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PO Box 363 Balgowlah, NSW, 2093

## Bush Fire Assessment Report

In relation to a proposed development at:

81 Hilltop Road, Avalon, NSW

This assessment has been prepared and certified by: Matthew Toghil. BPAD certified practitioner FPAA Accreditation No: BPAD31642 Report No: 81Hil-01    Date: 16/04/2019	
Architectural plans provided by:	Bluesky Building Designs Project No: 2017090 Dated: 13/03/2019

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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 alterations and additions to the existing dwelling at No 81 Hilltop Road, Avalon, 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 4.3.5 of *Planning for Bushfire Protection 2006* 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 2006 [PBP] and Australian Standard AS3959, 2009.

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-29, in accordance with the methodology described in PBP. The development also meets performance criteria as set out in chapter 4 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 No 2 DP 30019, 81 Hilltop Rd, Avalon

Local Government Area: Northern Beaches

The development site is a residential block on the southeast side of Hilltop 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 alterations and additions to the existing dwelling and new pool.

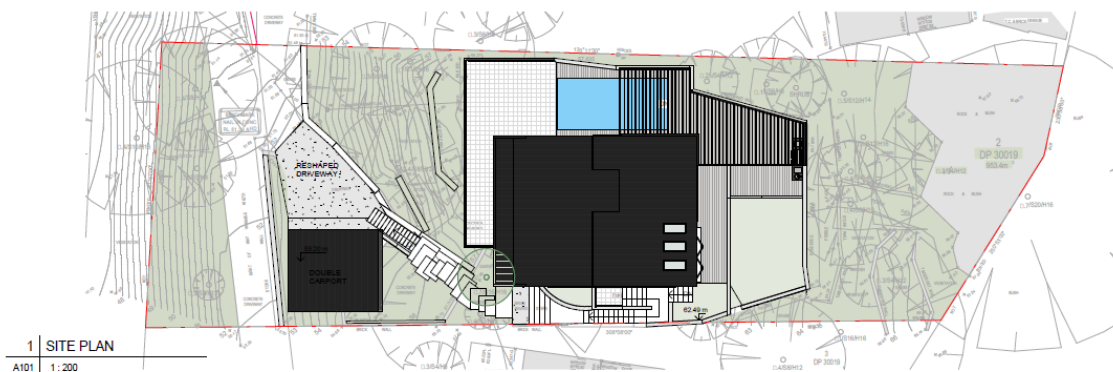


Figure 2: Site plan.

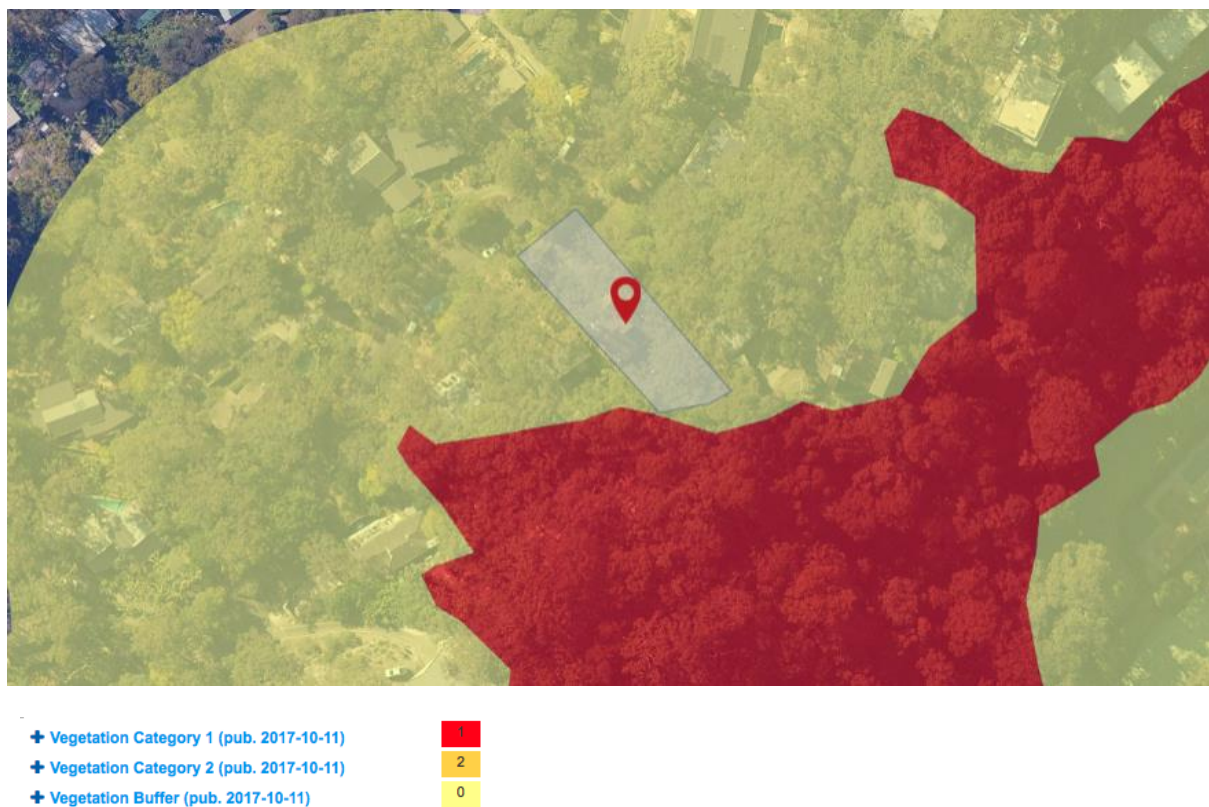


Figure 3: Bushfire prone land map showing the location of the subject site.



### 3. Classification of the Vegetation on and surrounding the site

The site is located within an existing residential subdivision. The site has been cleared and there is no threat from bushfire attack on the site. For the purpose of assessing the bushfire hazard to the subject site, there is an area of vegetation to the south, which is of significance.

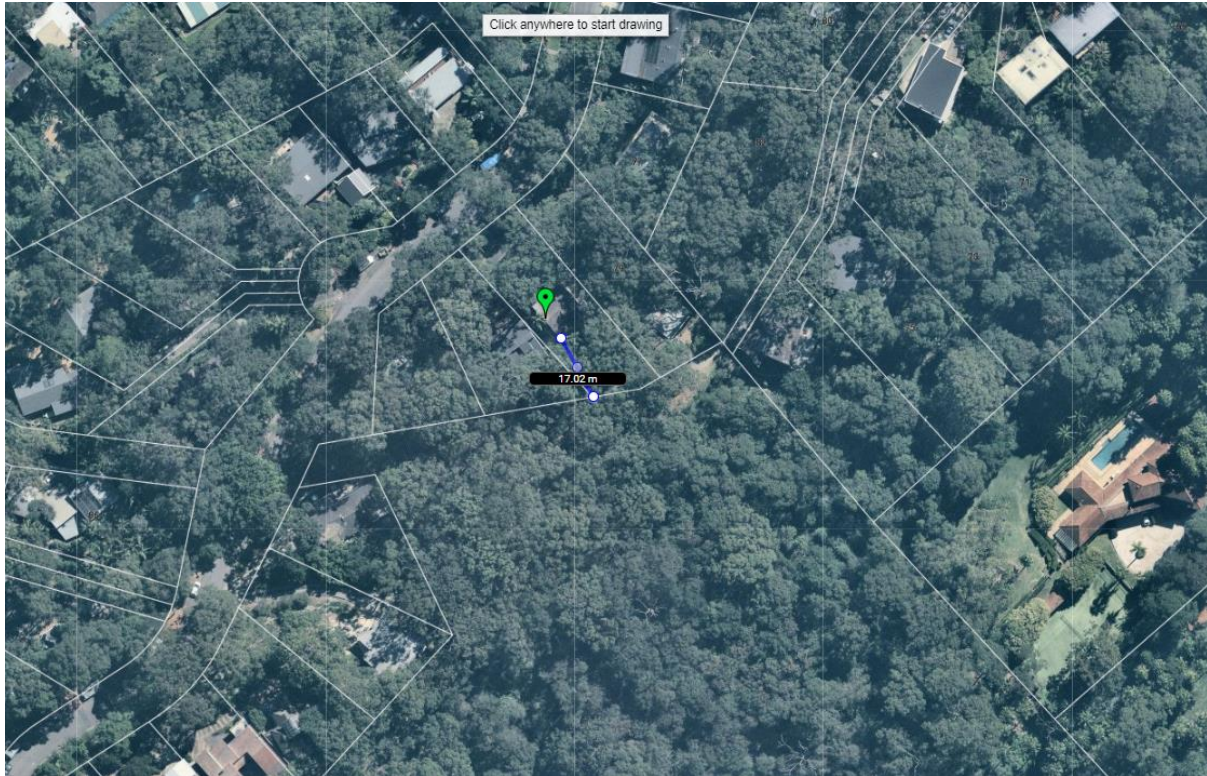


Figure 4: Aerial photo showing the location of the site and surrounding vegetation.

**North:** Properties to the north of the site are developed and maintained and there is no threat of bushfire attack from this direction for more than 100m.

**East:** Properties to the east of the site are developed and maintained and there is no threat of bushfire attack from this direction for more than 100m.

**South:** 17m to the south of the existing dwelling, there is an area of vegetation that is considered a threat for bushfire attack. With reference to PBP and the bushfire prone land map for the area the classification of vegetation for this hazard Category 1, and for the purpose of this assessment will be classified as Forest.

**West:** Properties to the west of the site are developed and maintained and there is no threat of bushfire attack from this direction for more than 100m.





Figure 5: Photos showing the landscaped backyard of the subject site.





Figure 6: Photo showing neighbouring block to the west (No 83) with Forest vegetation beyond

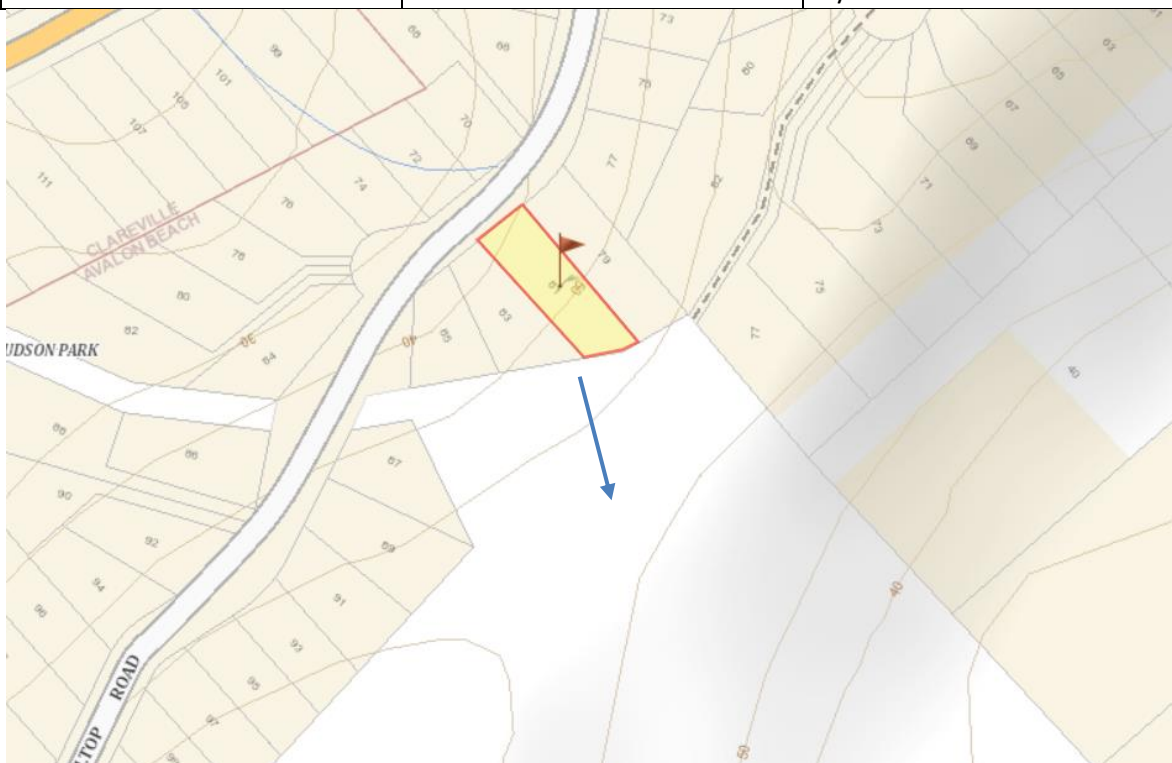


Figure 7: Photo showing the area adjoining the rear boundary of the site. The access for this area is from Chisholm Ave and provides access to the area for emergency services in the event of a fire.



## 4. Assessment of effective slope

Direction	Hazard type	Effective Slope
North	Woodland	Upslope
East	No hazard >100m	N/A
South	Forest	Upslope (16 degrees)
West	No hazard >100m	N/A



### Legend:

 Direction of effective slope

Figure 8: Contour map.

## 5. Access and Egress

The site has direct access to Hilltop 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 Hilltop 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 assessment 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

**Table 1;** reference AS 3959, 2009 Appendix B, Method 2

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

**Note:** Full computer modelling calculations can be found in Appendix 1 of this report

Direction	Distance to classified vegetation	Vegetation Classification	Assessment of effective slope	FDI	Bushfire Attack Level
North	>100m	N/A	N/A	N/A	N/A
East	>100m	N/A	N/A	N/A	N/A
South	17m	Forest	Upslope (16 Degrees)	100	BAL-29
West	>100m	N/A	N/A	N/A	N/A

Summary: Based upon the relevant provisions of PBP the anticipated radiant heat attack for the site is <29kW/m<sup>2</sup> and the subsequent minimum construction standard is BAL-29 AS 3959- 2009.

The principle of shielding allows for the next lower BAL level than that determined for the site to be applied to an elevation of the building where the elevation is not exposed to the source of bushfire attack. In this instance the northeast, southeast and southwest elevations must be BAL-29 and the northwest elevation can be reduced by one level to BAL-19.

*[There can only be a reduction of one BAL level and this can only apply to the elevation directly opposite the exposed side]*

## 10. Assessment of proposed new pool

### Pool

For the purpose of *PBP* the pool is considered a Class10b building. The Building Code of Australia (BCA) does not provide for any bush fire specific performance requirements and as such AS3959-2009 does not apply a set of 'deemed to satisfy' provisions.

Chapter 4.3.6 *PBP and other development, part (F)* of PBP requires that; *at the planning level, class 10b buildings in bushfire prone areas (e.g. fencing) should be non-combustible and where an above ground swimming pool is erected it should not adjoin or be attached directly onto the wall of a building of class 1-4 or SFPP class 9.*

In this instance, the plans and specifications provided show that the pool is constructed entirely of non-combustible materials and therefore meet to requirements of *PBP*.

Additionally, the NSW Rural Fire Service provide advice that fuel free areas, such as a swimming pool, are a desirable feature and should be encouraged.

### Pool fencing

For the purpose of *PBP* the proposed new pool fence is considered a Class10b building. The Building Code of Australia (BCA) does not provide for any bush fire specific performance requirements and as such AS3959-2009 does not apply a set of 'deemed to satisfy' provisions.

Chapter 4.3.6 *PBP and other development, part (F)* of PBP requires that; *at the planning level, class 10b buildings in bushfire prone areas should be non-combustible. (Class 10b buildings include a fence, mast, antenna, retaining or free standing wall, swimming pool or the like).*

However, The NSW Rural Fire Service has issued Fast Fact No 2/06 which provides advice on dividing fences and fences in general in bushfire prone areas.

In this instance, the plans and specifications provided show that all fencing surrounding the pool are constructed entirely of non-combustible material and therefore conforming to the NSW RFS Fast Fact 2/06.

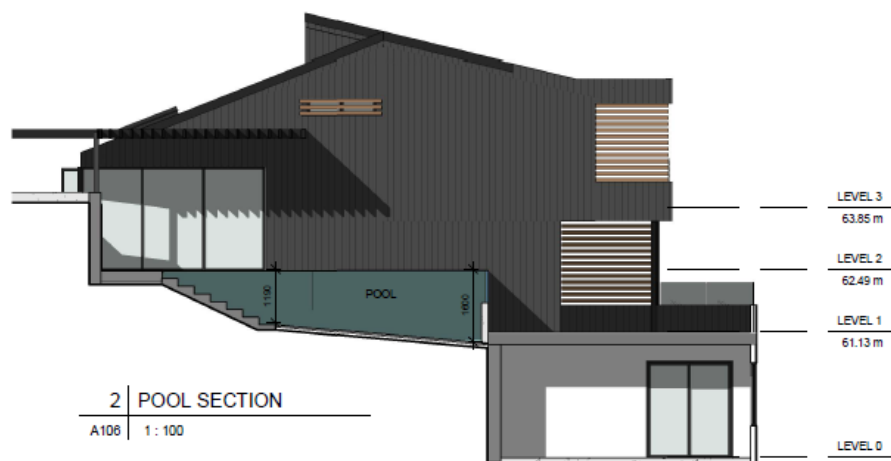


Figure 9: Section view showing proposed new pool



## 11. The extent to which the construction conforms or deviates from Chapter 4 of 'Planning for Bushfire Protection 2006'

Performance Criteria	How this development meets acceptable solutions
The intent may be achieved where:	
<u>In relation to APZ's:</u> -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.
<u>In relation to siting and design:</u> - Building are sited and designed to minimise the risk of bushfire attack.	The siting of the building has been previously determined in accordance with local council requirements, no advantage could be gained by recommending a re-siting of the building.
<u>In relation to construction standards:</u> 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 <i>Planning for Bushfire Protection 2006</i> and <i>AS 3959-2009 Construction of buildings in bushfire prone areas</i> .
<u>In relation to access requirements:</u> 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.
<u>In relation to water and utility services:</u> -Adequate water and electrical services are provided for fire fighting operations. -Gas and electricity services are located so as to not contribute to the risk of the building.	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. This report shall recommend compliance with PBP 4.1.3 for services including electricity and gas.
<u>In relation to landscaping:</u> 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 5 of <i>Planning for Bushfire Protection 2006</i> outlines the requirements for landscaping and property maintenance.
<u>In relation to emergency and evacuation planning</u>	It is advised the residents should complete a <i>Bushfire Survival Plan</i> as formulated by the NSW Rural Fire Service and Fire and Rescue NSW.

## 12. Recommendations

The following recommendations are made for the bushfire protection measures for the proposed alterations and additions to the existing dwelling at No 81 Hilltop Road, Avalon, NSW and are based upon the relevant provisions of the NSW RFS guideline entitled *Planning for Bushfire Protection 2006*.

1) <u>Construction standard.</u> Northwest elevation	New construction shall comply with a minimum standard of section 3 [construction general] and section 6 (BAL-19), AS3959-2009 and Addendum to Appendix 3 of <i>Planning for Bushfire Protection 2006</i> .
2) <u>Construction standard.</u> Northeast, southeast and southwest elevations	New construction shall comply with a minimum standard of section 3 [construction general] and section 7 (BAL-29), AS3959-2009 and Addendum to Appendix 3 of <i>Planning for Bushfire Protection 2006</i> .
3) <u>Electricity and gas supply</u>	As far as practical, new electricity and gas supplies shall be installed in accordance with the requirements of 4.1.3 of PBP. Note: 4.1.3 of PBP requires the ' <i>where practical, electrical transmission lines should be underground</i> ' and ' <i>the location of gas services will not lead to ignition of surrounding bushland of the fabric of the building</i> '.
4) <u>Asset Protection Zones</u>	At the commencement of building works and in the perpetuity, the entire property shall be managed as an Inner Protection Area as outlined within PBP and the NSW RFS document 'Standards for asset protection zones'.
5) <u>Emergency Risk Management</u>	It is advised the residents should complete a <i>Bushfire Survival Plan</i> as formulated by the NSW Rural Fire Service and Fire and Rescue NSW. An emergency evacuation is not recommended as a condition of consent.
6) <u>Adjacent Structures [class 10b]</u>	At the planning stage, class 10b buildings in bushfire prone areas should be non-combustible. [Class 10b buildings include a fence, retaining wall or free standing wall, swimming pool or the like].
7) <u>Water supplies</u>	Reticulated water supply is located on the adjoining road at regular intervals and is easily accessible. No additional water supplies have been recommended.

## 13. Summary

This report consists of a bushfire risk assessment for proposed alterations and additions to the existing dwelling at No 81 Hilltop Road, Avalon, 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 2006* and *AS 3959-2009 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 2006* and *Australian Standard AS3959, 2009*.

*Note: Notwithstanding 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 2006 and AS3959, 2009. 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.*



Matthew Toghil- 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)





## 14. 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 2<sup>nd</sup> 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 NSW [2006]**

Planning for Bushfire Protection 2006

A guide for Councils, Planners, Fire Authorities, Developers and Home Owners

*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 2001.*

*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 [2009]**

Australian Standards 3959

Australian Building Code Board

## Appendix 1- Computer modelling calculations

		<b>NBC Bushfire Attack Assessment Report V3.0</b>	
		AS3959 (2009) Appendix B - Detailed Method 2	
<b>Print Date:</b>		16/04/2019	<b>Assessment Date:</b> 16/04/2019
<b>Site Street Address:</b>	81 Hilltop Rd, Avalon		
<b>Assessor:</b>	Matthew Toghil; Bushcon Australia Pty Ltd		
<b>Local Government Area:</b>	Pittwater	<b>Alpine Area:</b>	No
<b>Equations Used</b>			
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			
<b>Run Description:</b>		south	
<b>Vegetation Information</b>			
<b>Vegetation Type:</b>	Forest	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	15 Degrees	<b>Vegetation Slope Type:</b>	Upslope
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	35
<b>Vegetation Height(m):</b>	2	Only Applicable to Shrub/Scrub and Vesta	
<b>Site Information</b>			
<b>Site Slope:</b>	15 Degrees	<b>Site Slope Type:</b>	Upslope
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	17
<b>Fire Inputs</b>			
<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1090
<b>Calculation Parameters</b>			
<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	100
<b>Program Outputs</b>			
<b>Category of Attack:</b>	HIGH	<b>Peak Elevation of Receiver(m):</b>	9.17
<b>Level of Construction:</b>	BAL 29	<b>Fire Intensity(kW/m):</b>	19271
<b>Radiant Heat(kW/m2):</b>	23.39	<b>Flame Angle (degrees):</b>	56
<b>Flame Length(m):</b>	11.13	<b>Maximum View Factor:</b>	0.362
<b>Rate Of Spread (km/h):</b>	1.07	<b>Inner Protection Area(m):</b>	11
<b>Transmissivity:</b>	0.85	<b>Outer Protection Area(m):</b>	6