

# Bush Fire Assessment Report

## *Planning Proposal*

**9 Palaran Avenue,  
North Kellyville NSW**

*Reference Number: 211309*

*Prepared For:*

**Dr Geoff Morgans**

**C/- Robert Moore & Associates**

**3<sup>rd</sup> June 2021**



*Prepared By:*

**Building Code & Bushfire  
Hazard Solutions Pty Limited**

Tel: (02) 9457 6530

PO Box 124  
Berowra NSW 2081  
ABN 19 057 337 774

[www.bushfirehazardsolutions.com.au](http://www.bushfirehazardsolutions.com.au)



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4.14 applications (under the Environmental Planning and Assessment Act 1979) and all infill development applications may be referred by Council to the NSW Rural Fire Service for review and concurrence during the DA process. S100B applications under the Rural Fires Act 1997 (subdivisions and Special Fire Protection Purpose Developments), Flame Zone determinations and Alternate Solutions must be referred by Council to the NSW Rural Fire Service for review and receipt of a Bushfire Safety Authority (BSA) or other such recommended conditions from the NSW Rural Fire Service before the consent can be granted.

The onus is on the applicant to cross reference this document with any conditions of consent issued by Council or any requirements supplied by the NSW Rural Fire Service following development approval. Building Code & Bushfire Hazard Solutions can review and cross reference these documents however the onus is on the applicant to provide them to us and request this review – Building Code and Bushfire Hazard Solutions Pty. Ltd. is not in a position to track every DA through Council and we rely upon the applicant to undertake this role as project co-ordinator.

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Version Control			
Version	Date	Author	Details
1	03/06/2021	Stuart McMonnies BPAD Accreditation No. 9400	Final Report

## List of Abbreviations:

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APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018 as amended
BAL	Bushfire Attack Level
BPMs	Bushfire Protection Measures
BPLM	Bush Fire Prone Land Map
Council	The Hills Shire Council
DA	Development Application
EP&A Act	Environmental Planning and Assessment Act - 1979
FRNSW	Fire & Rescue NSW
IPA	Inner Protection Area
NCC	National Construction Code
NP	National Park
NSP	Neighbourhood Safer Places
OPA	Outer Protection Area
PBP	Planning for Bush Fire Protection – 2019
ROW	Right of Way
RF Act	Rural Fires Act - 1997
RFS	NSW Rural Fire Service
SBFS	Strategic Bush Fire Study
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SWS	Static Water Supply

## Executive Summary

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Building Code and Bushfire Hazard Solution P/L has been commissioned by Dr Geoff Morgans to prepare an independent Bushfire Assessment Report for a Planning Proposal which will facilitate a future residential development at 9 Palaran Avenue, North Kellyville.

The subject site comprises of an existing allotment (Lot 3 DP 249675), zoned R2: Low Density Residential and E4: Environmental Living.

The subject site is located within the North Kellyville precinct of the North West Growth Area.

The Planning Proposal seeks the following amendments to the State Environmental Planning Policy (Sydney Region Growth Centres) 2006, which are the basis for the assessment in this Planning Proposal:

- Amend the North West Growth Centre Lot Size Map to change the minimum lot size that applies to part of the site from 4,000 square metres to 600 square metres; and
- Rezone the subject site from E4 Environmental Living to R2 Low Density Residential.

In this instance the subject site is depicted on The Hills Council's Bushfire Prone Land Map as partially containing the 100 metre buffer zone from designated Category 1 Vegetation. The subject site is therefore considered 'bushfire prone'.

In relation to this Planning Proposal The Hills Council is required to apply section 9.1(2) of the Environmental Planning and Assessment Act 1979. Direction 4.4 Planning for Bushfire Protection identifies matters for consideration for proposals that affect or are in proximity to land mapped as bushfire prone. Under these directions the following objectives apply:

- i. to protect life, property and the environment from bush fire, by discouraging the establishment of incompatible land uses in bush fire prone areas; and*
- ii. to encourage sound management of bush fire prone areas.*

A Strategic Bush Fire Study has been undertaken and concluded the proposal is appropriate in the bushfire hazard context.

In addition to the Strategic Bush Fire Study an assessment of the proposal against Planning for Bush Fire Protection 2019 has concluded the future Development Application has the capacity to satisfy this document.

A key consideration for planning proposals in bushfire prone areas is limiting or excluding incompatible development commensurate with the level of risk. In this regard the subject site is considered to have a low bushfire risk when considering the characteristics of the vegetation and the fact there have been no recorded wildfires within the immediate area (closest recorded wildfire approximately 3.6km to the north).

It is of our opinion that the proposal satisfies all relevant specifications and requirements of Planning for Bush Fire Protection 2019.

## 1.0 Introduction

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Building Code and Bushfire Hazard Solution P/L has been commissioned by Dr Geoff Morgans to prepare an independent Bushfire Assessment Report for a Planning Proposal which will facilitate a future residential development at 9 Palaran Avenue, North Kellyville.

The subject site comprises of an existing allotment (Lot 3 DP 249675), zoned R2: Low Density Residential and E4: Environmental Living.

The Planning Proposal relates to the eastern portion of subject site and will facilitate development of the land currently zoned E4: Environmental Living in a manner consistent with the R2: Low Density Residential zoned land.

In this instance the subject site is depicted on The Hills Council's Bushfire Prone Land Map as partially containing the 100 metre buffer zone from designated Category 1 Vegetation. The subject site is therefore considered 'bushfire prone'.

In relation to this planning proposal The Hills Council is required to apply section 9.1(2) of the Environmental Planning and Assessment Act 1979. Direction 4.4 Planning for Bushfire Protection identifies matters for consideration for proposals that affect or are in proximity to land mapped as bushfire prone. Under these directions the following objectives apply:

- i. to protect life, property and the environment from bush fire, by discouraging the establishment of incompatible land uses in bush fire prone areas; and*
- ii. to encourage sound management of bush fire prone areas.*

The proposal must demonstrate compliance with the s9.1(2) Directions and the relevant specification and requirements of Planning for Bush Fire Protection 2019 (PBP).

The application of PBP requires satisfactory demonstration of the aim and objectives and the specific objectives and bushfire protection measures relevant to the type of development.

In this instance the proposal relates to a Planning Proposal to facilitate a future residential subdivision and therefore in addition to the aim and objectives detailed in Chapter 1 'Introduction' the proposal must satisfy Chapter 4 'Strategic Planning' of PBP. The bushfire protection measures detailed in Chapter 5 'Residential and Rural Residential Subdivisions' of PBP have also been considered for the future subdivision application.

## 2.0 Purpose of Report

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The purpose of this Bushfire Assessment Report is to provide an independent bushfire assessment together with appropriate recommendations for bushfire mitigation measures considered necessary having regard to development within a designated 'bushfire prone' area.

## 3.0 Scope of this Report

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The scope of this report is limited to providing a bushfire assessment and recommendations for the subject site. Where reference has been made to the surrounding lands, this report does not purport to directly assess those lands; rather it may discuss bushfire impact and/or progression through those lands and possible bushfire impact to the subject site.

## 4.0 Aerial Image, BPLM, Zoning Conceptual & Lot Layout



Figure 01: Aerial view of the subejct area (Nearmap April 2021)  
Subject site (thick red outline)



Figure 02: Extract from The Hills Council's Bushfire Prone Land Map  
Subject site (thick red outline)

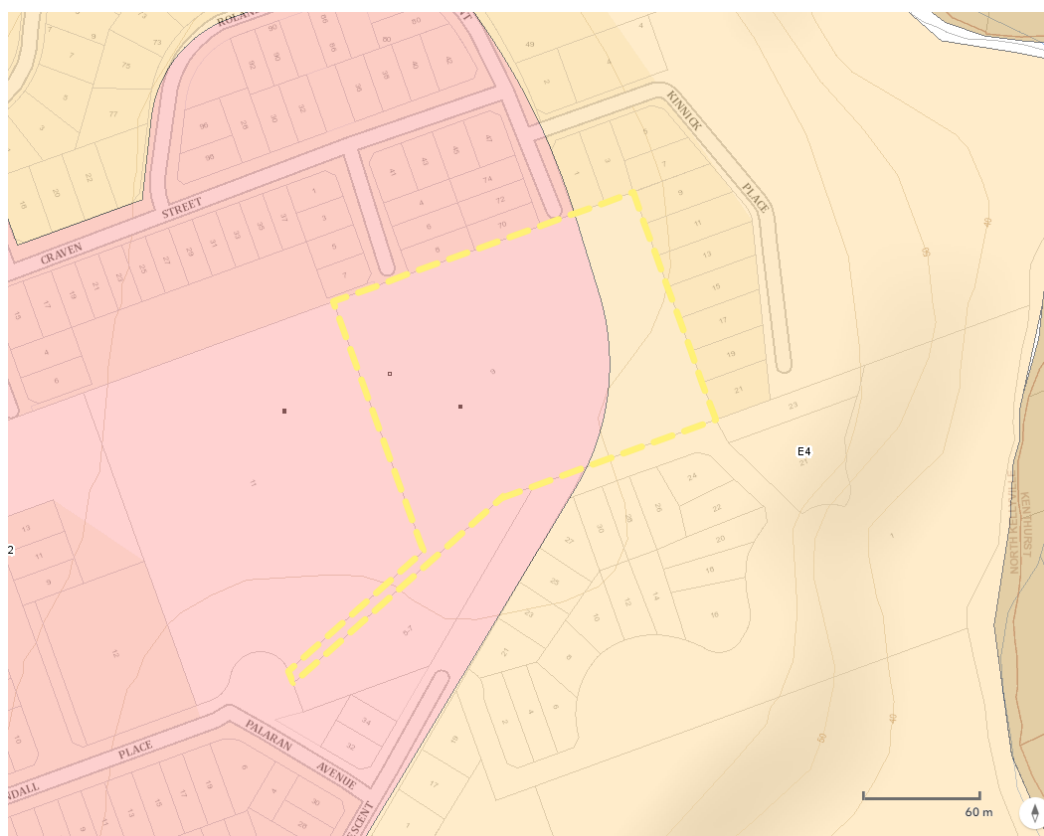


Figure 03: Land zoning of the subject area  
Subject site (outlined in yellow)



Figure 04: Extract of Conceptual Lot Layout prepared by Robert Moore and Associates Pty Ltd

## 5.0 Bushfire Assessment

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### 5.01 Preface

Properties considered to be affected by possible bushfire impact are determined from the local Bushfire Prone Land Map as prepared by Council and/or the Rural Fire Service. All development within affected areas is subject to the application of the relevant specifications and requirements of 'Planning for Bush Fire Protection - 2019' (PBP).

PBP formally adopted on the 1<sup>st</sup> March 2020 provides for the protection of property and life (including fire-fighters and emergency service personnel) from bushfire impact.

In this instance the subject site is depicted on The Hills Council's Bushfire Prone Land Map as partially containing the 100 metre buffer zone from designated Category 1 Vegetation. The subject site is therefore considered to be 'bushfire prone'.

When preparing a planning proposal s9.1(2) of the EP&A Act is required to be applied. Direction 4.4 'Planning for Bushfire Protection' of the s9.1(2) Direction, applies when a Council prepares a draft LEP that affects, or is in proximity to, land mapped as bushfire prone. Under these directions the following objectives apply:

- i. to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas; and
- ii. to encourage sound management of bush fire prone areas.

Under direction 4.4 the Commissioner of the NSW RFS must be consulted and any comments taken into account. As part of the consultation process with the NSW RFS, a bush fire assessment is required to be submitted to demonstrate compliance with the s9.1(2) Directions and PBP.

Consideration must be given to limiting or excluding incompatible development in bushfire affected areas commensurate with the level of risk. A key principle to ensure this is that future development is designed and sited capable of complying with PBP.

The NSW Rural Fire Service also encourages the application of zones that limit or exclude inappropriate development in bushfire prone areas where:

- *the development area is exposed to a high bush fire risk and should be avoided;*
- *the development is likely to be difficult to evacuate during a bush fire due to its siting in the landscape, access limitations, fire history and/or size and scale;*
- *the development will adversely effect other bush fire protection strategies or place existing development at increased risk;*
- *the development is within an area of high bush fire risk where density of existing development may cause evacuation issues for both existing and new occupants; and*
- *the development has environmental constraints to the area which cannot be overcome.*

We provide the following assessment in consideration of the above and Planning for Bush Fire Protection 2019 to highlight the suitability of the site for higher density residential development and the relevant bushfire protection measures.

## 5.02 Strategic Bush Fire Study

Planning proposals which relate to bushfire prone properties require the preparation of a Strategic Bush Fire Study. The Strategic Bush Fire Study (SBFS) provides opportunity to assess the broader landscape and ultimately assesses whether the new zone and proceeding development is appropriate in the bushfire hazard context.

Once these strategic issues have been addressed in the SBFS, an assessment of whether the proposal can comply with PBP must then be carried out. The assessment against PBP is addressed in section 5.03 of this report.

The following assessment details the components in Table 4.2.1 of PBP which must be addressed in a SBFS.

### Bushfire Landscape Assessment

The Bushfire Landscape Assessment component considers the likelihood of a bushfire and its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.

#### Location

The subject site comprises of one (1) existing allotment (zoned R2: Low Density Residential and E4: Environmental Living), being:

Street Address	Lot and DP
9 Palaran Avenue, North Kellyville	Lot 3 DP 249675

The subject site is located within The Hills Council's local government area and is captured in the North West Growth Area.

The subject site has street frontage to Palaran Avenue to the southwest, Roland Garros Crescent to the south and north and Barabati Road to the north. The subject site abuts existing developed properties to the north, east and south and a large private residential allotment to the west.

The rezoning application relates to the eastern portion of subject site and will facilitate the creation of twenty-one (21) new residential allotments, one (1) residue allotment and associated infrastructure (roads).



Figure 05: Extract from the North Kellyville Precinct Draft Indicative Layout Plan

## Vegetation

The subject site was found to largely comprise of maintained lawns and gardens.

As part of this bushfire assessment process consideration has been given to all existing vegetation within neighbouring allotments and any retained or proposed vegetated areas within the subject site. We have also considered the extent of the 'Native Vegetation Protection' layer in accordance with *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.

It is understood that there will be no retained or proposed vegetated areas within the subject site which would warrant consideration as a bushfire hazard.

In accordance with Appendix 1 'Site Assessment Methodology' of PBP we have undertaken an assessment of all vegetation formations within 140 metres of the subject site for each aspect as per Keith (2004).

The vegetation posing a bushfire hazard to the subject site was found to be located to the east and south within large vegetated allotments. The extent of the bushfire hazards is consistent with the 'Native Vegetation Protection' layer of the SEPP.

It is acknowledged that there is a designated Asset Protection Zone (APZ) within the vegetated allotment to east of the subject site. This APZ is a condition of consent relating to the adjacent residential development (DA 294/2016/ZD). As there is an enforcement mechanism for this APZ it has been included within the available APZ for this matter.

The development consent (635/2019/ZD) for the residential subdivision to the south of the subject site also includes a Managed Ecological Zone which is required to be maintained in accordance with an APZ. Similarly, as there is an enforcement mechanism for this APZ it has also been included within the available APZ for this matter

The vegetation posing a hazard to the east and south was found to consist 10-20 metres in height with a 30-70% canopy foliage cover and understorey of low trees, shrubs and grasses. For the purpose of this assessment the vegetation posing a hazard was determined to be Sydney Coastal Dry Sclerophyll Forests.



Figure 06: Aerial view of the subject area with vegetation assessment  
Subject site (thick red outline), external DA enforced APZs (green shade)

## Slope and Topography

The slope of the land under the classified vegetation has a direct influence on the forward rate of spread, fire intensity and radiant heat exposure. The effective slope is considered to be the slope under the classified vegetation which will most significantly influence bushfire behaviour toward the development site.

In accordance with A1.4 'Determine slope' of PBP the slope assessment is to be derived from the most detailed contour data available.

The slope that would **most significantly** influence bushfire behaviour was determined from topographic imagery (1 metre contours sourced from ELVIS - Geoscience Australia) in conjunction with site observations.

As shown in Figure 08 overleaf there were areas to the northeast and east of the subject site within the bushfire hazard where the slope consistently exceeds 20 degrees.

The APZ tables within PBP are provided for acceptable solutions with slopes of up to 20 degrees. Effective slopes in excess of 20 degrees require a detailed performance assessment which include a consideration of the potential flame length and its impact on the proposed development. In this regard bushfire design modelling has been used to determine the minimum required Asset Protection Zones.



Figure 07: LiDar contour mapping of subject area (1m contours)

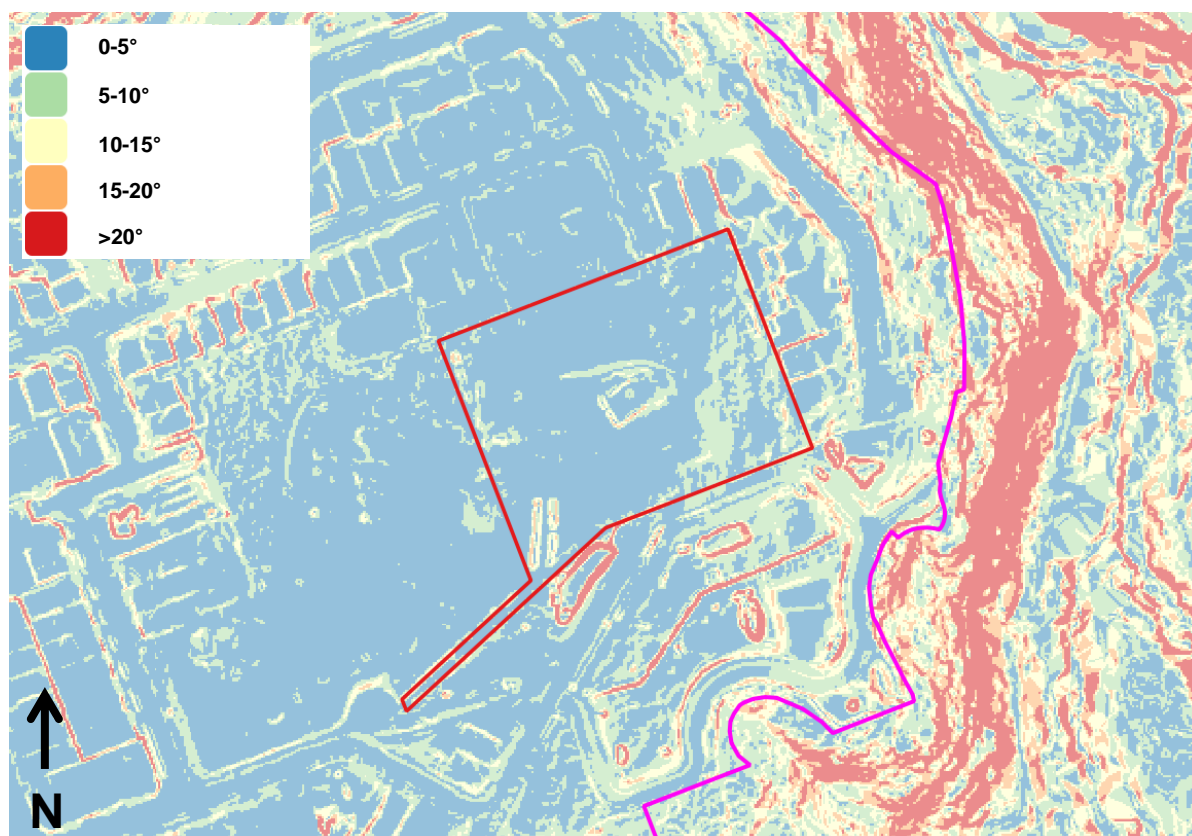


Figure 08: Slope analysis plan  
Subject site (red outline), hazard interface (thick pink line)

### Fire Weather

All development which attracts an Asset Protection Zone under PBP requires the identification of the relevant Fire Danger Index (FDI). The FDI required to be used for development assessment purposes is based on the local government boundaries, being The Hills Council in this instance.

In accordance with the NSW Rural Fire Service publication 'NSW Local Government Areas FDI' (2017) The Hills Council is located within the Greater Sydney Region Fire Weather District which attracts a Fire Danger Index (FDI) of 100 for bushfire planning purposes.

## Previous Bushfire History

There are areas within NSW that have significant fire history and are recognised as known fire paths. In a planning context it is important to identify these locations and ensure incompatible development is not proposed.

In this instance there have been no recorded wildfires within the subject site or immediate surrounding area (source NPWS Fire History dataset).

There were also no visual indicators of previous bushfires at the time of our inspection.

The closest recorded wildfire was found to be located approximately 3.6 kilometres to the north of the subject site which occurred in 2002 (Chilvers (East)).

The subject site is therefore not considered to be within a known fire path. Furthermore in consideration of the previous bushfire history the likelihood of a bushfire occurring within the immediate area is considered unlikely.



Figure 09: Aerial view of the subject area

## Potential Fire Behaviour

The most significant bushfire threat to the subject site is considered to be from the Native Vegetation Protection area to the east and south of the subject site.

This vegetated corridor is associated with Cattai Creek and associated tributaries and predominately runs in a north /south direction.

Traditionally severe fire weather in this locality is influenced by north-westerly / westerly winds which bring hot dry conditions from inland Australia. A bushfire burning under these conditions within the identified bushfire hazards would be influenced away from the subject site.

In applying the parameters described in this section and accepted assessment methodology described in PBP bushfire design modelling indicates the vegetation posing a hazard to the east, being the highest hazard, has the following potential outputs:

### East:

Bushfire Behaviour	Output
Flame Length	90.31 metres *
Rate of Spread	13.39 km/h
Fire Intensity	188,854 kW/m

\* In consideration of the vegetation height, aspect, traditional prevailing weather conditions associated with severe fire behaviour and volume of exposed rock outcrops a 90.31 metre flame length is not considered realistic.

While there is a general acceptance that the use of tradition bushfire design modelling on slopes >20 degrees exaggerates the calculated flame length it is currently industry practice to ensure available building envelopes/ future dwellings are outside this calculated flame length.

## Access & Suppression

Access for attending fire services to undertake early suppression is a key factor in whether a fire has the opportunity to develop into a quasi-steady state at which point the opportunity to control / extinguish the fire becomes far more challenging.

Where good access is available it provides opportunity to control / extinguish a fire in its growth phase before developing further and consequently becoming more difficult to conduct direct attacks.

In this particular instance direct vehicle access is available to the identified bushfire hazards via either Kinnick Place or Eden Road. These roads were designed and approved under Planning for Bush Fire Protection.

In addition a service trail is also located along the length of Smalls Creek which may be utilised by attending fire services.

In consideration of the comprehensive access available to the identified hazards and their exposure to the public the identification and subsequent early extinguishment of a bushfire in the area is considered probable.

## Land Use Assessment

The Land Use Assessment identifies the most appropriate locations in the masterplan area for the proposed land uses.

In this instance the proposal does not include a broad masterplan but rather a specific 'spot' rezoning. The Planning Proposal relates to the eastern portion of subject site and will facilitate development of the land currently zoned E4: Environmental Living in a manner consistent with the R2: Low Density Residential zoned land.

The proposed Conceptual Lot Layout has located the future road design and residential allotments consistent with the North Kellyville Precinct Draft Indicative Layout Plan. The subject site is also located such that there is existing residential development, including perimeter roads, located between the identified bushfire hazards.

## Access and Egress

It is important to assess the capacity of both the existing and proposed road networks both within and external to the area.

The subject site has street frontage to Palaran Avenue to the southwest, Roland Garros Crescent to the south and north and Barabati Road to the north.

The future residential development will provide the continuation of Roland Garros Crescent and Barabati Road consistent with the North Kellyville Precinct Draft Indicative Layout Plan. Importantly these two future connection points will provide residents in the area alternate egress options in the event of a bushfire.

The key evacuation routes from the subject site is to the north via Roland Garros Crescent and Barabati Road or south via Roland Garros Crescent.

Future residents / occupants will have two evacuation routes available which are generally away from the identified bushfire hazards.

The existing surrounding public roads currently exceed the minimum carriageway requirements for non-perimeter roads as described in section 5.3.2 of PBP.

In consideration of the existing surrounding road network and the modest population increase as a result of the proposal, the available access and egress routes are considered acceptable.

## Emergency Services

In some circumstances the scale of a planning proposal warrants a need to include provisions for a new fire station.

The subject site is located within the NSW Rural Fire Service area with a station (Kellyville RFB) located less than 1 kilometre to the south (measured in direct line of sight).

NSW Fire & Rescue also has a station located within the township Kellyville.

In consideration of the relatively modest size of the future residential development the existing fire service coverage is considered acceptable.

## Infrastructure

An assessment of the issues associated with infrastructure and utilities must be undertaken. This assessment is to include the ability of the reticulated water system to deal with a major bushfire event in terms of pressures, flows and spacing of hydrants.

There are existing hydrants available along Palaran Avenue, Roland Garros Crescent, Barabati Road and surrounding streets for the replenishment of attending fire services.

The capabilities of this broader hydrant network is the responsibility of Sydney Water. The modest size of the future residential development is unlikely to have a significant adverse impact on this system.

The sizing, spacing and pressures of any future internal hydrant system must comply with AS2419.1-2005.

### 5.03 Planning for Bush Fire Protection

As the strategic issues have been satisfactorily addressed in the SBFS, an assessment of whether the proposal can comply with PBP is required. This section addresses the future residential subdivisions capacity to comply with the relevant specifications and requirements of PBP.

#### Asset Protection Zones

Asset Protection Zones (APZs) for residential subdivision are determined from Table A1.12.2 of Planning for Bush Fire Protection 2019 (PBP) or bushfire design modelling achieving a radiant heat impact of no more than 29 kW/m<sup>2</sup> at a building footprint.

The minimum required Asset Protection Zones for the future residential development were determined from Table A1.12.2 of PBP to be 56 metres to the east and southeast and 45 metres to the south.

Bushfire design modelling was used to determine the minimum required Asset Protection Zones for the hazards to the northeast and east which were found to have an effective slope of >20 degrees.

This modelling (attached) while concluding a 69 metre Asset Protection Zone is necessary to achieve the 29kW/m<sup>2</sup> requirement to the northeast calculated a flame length of 84.53 metres.

Similarly while a 74 metre Asset Protection Zone is necessary to achieve the 29kW/m<sup>2</sup> requirement to the east the calculated flame length is 90.31 metres

While there is a general acceptance that the use of tradition bushfire design modelling on slopes >20 degrees exaggerates the calculated flame length it is currently industry practice to ensure available building envelopes/ future dwellings are outside this calculated flame length. We have subsequently adopted the calculated flame length as the minimum required APZs to these aspects.

As shown on Figure 10 overleaf the subject site and future residential allotments have the capacity to comply with the minimum required Asset Protection Zones as detailed in PBP.

The available APZs consist of the land within the subject site and existing developed residential properties, DA enforced APZs and formed roads.

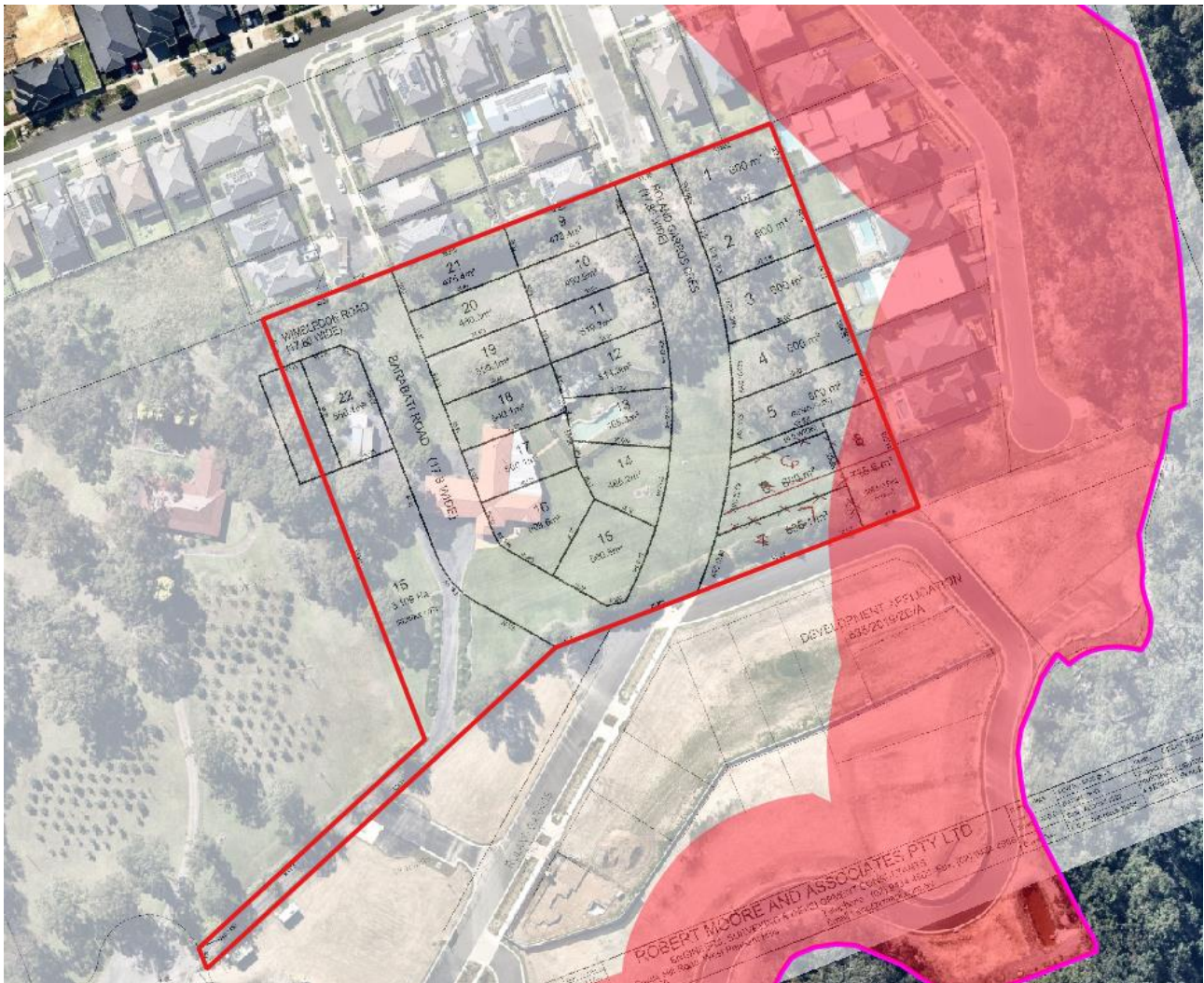


Figure 10: Aerial of the subject are overlaid with Conceptual Lot Layout and minimum required Asset Protection Zones

## Fire Fighting Water Supply

There are existing hydrants available along Palaran Avenue, Roland Garros Crescent, Barabati Road and surrounding streets for the replenishment of attending fire services.

The sizing, spacing and pressures of any future internal hydrant system must comply with AS2419.1-2005.

The subject site has the capacity to comply with the Water Supply requirements as detailed in section 5.3.3 of PBP.

## Property Access

The subject site has street frontage to Palaran Avenue to the southwest, Roland Garros Crescent to the south and north and Barabati Road to the north.

Planning for Bush Fire Protection addresses design considerations for internal roads (public roads) for properties determined to be bushfire prone.

The future residential development will provide the continuation of Roland Garros Crescent and Barabati Road consistent with the North Kellyville Precinct Draft Indicative Layout Plan.

We are satisfied that the proposed internal road system has the capacity to comply with the requirements for Access under section 5.3.2 of PBP 2019.

## 6.0 Conclusion

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Building Code and Bushfire Hazard Solution P/L has been commissioned by Dr Geoff Morgans to prepare an independent Bushfire Assessment Report for a Planning Proposal which will facilitate a future residential development at 9 Palaran Avenue, North Kellyville.

The subject site comprises of an existing allotment (Lot 3 DP 249675), zoned R2: Low Density Residential and E4: Environmental Living.

In this instance the subject site is depicted on The Hills Council's Bushfire Prone Land Map as partially containing the 100 metre buffer zone from designated Category 1 Vegetation and therefore the subject site is considered 'bushfire prone'.

We are satisfied that the subject site and proposed Conceptual Lot Layout has the capacity to comply with the relevant specifications and requirements of *Planning for Bush Fire Protection 2019*.

Furthermore we are satisfied that the proposed Conceptual Lot Layout, in combination with the bushfire protection measures discussed herein will not result in areas that are difficult to evacuate, create control difficulties during a bushfire or adversely affect other bush fire protection strategies or place existing development at increased risk.

We are therefore in support of the Planning Proposal.

Should you have any enquiries regarding this project please contact me at our office.

Prepared by  
Building Code & Bushfire Hazard Solutions P/L



### **Stuart McMonnies**

Manager Bushfire Section  
G. D. Design in Bushfire Prone Areas.  
Certificate IV Fire Technology  
Fire Protection Association of Australia BPAD – L3 Accredited Practitioner  
Certification number – BPAD9400



## 7.0 Annexure 01

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### List of Referenced Documents

Australian Building Codes Board (2019). *National Construction Code Volume Two - Building Code of Australia*. ABCB

ELVIS -Elevation -Foundation Spatial Data. Elevation.fsdf.org.au. Available at: <http://elevation.fsdf.org.au/>

*Environmental Planning and Assessment Act 1979*

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*Rural Fires Regulations 2013*

Rural Fire Service NSW (2005). *Standards for Asset Protection Zones*

Rural Fire Service NSW (2017). *NSW Local Government Areas FDI*

State Environmental Planning Policy (Sydney Region Growth Centres) 2006

Standards Australia (2018). *AS3959 Construction of buildings in bushfire-prone areas*.

Standards Australia (2014). *AS/NZS 1596 The storage and handling of LP Gas*

Acknowledgements to:

Geoscience Australia  
Nearmap  
[Street-directory.com.au](http://Street-directory.com.au)

### Attachments

Attachment 01: Bushfire Attack Assessment Report



# NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 1/06/2021

Assessment Date: 1/06/2021

Site Street Address: 9 Palaran Avenue, North Kellyville

Assessor: Stuart McMonnies; Bushfire Hazard Solutions

Local Government Area: The Hills

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: East

## Vegetation Information

Vegetation Type: Sydney Coastal DSF

Vegetation Group: Dry Sclerophyll Forests (Shrubby)

Vegetation Slope: 24 Degrees

Vegetation Slope Type: Downslope

Surface Fuel Load(t/ha): 21.3

Overall Fuel Load(t/ha): 27.3

Vegetation Height(m): 1.4

Only Applicable to Shrub/Scrub and Vesta

## Site Information

Site Slope: 6 Degrees

Site Slope Type: Downslope

Elevation of Receiver(m): Default

APZ/Separation(m): 74

## 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

Level of Construction: BAL FZ

Peak Elevation of Receiver(m): 24.79

Radiant Heat(kW/m2): 29

Flame Angle (degrees): 46

Flame Length(m): 90.31

Maximum View Factor: 0.488

Rate Of Spread (km/h): 13.39

Inner Protection Area(m): 76

Transmissivity: 0.781

Outer Protection Area(m): 0

Fire Intensity(kW/m): 188854

Run Description:	Northeast		
<u>Vegetation Information</u>			
Vegetation Type:	Sydney Coastal DSF		
Vegetation Group:	Dry Sclerophyll Forests (Shrubby)		
Vegetation Slope:	23 Degrees	Vegetation Slope Type:	Downslope
Surface Fuel Load(t/ha):	21.3	Overall Fuel Load(t/ha):	27.3
Vegetation Height(m):	1.4	Only Applicable to Shrub/Scrub and Vesta	
<u>Site Information</u>			
Site Slope:	7 Degrees	Site Slope Type:	Downslope
Elevation of Receiver(m):	Default	APZ/Separation(m):	69
<u>Fire Inputs</u>			
Veg./Flame Width(m):	100	Flame Temp(K):	1090
<u>Calculation Parameters</u>			
Flame Emissivity:	95	Relative Humidity(%):	25
Heat of Combustion(kJ/kg	18600	Ambient Temp(K):	308
Moisture Factor:	5	FDI:	100
<u>Program Outputs</u>			
Level of Construction:	BAL FZ	Peak Elevation of Receiver(m):	22.94
Radiant Heat(kW/m2):	29	Flame Angle (degrees):	48
Flame Length(m):	84.53	Maximum View Factor:	0.487
Rate Of Spread (km/h):	12.5	Inner Protection Area(m):	0
Transmissivity:	0.783	Outer Protection Area(m):	0
Fire Intensity(kW/m):	176262		