

# Bushfire Assessment Report

***Proposed:***  
**Mixed use and Seniors  
Housing Development**

***At:***  
**5 Skyline Place,  
Frenchs Forest NSW**

*Reference Number:* 210979

*Prepared For:*  
Platino Properties Pty Ltd

**22<sup>nd</sup> February 2021**



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Version Control				
Version	Date	Author	Reviewed By	Details
1	22/02/2021	Stuart McMonnies BPAD Accreditation No. 9400	David McMonnies BPAD Accreditation No. 2354	Final Report

## List of Abbreviations:

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APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018 as amended
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BPMs	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
Council	Northern Beaches Council
DA	Development Application
ELVIS	Elevation and Depth Foundation Spatial Data
EP&A Act	<i>Environmental Planning and Assessment Act - 1979</i>
ESD	Ecologically Sustainable Development
FRNSW	Fire and Rescue NSW
IPA	Inner Protection Area
NCC	National Construction Code
NP	National Park
NSP	Neighbourhood Safer Places
OPA	Outer Protection Area
PBP	<i>Planning for Bush Fire Protection – 2019</i>
ROW	Right of Way
RF Act	<i>Rural Fires Act - 1997</i>
RFS	NSW Rural Fire Service
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 Solutions P/L has been commissioned by Platino Properties Pty Ltd to prepare an independent Bushfire Assessment Report to accompany a Development Application seeking approval for a seniors housing and mixed use development at 5 Skyline Place, Frenchs Forest (Lot 101 DP 1209504).

The development involves the construction of two (2) multi-storey apartment buildings, comprising of one hundred and thirty-three (133) units, and associated infrastructure and landscaping.

The proposal expands on a recently approved senior housing and mixed use development within the subject site (DA2018/0995 & Mod2019/0654). The NSW Rural Fire Service assessed both of these applications against Planning for Bush Fire Protection 2006 and issued their General Terms of Approval under Division 4.8 of the *Environmental Planning and Assessment Act 1979*, and a Bush Fire Safety Authority, under section 100B of the *Rural Fires Act 1997* (RFS ref: D18/6003 & DA-2018-02401-s4.55-1).

The subject site has street frontage to Skyline Place to the east and Frenchs Forest Road East to the north and abuts existing private allotments (zoned B7: Business Park) to the south and west.

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

Seniors housing is a listed Special Fire Protection Purpose (SFPP) under section 100b(6) of the *Rural Fires Act 1997*.

As the proposal involves a listed SFPP development on bushfire prone land it is classified as integrated development under section 4.46 of the *Environmental Planning and Assessment Act 1979*. The Development Application subsequently requires a Bushfire Safety Authority from the NSW Rural Fire Service.

In accordance with the submission requirements for a Bush Fire Safety Authority as detailed in clause 44 of the *Rural Fires Regulation 2013* an assessment of the extent to which the proposed development conforms with or deviates from *Planning for Bush Fire Protection* (PBP) is required.

The vegetation identified as being the potential bushfire hazard is located to the west of the subject site within two (2) vacant allotments zoned B7: Business Park and RE1: Public Recreation. This hazard was found to be a small (<2ha) fragmented stand of Sydney Coastal Dry Sclerophyll Forest surrounded by the recently upgraded Frenchs Forest Road East, Warringah Road and Wakehurst Parkway and existing commercial development.

The vegetation posing a hazard presents physical limitations which limit the interface exposure to the proposed buildings. In this regard comprehensive bushfire design modelling, considering numerous fire runs, has been undertaken to accurately reflect the potential bushfire impact to the proposal.

This modelling has incorporated various redundancies to ensure a margin of safety. These redundancies include increased vegetation width than actually present and use of fully developed bushfire modelling regardless of the limited fire development period.

In addition an existing commercial building immediately adjacent the hazard provides substantial shielding to the proposed buildings, with this reduced view factor not incorporated into the bushfire design modelling (i.e. modelling considers unencumbered impact).

As a verification method to the use of a physically constrained vegetation width (due to allotment configuration) Short Fire Run Modelling was used which concluded a smaller width than that adopted herein.

In this instance it has been demonstrated that the closest point of the proposed buildings is exposed to a maximum potential radiant heat impact of 9.45 kW/m<sup>2</sup>, satisfying section 6.8.1 'APZs and building construction' of PBP.

The highest Bushfire Attack Level to the proposed buildings was determined to be 'BAL 12.5'. The proposed buildings must comply with sections 3 & 5 (BAL 12.5) of Australian Standard 3959 'Construction of building in bushfire-prone areas' 2018 and section 7.5 'Additional construction requirements' of PBP.

Due to the type and nature of the proposal it incorporates numerous fire protection measures and increased construction standards above that for BAL 12.5 which will further enhance the buildings resilience. These include, but are not limited to:

- Type A construction throughout;
- Internal fire sprinkler system throughout;
- Fire separation as required under the NCC;
- Wet fire hydrant services including hydrants and hose reels throughout;
- Portable fire extinguishers;
- Smoke management measures;
- Emergency Warning and Intercommunication System;
- Automatic fire detection and alarm system; and
- Emergency lighting.

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



## 1.0 Introduction

Building Code and Bushfire Hazard Solutions P/L has been commissioned by Platino Properties Pty Ltd to prepare an independent Bushfire Assessment Report to accompany a Development Application seeking approval for a seniors housing and mixed use development at 5 Skyline Place, Frenchs Forest (Lot 101 DP 1209504).

The development involves the construction of two (2) multi-storey apartment buildings, comprising of one hundred and thirty-three (133) units, and associated infrastructure and landscaping.

The proposal expands on a recently approved senior housing and mixed use development within the subject site (DA2018/0995 & Mod2019/0654). The NSW Rural Fire Service assessed both of these applications against Planning for Bush Fire Protection 2006 and issued their General Terms of Approval under Division 4.8 of the *Environmental Planning and Assessment Act 1979*, and a Bush Fire Safety Authority, under section 100B of the *Rural Fires Act 1997* (RFS ref: D18/6003 & DA-2018-02401-s4.55-1).

The subject site has street frontage to Skyline Place to the east and Frenchs Forest Road East to the north and abuts existing private allotments (zoned B7: Business Park) to the south and west.

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



Figure 01: Extract from Northern Beaches Council's Bushfire Prone Land Map

## 2.0 Purpose of Report

The purpose of this Bushfire Assessment Report is to provide Platino Properties Pty Ltd, Council and the NSW Rural Fire Service with an independent bushfire assessment together with appropriate recommendations for both new building construction and bushfire mitigation measures considered necessary having regard to construction within a designated 'bushfire prone' area.

The recommendations contained within this report may assist in forming the basis of any specific construction conditions and/or bushfire mitigation measures that Council and/or the NSW Rural Fire Service may elect to place within any consent conditions issued for the subject Development Application.

## 3.0 Scope of this Report

The scope of this report is limited to providing a bushfire assessment and recommendations for the subject property. 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 property.

## 4.0 Compliance Tables & Notes

The following table sets out the projects compliance with *Planning for Bush Fire Protection – 2019*.

	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6
<b>Vegetation</b>	Sydney Coastal DSF	Sydney Coastal DSF	Sydney Coastal DSF	Sydney Coastal DSF	Sydney Coastal DSF	Sydney Coastal DSF
<b>Veg./Flame Width</b>	60 metres	60 metres	60 metres	60 metres	100 metres	80 metres
<b>Flame Temp.</b>	1200K	1200K	1200K	1200K	1200K	1200K
<b>Vegetation Slope</b>	2° down	1° down	1° down	2° down	1° down	1° down
<b>Site Slope</b>	0° across	0° across	0° across	1° down	0° across	0° across
<b>Separation Distance</b>	≥59 metres	≥59 metres	≥57 metres	≥69 metres	≥68 metres	≥65 metres
<b>Radiant Heat</b>	9.37 kW/m <sup>2</sup>	8.8 kW/m <sup>2</sup>	9.38 kW/m <sup>2</sup>	4.93 kW/m <sup>2</sup>	9.45 kW/m <sup>2</sup>	8.96 kW/m <sup>2</sup>
<b>Bushfire Attack Level</b>	BAL 12.5	BAL 12.5	BAL 12.5	BAL 12.5	BAL 12.5	BAL 12.5

\* Refer to section 7.03 of this report for a depiction of the assessed transects.



<b>Compliance Summary of Bushfire Protection Measures Assessed</b>			
<b>Bushfire Protection Measure</b>	<b>Acceptable Solution</b>	<b>Performance Solution</b>	<b>Report Section</b>
<b>Asset Protection Zones</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	7.03
<b>Construction Standard</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03
<b>Access</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03
<b>Services</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03
<b>Emergency Management Planning</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03

## 5.0 Aerial view of the subject allotment



Figure 02: Aerial view of the subject area courtesy Nearmap  
Subject site (thick red outline) and proposed building envelope (yellow outline)



## 6.0 Site Assessment

### Location

The subject site known as 5 Skyline Place, Frenchs Forest (Lot 101 DP 1209504) and comprises of an existing allotment (zoned B7: Business Park). The subject site is located within Northern Beaches Councils Local Government Area.

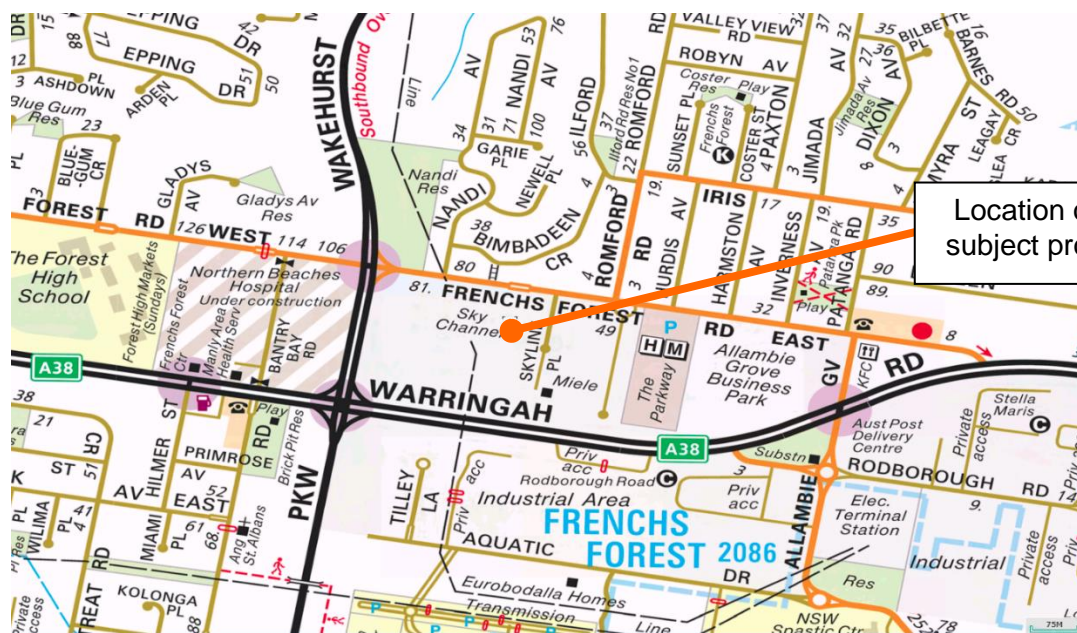
The subject site has street frontage to Skyline Place to the east and Frenchs Forest Road East to the north and abuts existing private allotments (zoned B7: Business Park) to the south and west.

The vegetation identified as being the potential bushfire hazard is located to the west of the subject site within two (2) vacant allotments zoned B7: Business Park and RE1: Public Recreation.



Subject site

Photograph 01: View south along Skyline Place



Location of the subject property

Figure 03: Extract from street-directory.com.au

## Vegetation

The grounds within the subject site were found to comprise of landscaped gardens and mown lawns around the existing building.

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

The vegetation identified as posing a hazard to the subject site is located to the west within vacant allotments.

The vegetation posing a potential bushfire hazard was found to consist of trees 10-20 metres in height with a canopy cover of 30-70% and an understorey of small trees, shrubs, grasses and areas of weeds (Lantana). There was a clear absence of elevated fuels in this area.

This vegetation is mapped (SydneyMetroArea v3 2016) as being Sydney Ironstone Bloodwood-Silvertop Ash Forest (Duffys Forest Ecological Community) a listed Endangered Ecological Community under the *Biodiversity Conservation Act 2016*.

Localised impact occurred to this community as part of the recent Northern Beaches Hospital Road Upgrade project, including the establishment of a site compound with the allotment to the west of the site. As part of the approval for this roadworks project to offset this impact a biodiversity offset site was established along Forest Way.

It is acknowledged that a condition of consent for the roadworks project requires impacted vegetation to be rehabilitated to the greatest extent practicable. In this regard it is noted that the NSW Government advertised the project's completion in August 2020. Regardless the modelling used herein has considered a fully developed fire and therefore any future rehabilitation is inconsequential to this assessment.

The hazard is a small (<2ha) fragmented stand of Forest surrounded by the recently upgraded Frenchs Forest Road East, Warringah Road and Wakehurst Parkway and existing commercial development.

The vegetation presents physical limitations (property boundaries) which limit the interface exposure to the proposed buildings. These property boundaries preclude a 100 metre vegetation width / fire front, in which the prescriptive tables in PBP consider, at the closest point of impact.

In this regard comprehensive bushfire design modelling, considering numerous fire runs and corresponding vegetation widths, has been undertaken to accurately reflect the potential bushfire impact to the proposal.

For the purpose of this assessment the vegetation posing a hazard has been classified Sydney Coastal Dry Sclerophyll Forest and in accordance with the NSW Rural Fire Service publication 'Comprehensive Vegetation Fuel Loads' (2019) a surface fuel load of 21.3 t/ha and overall fuel load of 27.3 t/ha adopted.

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 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 the hazard has direct frontage to the recently upgraded Frenchs Forest Road East, Warringah Road and Wakehurst Parkway.

In consideration of the comprehensive access available around the hazard and its exposure to the public the identification and subsequent early extinguishment of a bushfire is considered probable.



Photograph 02: View within the hazard to the west



Photograph 03: View within the hazard to the west



## 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 gradient with the vegetation to the west was found to rise or be level for approximately 70 metres before falling gently to Wakehurst Parkway.

It is acknowledged there is a steeper area adjacent Frenchs Forest Road East to the northwest of the site. This area was found to be located greater than 100 metres from the proposed buildings and was not considered to be an influential slope toward the site.

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

Refer to section 7.03 of this report for the detail of the adopted slope for each assessed transect.



Figure 04: Extract from ELVIS – Geoscience Australia 1m contours  
Subject site (thick red outline) and proposed building envelope (yellow outline)



## Fire Weather

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

In accordance with the NSW Rural Fire Service publication 'NSW Local Government Areas FDI' (2017) Northern Beaches Council forms part of the Greater Sydney Region Fire Weather District and attracts an FFDI of 100.

## Fire History

There are areas within NSW that have significant fire history and are recognised as known fire paths. While the fire history is more commonly considered as part of strategic planning (to ensure future development is not exposed to an unacceptable risk), it is useful to consider at a Development Application phase to ensure the land is suitable for development in the context of bushfire risk.

In this instance there have been no recorded wildfires or hazard reductions within the immediate surrounding area.

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

The closest recorded wildfires were found to be located 400 metres to the south of the subject site (1990-91). Large fires have also been recorded to the south >700 metres from the subject site ('Bantry Bay' 2000) and >1.2 kilometres to the northeast (1994).

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 05: Aerial view of the subject area with previous wildfire history layer (source NPWS Fire History)

## 7.0 Bushfire Assessment

### 7.01 Planning for Bush Fire Protection - 2019

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.

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

Seniors housing is a listed Special Fire Protection Purpose (SFPP) under section 100b(6) of the *Rural Fires Act 1997*.

As the proposal involves a listed SFPP development on bushfire prone land it is classified as integrated development under section 4.46 of the *Environmental Planning and Assessment Act 1979*. The Development Application subsequently requires a Bushfire Safety Authority from the NSW Rural Fire Service.

In accordance with the submission requirements for a Bush Fire Safety Authority as detailed in clause 44 of the *Rural Fires Regulation 2013* an assessment of the extent to which the proposed development conforms with or deviates from *Planning for Bush Fire Protection* (PBP) is required.

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 proposed development must satisfy the aim and objectives detailed in Chapter 1 'Introduction' and specific objectives and bushfire protection measures detailed in Chapter 6 'Special Fire Protection Purpose Developments' of PBP.

In addition as the proposal includes multi-storey building section 8.2.2 'Multi-storey residential development' of PBP has been considered.

### 7.02 Specific Objectives

The following table lists the specific objectives for Special Fire Protection Purpose development in accordance with section 6.2 of PBP applicable to the proposal and our comments on compliance or otherwise.

Specific Objective	Comment
<i>minimise levels of radiant heat, localised smoke and ember attack through increased APZ, building design and siting;</i>	<p>The proposal does not exceed the maximum 10kW/m<sup>2</sup> at any point of the proposed buildings.</p> <p>The available separation distance includes existing hardstand areas (carpark and tennis courts) and an existing large commercial building.</p> <p>The proposed building construction also far exceeds that of the relevant Bushfire Attack Level (BAL 12.5), with the inclusion of Type A construction, fire separation, internal sprinkler system and other building fire safety measures required under the National Construction Code.</p>

Specific Objective	Comment
<i>provide an appropriate operational environment for emergency service personnel during firefighting and emergency management;</i>	<p>The recently upgraded Frenchs Forest Road East, Warringah Road and Wakehurst Parkway provide direct access to the identified bushfire hazard for attending fire services and are considered the logical fire fighting platform for suppression and hazard reduction activities.</p> <p>Fire services can also access the hazard via the existing &gt;6m wide access drive within the adjacent commercial development to the west.</p> <p>Where necessary attending fire services can undertake property protection activates from Skyline Place, utilising the proposed onsite hydrant system.</p>
<i>ensure the capacity of existing infrastructure (such as roads and utilities) can accommodate the increase in demand during emergencies as a result of the development; and</i>	<p>Frenchs Forest Road East, Warringah Road and Wakehurst Parkway have all been the subject of a recent significant road upgrade program.</p> <p>These roads are considered adequate to accommodate the increase in demand associated with the proposal.</p> <p>The external utility providers (e.g. Sydney Water) have systems in place to cater for increased demand as necessary.</p>
<i>ensure emergency evacuation procedures and management which provides for the special characteristics and needs of occupants.</i>	<p>This assessment includes a recommendation that a Bushfire Emergency Management Plan be prepared.</p>

## 7.03 Bushfire Protection Measures

Section 6.8 'Bush fire protection measures' of PBP outlines the specific Bushfire Protection Measures (BPMs) applicable to Special Fire Protection Purpose development, including APZs, Construction, Access, Services and Emergency Management Plan.

The following section addresses each BPM and the proposals compliance or otherwise.

### Asset Protection Zones

Asset Protection Zones for new Special Fire Protection Purpose (SFPP) development are determined from Table A1.12.1 of PBP or bushfire design modelling achieving a radiant heat impact of no more than 10kW/m<sup>2</sup> at the closest point of the available building footprint.

For the purpose of this assessment six (6) potential fire runs (transects) were assessed to ensure the worst possible impact considered.

The modelling has incorporated various redundancies to ensure a margin of safety. These redundancies include increased vegetation width than actually present and the use of fully developed bushfire modelling regardless of the limited fire development period.



In addition an existing commercial building immediately adjacent the hazard provides substantial shielding to the proposed buildings, with this reduced view factor not incorporated into the bushfire design modelling (i.e. modelling considers unencumbered impact).

As a verification method to the use of a physically constrained vegetation widths (due to allotment configuration) Short Fire Run Modelling was used which concluded a smaller width (54.91m) than that minimum adopted herein (60m).

### Transect 1:

Transect 1 considers a fire impacting the subject site from a north-westerly direction, being that commonly associated with severe fire behaviour. This scenario would result in a bushfire impacting the interface on a tangent and therefore it would be reasonable to reduce the fire front width from the actual exposed interface (55m). As a margin of a safety a 60 metre fire front was adopted for this transect.

It should be noted that while this scenario would result in impact the fire run is not directly toward to the site and consequently the adopted modelling is an overrepresentation of the potential impact.

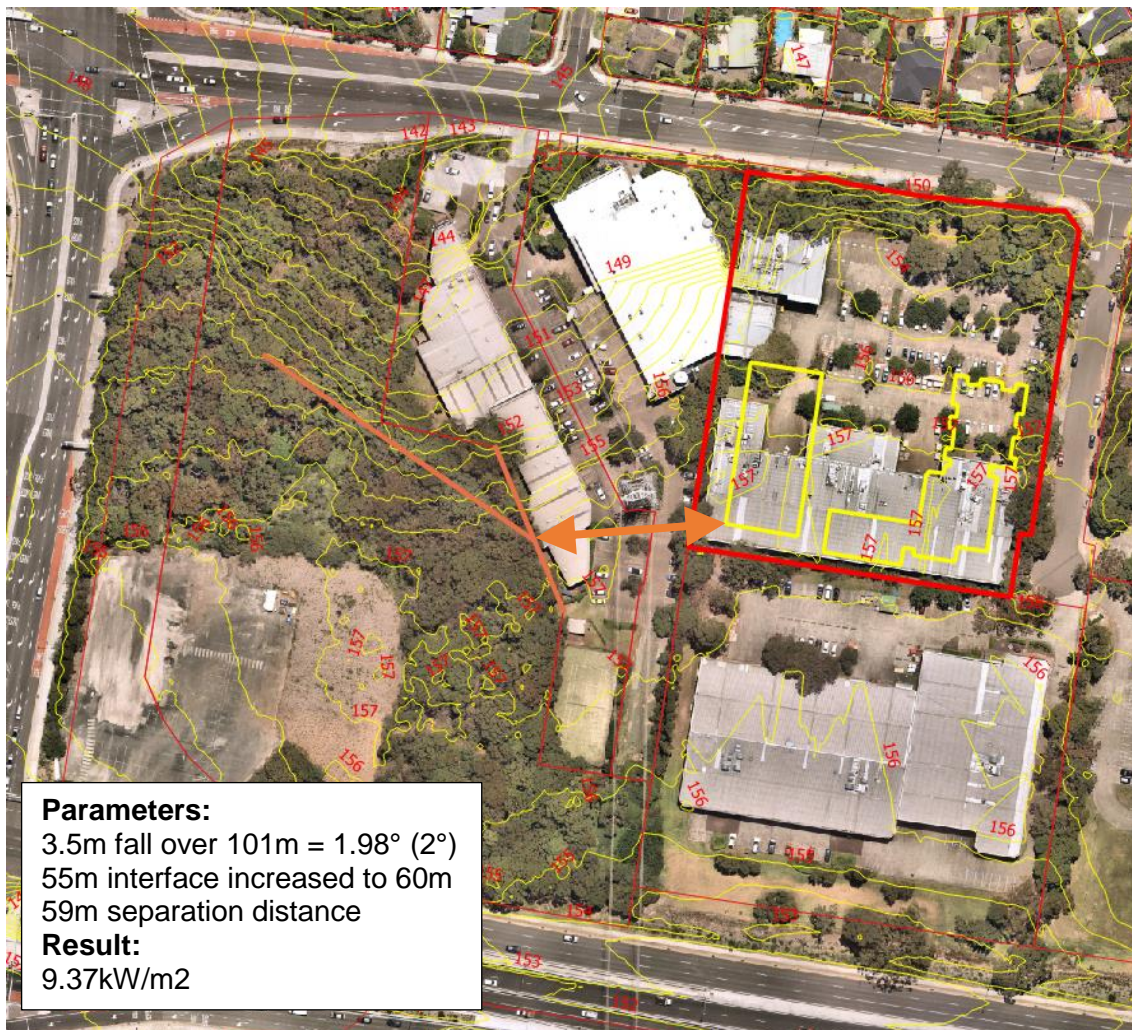


Figure 06: Aerial view of the subject area, 1 metre contours and Transect 1 Subject site (thick red outline) and proposed building envelope (yellow outline)



**Transect 2:**

Transect 2 considers a fire impacting the subject site from a westerly direction, also being that commonly associated with severe fire behaviour. This scenario would result in a bushfire impacting the interface direct. As a margin of a safety a 60 metre fire front was adopted for this transect rather than the measured 55 metre interface.



Figure 07: Aerial view of the subject area, 1 metre contours and Transect 2 Subject site (thick red outline) and proposed building envelope (yellow outline)



**Transect 3:**

Transect 3 considers a fire impacting the subject site from a south-westerly direction, and allows for additional revegetation works within the vacant allotments. This scenario would result in a bushfire impacting the interface direct. As a margin of a safety a 60 metre fire front was adopted for this transect rather than the measured 55 metre interface.

In addition it should be noted that an upslope was recorded for approximately 70 metres, regardless as an additional margin of safety a downslope was adopted.

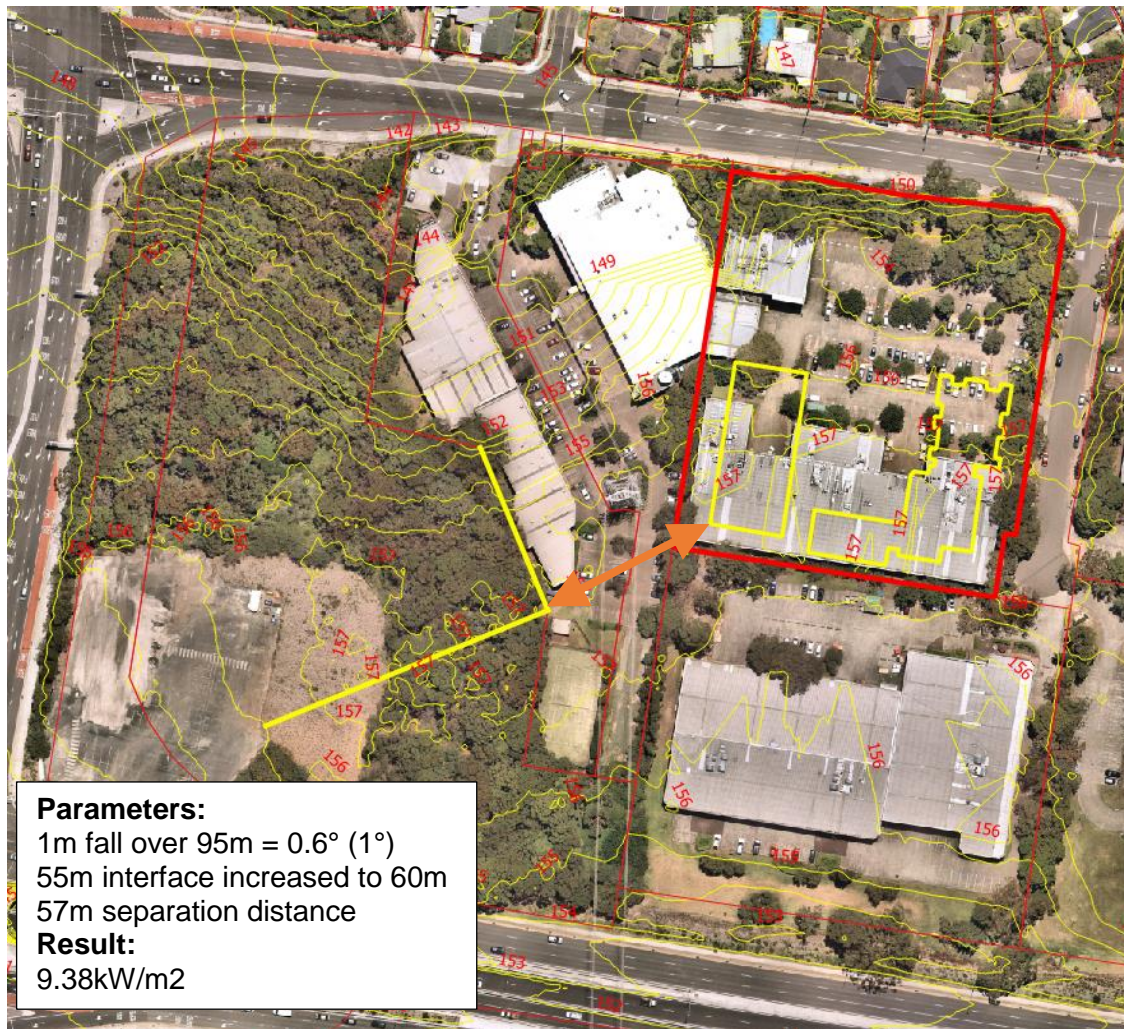


Figure 08: Aerial view of the subject area, 1 metre contours and Transect 3 Subject site (thick red outline) and proposed building envelope (yellow outline)



**Transect 4:**

Transect 4 considers a fire impacting the subject site from a southerly direction. This scenario has a limited fire development period (42m) and is not expected to reach a fully developed state by the point of impact. Regardless this transect has also been modelled as a fully developed fire.



Figure 09: Aerial view of the subject area, 1 metre contours and Transect 4 Subject site (thick red outline) and proposed building envelope (yellow outline)



**Transect 5:**

Transect 5 considers the point a fire could theoretically produce a 100 metre interface exposure to the site. This scenario is considered extremely unlikely given the limited fire development period. This view is supported by the use of Short Fire Run Modelling which accounts for limited fire development periods and found a maximum calculated fire front of 54.91m.



Figure 10: Aerial view of the subject area, 1 metre contours and Transect 5 Subject site (thick red outline) and proposed building envelope (yellow outline)



**Transect 6:**

Transect 6 similar to Transect 5 considers the point a fire could theoretically produce an 80 metre interface exposure to the site. This scenario again is considered extremely unlikely given the limited fire development period. This view is supported by the use of Short Fire Run Modelling which accounts for limited fire development periods and found a maximum calculated fire front of 54.91m.



Figure 11: Aerial view of the subject area, 1 metre contours and Transect 6 Subject site (thick red outline) and proposed building envelope (yellow outline)

In this instance it has been demonstrated that the closest point of the proposed buildings is exposed to a maximum potential radiant heat impact of 9.45 kW/m<sup>2</sup>, satisfying section 6.8.1 'APZs and building construction' of PBP.

All grounds within the subject site will be maintained in accordance with an Asset Protection Zone / Inner Protection Area as detailed in Appendix 4 of *Planning for Bush Fire Protection 2019* and the NSW Rural Fire Service publication 'Standards for Asset Protection Zones'.



## Construction

The proposed buildings are required to be constructed to the relevant Bushfire Attack Level under Australian Standard 3959 'Construction of buildings in bushfire-prone areas' 2018.

The highest Bushfire Attack Level (BAL) for the proposed buildings was determined using Table A1.12.5 of PBP to be BAL 12.5.

The proposed buildings must comply with sections 3 & 5 (BAL 12.5) of Australian Standard 3959 'Construction of building in bushfire-prone areas' 2018 and section 7.5 'Additional construction requirements' of PBP.

Due to the type and nature of the proposal it incorporates numerous protection measures and increased construction standards to the National Construction Code being above that for BAL 12.5 which will further enhance the buildings resilience. These include, but are not limited to:

- Type A construction throughout;
- Internal fire sprinkler system throughout;
- Fire separation;
- Wet fire hydrant services including hydrants and hose reels throughout;
- Portable fire extinguishers;
- Smoke management measures;
- Emergency Warning and Intercommunication System;
- Automatic fire detection and alarm system; and
- Emergency lighting.

## Access

The subject property has street frontage to Skyline Place to the east and Frenchs Forest Road East to the north.

Attending fire services have direct access to the identified bushfire hazard via Frenchs Forest Road East, Wakehurst Parkway and Warringah Road. These roads have hydrant points available at regular intervals and are considered the logical fire-fighting platform for attending fire services undertaking hazard reduction and / or fire suppression activities.

Fire services can also access the hazard via the existing >6m wide access drive within the adjacent commercial development to the west. This access drive was also found to have hydrants available at regular intervals.

Where necessary attending fire services can undertake property protection activates from Skyline Place, utilising the proposed onsite hydrant system.

Persons seeking to egress the subject site are able to do so via the proposed basement carpark and existing public road infrastructure away from the bushfire hazard.

Access for fire services and opportunities for occupant evacuation are considered adequate for this property.

The access provisions detailed in Table 6.8b of PBP are not considered applicable to the proposal.

## Services – Water, electricity & gas

The subject site will be connected to the reticulated town's water main in Skyline Place for its commercial needs. Existing in ground hydrants are available along Skyline Place, Frenchs Forest Road East, Wakehurst Parkway and Warringah Road for the replenishment of attending fire services.

The existing hydrant network will be extended into the subject site as part of this proposal. The hydrant spacing, design, sizing, flows and pressures must comply with AS2419.1-2005.

In addition the proposal includes an internal fire sprinkler system, hose reels and portable fire extinguishers throughout.

The proposed water supply is considered adequate for the replenishment of attending fire services.

Recommendations will be included to ensure compliance with the electricity and gas services requirements.

## Emergency Management Plan

The intent of the Emergency Management Plan measure is to provide suitable emergency and evacuation arrangements for occupants of SFPP developments.

This assessment includes a recommendation that a Bushfire Emergency Management Plan be prepared. This recommendation satisfies the acceptable solutions detailed in Table 6.8d of PBP.

## 7.04 Multi-storey Residential Development

The following table lists the specific considerations for multi-storey residential development in accordance with Table 8.2.2 of PBP and our comments of the proposal compliance or otherwise.

Technical Consideration	Comment
What capacity does the existing infrastructure have to allow evacuation of existing and proposed residents in the event of a bush fire?	<p>In consideration of the site characteristics, limited fire development period and 'burn-out time' and resilience of the proposed buildings the primary response to a bushfire event is expected to be 'shelter in place'.</p> <p>Regardless Frenchs Forest Road East, Warringah Road and Wakehurst Parkway have all been the subject of a recent significant road upgrade program.</p> <p>These roads are considered adequate to accommodate the increase in demand associated with the proposal.</p>
Can the building be located away from ridge tops to areas that have a reduced bush fire exposure?	The proposed buildings are not located on a ridgetop and have a reduced exposure to the bushfire hazard.

Technical Consideration	Comment
If unavoidable, what is the impact on the risk to the building?	Not Applicable
Is this risk appropriate for the building and occupant numbers?	<p>As previously established there have been no recorded wildfires within the subject site or immediate surrounding area.</p> <p>In consideration of the previous bushfire history and available fire-fighting resources the bushfire risk is considered appropriate for the buildings and occupants.</p>
What are the flame dimensions, including the flame angle?	<p>The highest potential bushfire impact to the proposed buildings was determined to be Transect 5.</p> <p>The design fire was modelled and results in the following output:</p> <p><b>Transect 5:</b></p> <p>flame length 21.08 metres flame angle 76 degrees</p>
Where is the hottest part of the flame located? How would this impact on the proposed building?	<p>The closest point of the proposed buildings was found to not exceed 9.45 kW/m<sup>2</sup> at a peak elevation of receiver of 10.23 metres.</p> <p>The application of BAL 12.5, being the relevant Bushfire Attack Level and other building measures described herein will adequately mitigate this impact.</p>
How would the warning and suppression systems in the building cope with this?	<p>The building design, inclusive of warning and suppression systems, will account for the maximum projected radiant heat flux.</p> <p>The building materials will account for the maximum projected radiant heat flux and other forms of bushfire attack.</p>
How does the emergency evacuation procedure take account of the location of bush fire prone vegetation?	A Bushfire Emergency Management Plan will be prepared prior to the resident occupation of the buildings.
What wall and cladding materials are proposed and what is proposed for the openings/penetrations (i.e. windows and doors)?	<p>The proposed buildings must comply with sections 3 &amp; 5 (BAL 12.5) of Australian Standard 3959 'Construction of building in bushfire-prone areas' 2018 and section 7.5 'Additional construction requirements' of PBP.</p> <p>Due to the type and nature of the proposal it incorporates numerous protection measures and increased construction standard above that for BAL 12.5 which will further enhance the buildings resilience (i.e. Type A construction under the NCC).</p>

	<p>These include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Type A construction throughout;</li> <li>• Internal fire sprinkler system throughout;</li> <li>• Fire separation;</li> <li>• Wet fire hydrant services including hydrants and hose reels throughout;</li> <li>• Portable fire extinguishers;</li> <li>• Smoke management measures;</li> <li>• Emergency Warning and Intercommunication System;</li> <li>• Automatic fire detection and alarm system; and</li> <li>• Emergency lighting.</li> </ul>
How does the proposed building construction deal with fire spread from the vegetation to the inside of the building?	As above.
Is compliance with AS 3959 sufficient to ensure that the bush fire risk is mitigated?	Construction to BAL 12.5 under AS3959 is considered adequate to ensure that the bushfire risk is mitigated.
Is this appropriate for the design fire scenario?	<p>The design fire scenarios have included various inbuilt redundancies to ensure a margin of safety is achieved.</p> <p>The proposed design is considered appropriate.</p>
Are there balconies proposed?	Yes, Balconies are proposed.
What may be stored on the balconies?	No restriction
Can there be restrictions on what is stored on the balconies due to fire risk?	Not considered necessary in this instance.
Is the warning and suppression system designed to take account of bush fire impact?	<p>The proposed buildings will be constructed to the relevant Bushfire Attack Level under AS3959 – 2018 and addition to other measures associated with this type of development.</p> <p>In addition the buildings will be fitted with an internal sprinkler system, Emergency Warning and Intercommunication System and have appropriate fire separation.</p>
Where are exits located? Are they guiding occupants away from the car park?	This exits guide occupants to the car park and local road network away from the bushfire hazard.

Technical Consideration	Comment
What would this mean for fire suppression?	<p>The buildings will be fitted with an internal sprinkler system and have appropriate fire separation.</p> <p>Attending fire services have comprehensive access to the identified bushfire hazard via Frenchs Forest Road East, Wakehurst Parkway and Warringah Road.</p> <p>These roads have hydrant points available at regular intervals and are considered the logical fire-fighting platform for attending fire services undertaking hazard reduction and / or fire suppression activities.</p>
How would warning and suppression systems take account of this?	<p>This consideration will be addressed as part of the future detailed Bushfire Emergency Management Plan.</p> <p>A Emergency Warning and Intercommunication System will be used for occupant control and management.</p>
What would this mean for evacuation?	<p>This consideration will be addressed as part of the future detailed Bushfire Emergency Management Plan.</p>

It is of our opinion that the proposed buildings have the capacity to comply with section 8.2.2 of PBP.

## 7.05 Aim & Objectives

The following table details the aim and objectives of *Planning for Bush Fire Protection 2019* and the proposals ability to comply.

Aim / Objective	Comment
<p><i>The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.</i></p>	<p>With the inclusion of the recommendations made herein it is of our opinion that the aim of PBP has been satisfied.</p>
<p><i>(i) afford buildings and their occupants protection from exposure to a bush fire;</i></p>	<p>Comprehensive bushfire design modelling, considering numerous fire runs, has been undertaken to accurately reflect the potential bushfire impact to the proposal and develop the corresponding Bushfire Protection Measures.</p> <p>This modelling has incorporated various redundancies to ensure a margin of safety.</p> <p>The recommended Bushfire Protection Measures in conjunction with the additional construction standards and measures associated with this type of development under the NCC will afford the buildings and their occupants protection from exposure to a bushfire.</p>



Aim / Objective	Comment
<p><i>(ii) provide for a defensible space to be located around buildings;</i></p>	<p>Attending fire services have comprehensive access to the identified bushfire hazard via Frenchs Forest Road East, Wakehurst Parkway and Warringah Road.</p> <p>These roads have hydrant points available at regular intervals and are considered the logical fire-fighting platform for attending fire services undertaking hazard reduction and / or fire suppression activities.</p> <p>There is suitable managed areas / defensible space around the proposed buildings.</p>
<p><i>(iii) provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;</i></p>	<p>The available APZs to the proposed buildings exceed the corresponding minimum required under PBP.</p> <p>The available APZs in conjunction with the proposed construction requirements will prevent the likely fire spread to the buildings.</p>
<p><i>(iv) ensure that appropriate operational access and egress for emergency service personnel and occupants is available;</i></p>	<p>Attending fire services have comprehensive access to the identified bushfire hazard via Frenchs Forest Road East, Wakehurst Parkway and Warringah Road.</p> <p>These roads have hydrant points available at regular intervals and are considered the logical fire-fighting platform for attending fire services undertaking hazard reduction and / or fire suppression activities.</p> <p>Persons seeking to egress the subject site are able to do so via the proposed basement carpark and existing public road infrastructure away from the bushfire hazard.</p> <p>Access for fire services and opportunities for occupant evacuation are considered adequate for this property.</p>

Aim / Objective	Comment
(v) provide for ongoing management and maintenance of bush fire protection measures, (BPMs); and	<p>The grounds within the subject site are to be maintained in accordance with the NSW Rural Fire Service's document 'Standards for Asset Protection Zones' and Appendix 4 of <i>Planning for Bush Fire Protection 2019</i>.</p> <p>Any new landscaping is to comply with the provisions of Appendix 4 of PBP.</p>
(vi) ensure that utility services are adequate to meet the needs of firefighters.	<p>The existing hydrant network will be extended into the subject site as part of this proposal. The hydrant spacing, design, sizing, flows and pressures must comply with AS2419.1-2005.</p> <p>In addition the proposal includes an internal fire sprinkler system, hose reels and portable fire extinguishers throughout.</p> <p>The proposed water supply is considered adequate for the replenishment of attending fire services.</p>

It is of our opinion that the proposal can satisfactorily comply with the aim and objectives of *Planning for Bush Fire Protection 2019*.

## 7.06 Submission Detail

Clause 44 of the *Rural Fires Regulation 2013* identifies various items which must be addressed and included within an application for a Bush Fire Safety Authority. The following table outlines these items and includes a corresponding response.

Submission Detail	Response
<i>(a) a description (including the address) of the property on which the development the subject of the application is proposed to be carried out,</i>	See section 6.01
<i>(b) a classification of the vegetation on and surrounding the property (out to a distance of 140 metres from the boundaries of the property) in accordance with the system for classification of vegetation contained in Planning for Bush Fire Protection,</i>	See section 6.02
<i>(c) an assessment of the slope of the land on and surrounding the property (out to a distance of 100 metres from the boundaries of the property),</i>	See section 6.03 and 7.03
<i>(d) identification of any significant environmental features on the property,</i>	None Known
<i>(e) the details of any threatened species or threatened ecological community under the Biodiversity Conservation Act 2016 that is known to the applicant to exist on the property,</i>	None Known
<i>(f) the details and location of any Aboriginal object (within the meaning of the National Parks and Wildlife Act 1974) or Aboriginal place (within the meaning of that Act) that is known to the applicant to be situated on the property,</i>	No known sites
<i>(g) a bush fire assessment for the proposed development (including the methodology used in the assessment) that addresses the following matters—</i>	See section 7.0
<i>(i) the extent to which the development is to provide for setbacks, including asset protection zones,</i>	See section 7.03
<i>(ii) the siting and adequacy of water supplies for fire fighting,</i>	See section 7.03



Submission Detail	Response
<i>(iii) the capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency,</i>	<p>In consideration of the site characteristics, limited fire development period and 'burn-out time' and resilience of the proposed buildings the primary response to a bushfire event is expected to be 'shelter in place'.</p> <p>Regardless Frenchs Forest Road East, Warringah Road and Wakehurst Parkway have all been the subject of a recent significant road upgrade program.</p> <p>These roads are considered adequate to accommodate the increase in demand associated with the proposal.</p>
<i>(iv) whether or not public roads in the vicinity that link with the fire trail network have two-way access,</i>	<p>The surrounding public roads do not link with a registered fire trail network within the immediate area.</p>
<i>(v) the adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response,</i>	<p>See section 7.03</p>
<i>(vi) the adequacy of bush fire maintenance plans and fire emergency procedures for the development site,</i>	<p>See section 7.03</p>
<i>(vii) the construction standards to be used for building elements in the development,</i>	<p>See section 7.03</p>
<i>(viii) the adequacy of sprinkler systems and other fire protection measures to be incorporated into the development,</i>	<p>There is no existing bushfire sprinkler system, nor is one proposed.</p> <p>The proposed includes the installation of an internal sprinkler system which will be installed and maintained in accordance with the relevant Australian Standard.</p> <p>See section 7.03 for all bushfire protection measures</p>
<i>(ix) any registered fire trails on the property,</i>	<p>There are no registered fire trails within the subject site.</p>

## 8.0 Recommendations

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The following recommendations are provided as the minimum necessary for compliance with *Planning for Bush Fire Protection 2019* and Australian Standard 3959 'Construction of buildings in bushfire-prone areas' 2018. Additional recommendations are provided to supplement these minimum requirements where considered necessary.

### Asset Protection Zones

1. That all grounds not built upon within the subject property be maintained as an Asset Protection Zone (Inner Protection Area) as detailed in the NSW Rural Fire Service's document 'Standards for Asset Protection Zones' and Appendix 4 of *Planning for Bush Fire Protection 2019*.

### Construction

2. New construction shall comply with sections 3 and 5 (BAL 12.5) Australian Standard AS3959-2018 "Construction of buildings in bush fire-prone areas' and section 7.5 of *Planning for Bush Fire Protection 2019*.

### Landscaping

3. That any new landscaping is to comply with Appendix 4 of *Planning for Bush Fire Protection 2019*.

### Emergency management

4. That a Bush Fire Emergency Management and Evacuation Plan is prepared consistent with the relevant requirements detailed in Table 6.8b of *Planning for Bush Fire Protection 2019*.

### Services (where applicable)

#### Water:

5. That the new internal hydrant system is to comply with the requirements detailed in Table 6.8c of *Planning for Bush Fire Protection 2019*, specifically:
  - fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005;
  - fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.
  - all above-ground water service pipes external to the building are metal, including and up to any taps.
  - fire hose reels are constructed in accordance with AS/NZS 1221:1997 Fire hose reels, and installed in accordance with the relevant clauses of AS 2441:2005 Installation of fire hose reels.

Electricity:

6. Any new electrical services must comply with Table 6.8c of *Planning for Bush Fire Protection 2019*, specifically:
  - where practicable, electrical transmission lines are underground.
  - where overhead electrical transmission lines are proposed:
    - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and
    - no part of a tree is closer to a power line than the distance set out in *ISSC3 Guideline for Management Vegetation Near Power Lines*.

Gas:

7. Any new gas services must comply with Table 6.8c of *Planning for Bush Fire Protection 2019*, specifically:
  - reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - *The storage and handling of LP Gas*, the requirements of relevant authorities, and metal piping is used;
  - all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
  - connections to and from gas cylinders are metal;
  - if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion;
  - polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used; and
  - above-ground gas service pipes external to the building are metal, including and up to any outlets.



## 9.0 Conclusion

The proposal relates to a mixed use and seniors housing development at 5 Skyline Place, Frenchs Forest.

Northern Beaches Council's Bushfire Prone Land Map identifies the subject property as partly containing the 100 metre buffer zone from designated Category 1, therefore the site is considered 'bushfire prone'.

Seniors housing is a listed Special Fire Protection Purpose (SFPP) under section 100b(6) of the *Rural Fires Act 1997*.

As the proposal involves a listed SFPP development on bushfire prone land it is classified as integrated development under section 4.46 of the *Environmental Planning and Assessment Act 1979*. The Development Application subsequently requires a Bushfire Safety Authority from the NSW Rural Fire Service.

In accordance with the submission requirements for a Bush Fire Safety Authority as detailed in clause 44 of the *Rural Fires Regulation 2013* an assessment of the extent to which the proposed development conforms with or deviates from *Planning for Bush Fire Protection (PBP)* is required.

In accordance with the bushfire safety measures contained in this report, and consideration of the site specific bushfire risk assessment it is our opinion that when combined, they will provide a reasonable and satisfactory level of bushfire protection to the subject development.

We are therefore in support of the development application.

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**

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Reviewed by  
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BPAD Accreditation No. BPAD2354



## 10.0 Annexure 01

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### List of Referenced Documents

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*Rural Fires Regulations 2013*

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

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

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  
Northern Beaches Council's Bushfire Prone Land Map  
NSW Gov. ePlanning Spatial Viewer  
[Street-directory.com.au](http://Street-directory.com.au)

### Attachments

Attachment 01: Bushfire Design Modelling

Attachment 02: Photographic Montage



# NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 19/02/2021

Assessment Date: 15/02/2021

Site Street Address: 5 Skyline Place, Frenchs Forest

Assessor: Stuart McMonnies; Bushfire Hazard Solutions

Local Government Area: Northern Beaches

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: SFR

## Vegetation Information

Vegetation Type: Sydney Coastal DSF

Vegetation Group: Dry Sclerophyll Forests (Shrubby)

Vegetation Slope: 2 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: 0 Degrees

Site Slope Type: Level

Elevation of Receiver(m): Default

APZ/Separation(m): 57

## Fire Inputs

Veg./Flame Width(m): 54.91

Flame Temp(K): 1200

## 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 12.5

Peak Elevation of Receiver(m): 10.57

Radiant Heat(kW/m<sup>2</sup>): 9.38

Flame Angle (degrees): 71

Flame Length(m): 22.35

Maximum View Factor: 0.109

Rate Of Spread (km/h): 2.93

Inner Protection Area(m): 39

Transmissivity: 0.774

Outer Protection Area(m): 18

Fire Intensity(kW/m): 41387



<b>Run Description:</b>	Transect 1		
<b><u>Vegetation Information</u></b>			
<b>Vegetation Type:</b>	Sydney Coastal DSF		
<b>Vegetation Group:</b>	Dry Sclerophyll Forests (Shrubby)		
<b>Vegetation Slope:</b>	2 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	21.3	<b>Overall Fuel Load(t/ha):</b>	27.3
<b>Vegetation Height(m):</b>	1.4	Only Applicable to Shrub/Scrub and Vesta	
<b><u>Site Information</u></b>			
<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	59
<b><u>Fire Inputs</u></b>			
<b>Veg./Flame Width(m):</b>	60	<b>Flame Temp(K):</b>	1200
<b><u>Calculation Parameters</u></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><u>Program Outputs</u></b>			
<b>Level of Construction:</b>	BAL 12.5	<b>Peak Elevation of Receiver(m):</b>	10.63
<b>Radiant Heat(kW/m2):</b>	9.37	<b>Flame Angle (degrees):</b>	72
<b>Flame Length(m):</b>	22.35	<b>Maximum View Factor:</b>	0.109
<b>Rate Of Spread (km/h):</b>	2.93	<b>Inner Protection Area(m):</b>	40
<b>Transmissivity:</b>	0.771	<b>Outer Protection Area(m):</b>	19
<b>Fire Intensity(kW/m):</b>	41387		
<hr/>			
<b>Run Description:</b>	Transect 2		
<b><u>Vegetation Information</u></b>			
<b>Vegetation Type:</b>	Sydney Coastal DSF		
<b>Vegetation Group:</b>	Dry Sclerophyll Forests (Shrubby)		
<b>Vegetation Slope:</b>	1 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	21.3	<b>Overall Fuel Load(t/ha):</b>	27.3
<b>Vegetation Height(m):</b>	1.4	Only Applicable to Shrub/Scrub and Vesta	
<b><u>Site Information</u></b>			
<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	59
<b><u>Fire Inputs</u></b>			
<b>Veg./Flame Width(m):</b>	60	<b>Flame Temp(K):</b>	1200
<b><u>Calculation Parameters</u></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><u>Program Outputs</u></b>			
<b>Level of Construction:</b>	BAL 12.5	<b>Peak Elevation of Receiver(m):</b>	10.08
<b>Radiant Heat(kW/m2):</b>	8.8	<b>Flame Angle (degrees):</b>	73
<b>Flame Length(m):</b>	21.08	<b>Maximum View Factor:</b>	0.102
<b>Rate Of Spread (km/h):</b>	2.74	<b>Inner Protection Area(m):</b>	41
<b>Transmissivity:</b>	0.771	<b>Outer Protection Area(m):</b>	18
<b>Fire Intensity(kW/m):</b>	38628		

<b>Run Description:</b>	Transect 3		
<b><u>Vegetation Information</u></b>			
<b>Vegetation Type:</b>	Sydney Coastal DSF		
<b>Vegetation Group:</b>	Dry Sclerophyll Forests (Shrubby)		
<b>Vegetation Slope:</b>	1 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	21.3	<b>Overall Fuel Load(t/ha):</b>	27.3
<b>Vegetation Height(m):</b>	1.4	Only Applicable to Shrub/Scrub and Vesta	
<b><u>Site Information</u></b>			
<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	57
<b><u>Fire Inputs</u></b>			
<b>Veg./Flame Width(m):</b>	60	<b>Flame Temp(K):</b>	1200
<b><u>Calculation Parameters</u></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><u>Program Outputs</u></b>			
<b>Level of Construction:</b>	BAL 12.5	<b>Peak Elevation of Receiver(m):</b>	10.02
<b>Radiant Heat(kW/m2):</b>	9.38	<b>Flame Angle (degrees):</b>	72
<b>Flame Length(m):</b>	21.08	<b>Maximum View Factor:</b>	0.109
<b>Rate Of Spread (km/h):</b>	2.74	<b>Inner Protection Area(m):</b>	39
<b>Transmissivity:</b>	0.773	<b>Outer Protection Area(m):</b>	18
<b>Fire Intensity(kW/m):</b>	38628		
<hr/>			
<b>Run Description:</b>	Transect 4		
<b><u>Vegetation Information</u></b>			
<b>Vegetation Type:</b>	Sydney Coastal DSF		
<b>Vegetation Group:</b>	Dry Sclerophyll Forests (Shrubby)		
<b>Vegetation Slope:</b>	2 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	21.3	<b>Overall Fuel Load(t/ha):</b>	27.3
<b>Vegetation Height(m):</b>	1.4	Only Applicable to Shrub/Scrub and Vesta	
<b><u>Site Information</u></b>			
<b>Site Slope:</b>	1 Degrees	<b>Site Slope Type:</b>	Downslope
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	69
<b><u>Fire Inputs</u></b>			
<b>Veg./Flame Width(m):</b>	40	<b>Flame Temp(K):</b>	1200
<b><u>Calculation Parameters</u></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><u>Program Outputs</u></b>			
<b>Level of Construction:</b>	BAL 12.5	<b>Peak Elevation of Receiver(m):</b>	9.54
<b>Radiant Heat(kW/m2):</b>	4.93	<b>Flame Angle (degrees):</b>	74
<b>Flame Length(m):</b>	22.35	<b>Maximum View Factor:</b>	0.058
<b>Rate Of Spread (km/h):</b>	2.93	<b>Inner Protection Area(m):</b>	49
<b>Transmissivity:</b>	0.76	<b>Outer Protection Area(m):</b>	20
<b>Fire Intensity(kW/m):</b>	41387		

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**Run Description:** Transect 5

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**Vegetation Information**

**Vegetation Type:** Sydney Coastal DSF  
**Vegetation Group:** Dry Sclerophyll Forests (Shrubby)  
**Vegetation Slope:** 1 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**

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**Site Information**

**Site Slope:** 0 Degrees **Site Slope Type:** Level  
**Elevation of Receiver(m):** Default **APZ/Separation(m):** 68

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**Fire Inputs**

**Veg./Flame Width(m):** 100 **Flame Temp(K):** 1200

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**Calculation Parameters**

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

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**Program Outputs**

**Level of Construction:** BAL 12.5 **Peak Elevation of Receiver(m):** 10.23  
**Radiant Heat(kW/m2):** 9.45 **Flame Angle (degrees):** 76  
**Flame Length(m):** 21.08 **Maximum View Factor:** 0.111  
**Rate Of Spread (km/h):** 2.74 **Inner Protection Area(m):** 45  
**Transmissivity:** 0.76 **Outer Protection Area(m):** 23  
**Fire Intensity(kW/m):** 38628

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**Run Description:** Transect 6

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**Vegetation Information**

**Vegetation Type:** Sydney Coastal DSF  
**Vegetation Group:** Dry Sclerophyll Forests (Shrubby)  
**Vegetation Slope:** 1 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**

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**Site Information**

**Site Slope:** 0 Degrees **Site Slope Type:** Level  
**Elevation of Receiver(m):** Default **APZ/Separation(m):** 65

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**Fire Inputs**

**Veg./Flame Width(m):** 80 **Flame Temp(K):** 1200

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**Calculation Parameters**

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

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**Program Outputs**

**Level of Construction:** BAL 12.5 **Peak Elevation of Receiver(m):** 10.18  
**Radiant Heat(kW/m2):** 8.96 **Flame Angle (degrees):** 75  
**Flame Length(m):** 21.08 **Maximum View Factor:** 0.105  
**Rate Of Spread (km/h):** 2.74 **Inner Protection Area(m):** 44  
**Transmissivity:** 0.763 **Outer Protection Area(m):** 21  
**Fire Intensity(kW/m):** 38628

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View east along Frenchs Forest Road East



View southeast along the access handle within the adjacent development



View south from Frenchs Forest Road East toward the adjacent development located between the site and hazard



View northeast from the hazard interface toward the subject site



View north from Warringah Road toward the former road works compound



View northeast from the intersection of Wakehurst Parkway and Warringah Road



View northeast from Warringah Road of existing commercial development

Aerial view and photographic montage of  
**5 Skyline Place,  
 Frenchs Forest**  
 February 2021 / Our Ref: 210979

