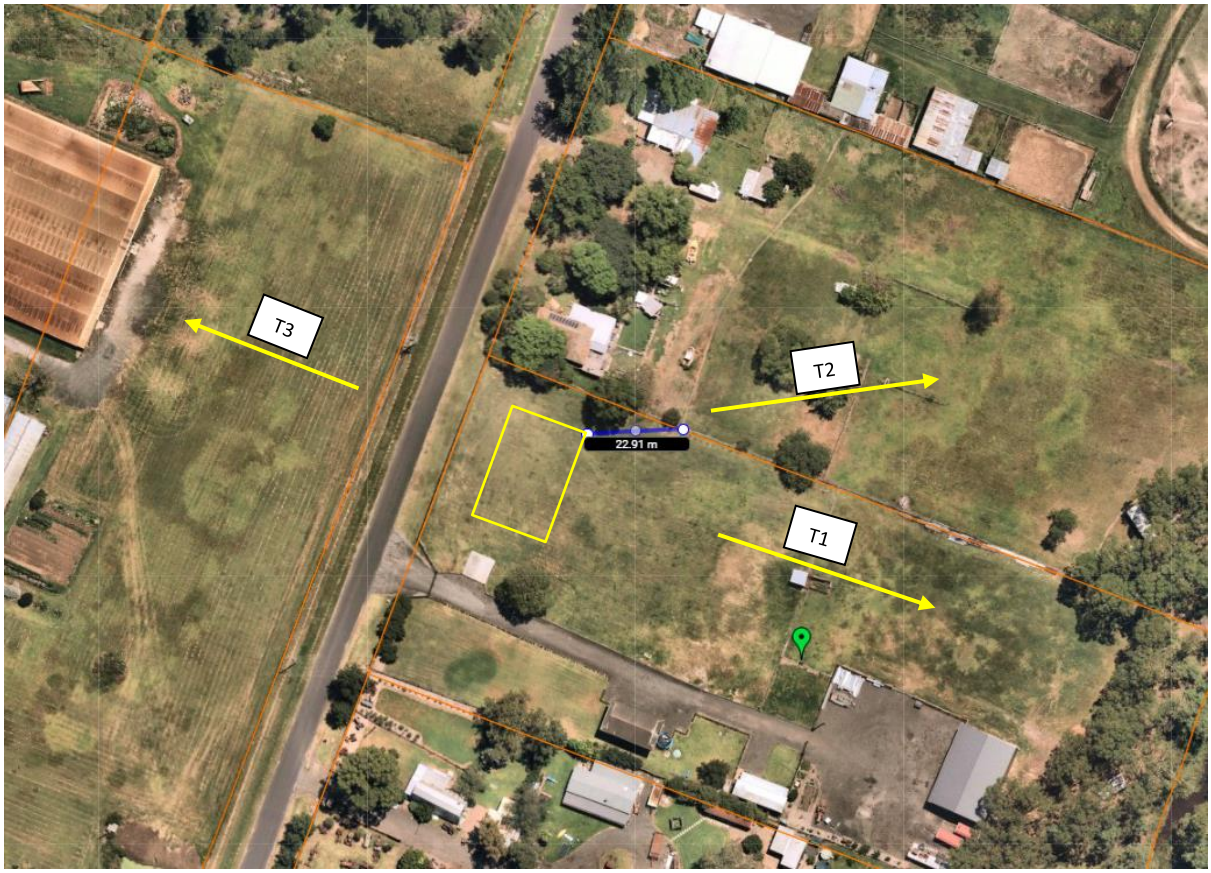
7. Features that may mitigate the impact of a high intensity bushfire

There are no significant features on or adjoining the site that may mitigate the impact of a high intensity bushfire on the proposed development.

8. Environmental impact of any proposed bushfire protection measures.

The scope of this report has not been to provide an environmental assessment. However, the bushfire protection measures that are proposed will have no adverse environmental effects. All protection measures are either within the boundaries of the allotment or part of the constructed building.

9. Bushfire Risk Assessment



New dwelling

Table 1; reference Method 2 AS 3929-2018

Determination of the category of bushfire attack for the site, and subsequent required building standards.

Note: Full Method 2 calculations can be found in Appendix 1 of this report.

Transect	Distance to classified vegetation	Vegetation Classification	Assessment of effective slope	FDI	Bushfire Attack Level
T1	22.50m (minimum recommended APZ)	Grassland	Downslope 2 degrees	100	BAL-12.5
T2	22.91m	Grassland	Downslope 2 degrees	100	BAL-12.5
T3	30.00m (10.00m onsite, 20.00m offsite	Grassland	Upslope 1 degree	100	BAL-12.5

Summary: Based upon the relevant provisions of PBP and AS 3959-2018, the anticipated maximum radiant heat attack for the new dwelling is <12.5kW/m2 and the subsequent minimum construction standard is BAL-12.5 AS 3959- 2018.

10. The extent to which the construction conforms or deviates from Chapter 7 of 'Planning for Bushfire Protection 2019'

Performance Criteria	How this development meets acceptable solutions
The intent may be achieved where:	
In relation to APZ's: -Defendable space is provided onsite. -An APZ is provided and maintained for the life of the building.	Defendable space is provided on all sides of the building. Asset protection zones are provided for on site and by adjoining development and public roads.
In relation to construction standards: It is demonstrated that the proposed building can withstand bushfire attack in the form of wind, smoke, embers, radiant heat and flame contact.	Construction standards have been recommended in accordance with the requirements of *Planning for Bushfire Protection 2019* and *AS 3959-2018 Construction of buildings in bushfire prone areas*.
In relation to access requirements: Safe operational access is provided [and maintained] for emergency service personnel in suppressing a bushfire while residents are seeking to relocate, in advance of a bushfire.	This site has direct access to public roads, and the access and egress for emergency vehicles and evacuation appears to be adequate.
In relation to water and utility services: -Adequate water is provided for fire fighting operations.	The area has reticulated water supply and the nearest street hydrant is within the minimum required distance from the most distant point of the subject site in accordance with the requirements of PBP and AS2419.1 2005.
In relation to landscaping: It is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind driven embers to cause ignition.	The subject site, where not built on, is considered part of the Asset Protection Zone (APZ) for the dwelling. Appendix 4 of *Planning for Bushfire Protection 2019* outlines the requirements for landscaping and property maintenance.
In relation to emergency and evacuation planning	It is advised the residents should complete a *Bushfire Survival Plan* as formulated by the NSW Rural Fire Service and Fire and Rescue NSW.

11. Recommendations

The following recommendations are made for the bushfire protection measures for the proposed construction of a new class 1a dwelling and pool at No 24-30 Reynolds Road, Londonderry, NSW and are based upon the relevant provisions of the NSW RFS guideline entitled *Planning for Bushfire Protection 2019.*

1) Construction standard.	All new construction shall comply with a minimum standard of section 3 [construction general] and section 5 (BAL-12.5), *AS3959-2018* and Chapter 7 of *Planning for Bushfire Protection 2019*.
2) Asset Protection Zones	All new landscaping should be designed in accordance with the Asset protection Zone principles of Appendix 4 of PBP 2019. Recommendations for APZ's area as follows; North: To property boundary East: Minimum 22.5m South: To property boundary West: To property boundary
3) Emergency Risk Management	It is advised the residents should complete a *Bushfire Survival Plan* as formulated by the NSW Rural Fire Service and Fire and Rescue NSW. An emergency evacuation is not recommended as a condition of consent.
4) Adjacent Structures [class 10a & 10b]	Where Class 10a & 10b structures are within 6m from a dwelling in bush fire prone areas it must be built in accordance with the NCC.
5) Water supplies	Reticulated water supply is located on the adjoining road at regular intervals and is easily accessible. No additional water supplies have been recommended.
6) Fences and gates	All fences in bush fire prone areas should be made from either hardwood or non-combustible material. However, in circumstances where the fence connects directly to the dwelling, or in areas of BAL-29 or greater, they should be made of non-combustible material.

12. Summary

This report consists of a bushfire risk assessment for proposed construction of a new class 1a dwelling and pool at No 24-30 Reynolds Road, Londonderry, NSW.

The report concludes that the proposed development is on designated bushfire prone land and the legislative requirements for development of bushfire prone areas are applicable. The proposed development will be constructed to the minimum standard required in accordance with the guidelines of *Planning for Bushfire Protection 2019* and *AS 3959-2018 Construction of buildings in bushfire prone areas.*

This report has considered all of the elements of bushfire attack and provided the proposed development is constructed in accordance with the recommendations of Section 11 of this report, it is my considered opinion that the development satisfies the Objectives and Performance requirements of the *Building Code of Australia, Planning for bushfire Protection 2019 and Australian Standard AS3959, 2018.*

Note: Not with standing the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and 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 a bushfire attack on every occasion. This report is a Bushfire Hazard Assessment that provides the required information to assist Local Councils and the Rural fire Service in determining compliance in accordance with Planning for Bushfire Protection 2019 and AS3959, 2018. The local Council is the final consenting authority and the construction of the building must comply with the recommendations included in the council's conditions of consent.

[redacted]

Matthew Toghill- Bushfire Consultant

Accreditation No: BPAD31642

Grad Cert in Bushfire Protection, UWS 2012

Certificate IV Building and Construction

Certificate III in Public Safety (firefighting and emergency operations)

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

13. References

Australian Building Codes Board

Building Code of Australia

Volume 1 & 2

Canprint

Australian Building Codes Board [2001]

Fire Safety Engineering Guidelines

Edition 2001

ABCB Canberra

D. Drysdale D. [1998]

Introduction to Fire Dynamics 2nd Edition

John Wiley & Sons Ltd

NSW Government Environmental Planning and Assessment Act [1979]

Part 79BA-Consultation and development consent- Certain bushfire prone land

NSW Government Printer

Planning for Bushfire Protection 2019

A guide for Councils, Planners, Fire Authorities and Developers

This document provides the necessary planning considerations when developing areas for residential use in residential, rural residential, rural and urban areas when development sites are in close proximity to areas likely to be affected by bushfire events and replaces Planning for Bushfire Protection 2006.

This document is essential reading. Download a copy from the RFS website or purchase a copy through the NSW Government online shop or phone 9228 6333.

Ramsay C & Rudolph L [2003]

Landscape and building design for bushfire prone areas

CSIRO Publishing

Standards Australia [2018]

Australian Standards 3959

Australian Building Code Board

Appendix 1-Method 2 AS3959-2018 Calculations

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 8/02/2021 **Assessment Date:** 8/02/2021

Site Street Address:	24-30 Reynolds Rd (T1), Londonderry
Assessor:	Matthew Toghill; Bushcon Australia Pty Ltd
Local Government Area:	Penrith **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: (T1)

Vegetation Information

Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	2 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	6	**Overall Fuel Load(t/ha):**	6
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	4.5 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	22.5

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:**	130

Program Outputs

Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	2.8
Radiant Heat(kW/m2):	12.36	**Flame Angle (degrees):**	82
Flame Length(m):	9.24	**Maximum View Factor:**	0.197
Rate Of Spread (km/h):	19.4	**Inner Protection Area(m):**	22
Transmissivity:	0.826	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	60142		

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 8/02/2021 **Assessment Date:** 8/02/2021

Site Street Address:	24-30 Reynolds Rd (T2), Londonderry
Assessor:	Matthew Toghill; Bushcon Australia Pty Ltd
Local Government Area:	Penrith
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: T2

Vegetation Information

Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	2 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	6	**Overall Fuel Load(t/ha):**	6
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	4.5 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	22.91

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:**	130

Program Outputs

Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	2.77
Radiant Heat(kW/m2):	12.11	**Flame Angle (degrees):**	82
Flame Length(m):	9.24	**Maximum View Factor:**	0.193
Rate Of Spread (km/h):	19.4	**Inner Protection Area(m):**	23
Transmissivity:	0.825	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	60142		

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 8/02/2021 **Assessment Date:** 8/02/2021

Site Street Address: 24-30 Reynolds Rd (T3), Londonderry

Assessor: Matthew Toghill; Bushcon Australia Pty Ltd

Local Government Area: Penrith **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: T3

Vegetation Information

Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	1 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	6	**Overall Fuel Load(t/ha):**	6
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	1 Degrees	**Site Slope Type:**	Upslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	30

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:**	130

Program Outputs

Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	4.63
Radiant Heat(kW/m2):	8.03	**Flame Angle (degrees):**	80
Flame Length(m):	8.34	**Maximum View Factor:**	0.131
Rate Of Spread (km/h):	15.77	**Inner Protection Area(m):**	30
Transmissivity:	0.807	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	48897		