



---

# Travers

bushfire & ecology

---

## bushfire protection assessment

Planning Proposal

Lots 3 & 4 DP 26902, Lot 9 DP 806132 &  
Lots 7072 & 7073 DP 93778  
10-12 Boondah Rd & 2-6 Jacksons Road, Warriewood

Under Section 9.1 (2) Direction No 4.4  
of the *EP&A Act*

August 2019  
(REF: 18HEN03)





Traversers  
bushfire & ecology

## Bushfire Protection Assessment

### Planning Proposal

Lots 3 & 4 DP 26902, Lot 9 DP 806132 & Lots 7072 & 7073 DP 93778  
10-12 Boondah Rd & 2-6 Jacksons Road, Warriewood

Report Authors:	Nicole van Dorst B. App. Sc., Grad. Dip., BPAD-L3 23610 Emma Buxton B. Sc.
Plans prepared:	Sandy Cardow B. Sc.
Checked by:	John Travers B. App. Sc., Ass. Dip., Grad. Dip., BPAD-L3 15195
Date:	26/08/2019
File:	18HEN03

This document is copyright ©



#### Disclaimer:

This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person, including the client, then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be relied upon as meaning it reflects any advice by this firm. The report does not suggest or guarantee that a bush or grass fire will not occur and or impact the development. The report does advise on matters published by the *NSW Rural Fire Service* in their guideline *Planning for Bush Fire Protection 2006* and other advice available from that organisation.

The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features is to be confirmed by a registered surveyor.



## EXECUTIVE SUMMARY

*Travers bushfire & ecology* has been engaged to undertake a bushfire assessment for the planning proposal located at No. 10-12 Boondah Road & 2-6 Jacksons Road, Warriewood. The proposal will involve a rezoning of the site to support future medium density residential housing and recreational open space.

This report identifies matters for consideration for the planning proposal and highlights the required bushfire protection measures (including asset protection zones (APZs)) required for the future development of the site against the current *Pre-release Planning for Bush Fire Protection (PBP) 2018* as well as *Community Resilience Practice Note 2/12 Planning Instruments and Policies*.

The key principle for the proposal is to ensure that future development is capable of complying with the *Section 9.1 (2) Direction No. 4.4 of the EP&A Act and PBP*.

Planning principles for the proposal include the provision of adequate access including the establishment of adequate APZs for future housing, specifying minimum lot depths to accommodate APZs and the introduction of controls which avoid placing inappropriate developments in hazardous areas and placement of combustible material in APZs.

Our assessment found that bushfire attack can potentially affect the development site from the Coastal Floodplain Wetland and Coastal Swamp Forest (endangered ecological community (EEC)) located within Warriewood Wetlands to the west, the retained Coastal Swamp Forest to the south and to a lesser extent the Coastal Swamp Forest associated with the creek line beyond Boondah Road to the east, resulting in possible ember and radiant heat attack.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures;

- APZs in accordance with the acceptable solutions outlined within *Pre-release PBP 2018*;
- Provision of access in accordance with the performance requirements outlined in *Pre-release PBP 2018*;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *Pre-release PBP 2018*;
- Future dwelling construction in compliance with the appropriate construction sections of *AS3959-2018*, and *Pre-release PBP 2018*.
- Creation of 88B easements to ensure the ongoing maintenance of APZs and the proposed fire trail within the property.

The future development of these lands will provide compliance with the planning principles of *Planning for Bush Fire Protection* and *Community Resilience Practice Note 2/12 – Planning Instruments and Policies* (refer Table 4.1) and compliance with the planning principles as outlined within Table E1 below.

**Table E1: Planning Principles**

Direction 4.4	Compliance statement
In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service	<b>Yes.</b> This report will be submitted to the NSW RFS for comment.
A planning proposal must:	
(a) have regard to <i>Planning for Bushfire Protection 2006</i>	<b>Yes.</b> This bushfire protection assessment report has been prepared in full accord with the current <i>Pre-release PBP 2018</i> .  It is anticipated that <i>PBP 2018</i> will become legislated by late October 2019.
(b) introduce controls that avoid placing inappropriate developments in hazardous areas	<b>Yes.</b> This bushfire protection assessment report has been prepared in full accord with <i>PBP</i> . Future development (residential purpose) will be provided with adequate APZs commensurate with the bushfire risk.
(c) ensure that bushfire hazard reduction is not prohibited within the APZ.	<b>Yes.</b> Environmental studies have been undertaken.
A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:	
(a) provide an Asset Protection Zone (APZ) incorporating at a minimum: (i) an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and (ii) an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,	<b>Yes.</b> The APZs recommended comply with requirements outlined in <i>PBP</i> . A fire trail will provide firefighting access to all aspects of the buildings and the bushland vegetation.
(c) contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks	<b>Yes.</b> The concept plan provides for a perimeter fire -trail with adequate linkages into the internal public roads extending from Boondah Road in the east.
(d) contain provisions for adequate water supply for firefighting purposes	<b>Yes.</b> Water supply will comply with <i>PBP</i> .
(e) minimise the perimeter of the area of land interfacing the hazard which may be developed	<b>Yes.</b> The planning proposal is bound by bushland associated with Warriewood Wetland to the west. However, the perimeter of interfacing hazard will be managed as an APZ exceeding the minimum requirements outlined in <i>PBP</i> .
(f) introduce controls on the placement of combustible materials in the Inner Protection Area.	<b>Yes</b> – can be a condition of consent at DA stage.

## GLOSSARY OF TERMS

AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
AS1596	<i>Australian Standard – The storage and handling of LP Gas</i>
AS2419	<i>Australian Standard – Fire hydrant installations</i>
AS3745	<i>Australian Standard – Planning for emergencies in facilities</i>
AS3959	<i>Australian Standard – Construction of buildings in bushfire-prone areas 2009</i>
BAL	bushfire attack level
BSA	Bushfire safety authority
DA	development application
DCP	Development Control Plan
EEC	endangered ecological community
<i>EP&amp;A Act</i>	<i>Environmental Planning and Assessment Act</i>
FDI	fire danger index
IPA	inner protection area
LEP	Local environmental plan
NCC	<i>National Construction Code</i>
OPA	outer protection area
PoM	Plan of Management
<i>PBP</i>	<i>Pre-release Planning for Bush Fire Protection 2018</i>
RFS	NSW Rural Fire Service
SFPP	special fire protection purpose

## TABLE OF CONTENTS

<b>SECTION 1.0 – INTRODUCTION .....</b>	<b>1</b>
1.1 Aims of the assessment.....	1
1.2 Project synopsis.....	1
1.3 Information collation.....	5
1.4 Site description .....	5
1.5 Legislation and planning instruments .....	6
1.6 Environmental constraints.....	8
<b>SECTION 2.0 – BUSHFIRE STRATEGIC STUDY .....</b>	<b>9</b>
<b>SECTION 3.0 – BUSHFIRE THREAT ASSESSMENT .....</b>	<b>13</b>
3.1 Hazardous fuels.....	13
3.2 Effective slope .....	14
3.3 Bushfire attack assessment .....	14
<b>SECTION 4.0 – SPECIFIC PROTECTION ISSUES.....</b>	<b>16</b>
4.1 Asset protection zones (APZs).....	16
4.2 Building protection .....	17
4.3 Hazard management .....	17
4.4 Access for firefighting operations .....	18
4.5 Water supplies .....	22
4.6 Gas.....	23
4.7 Electricity .....	23
<b>SECTION 5.0 – CONCLUSION AND RECOMMENDATIONS.....</b>	<b>24</b>
5.1 Conclusion .....	24
5.2 Recommendations .....	24

### REFERENCES

SCHEDULE 1 – Bushfire Protection Measures

APPENDIX 1 – Management of asset protection zones





# Introduction

# 1

*Travers bushfire & ecology* has been requested to undertake a bushfire protection assessment for the planning proposal associated with Lots 3 & 4 DP 26902, Lot 9 DP 806132 & Lots 7072 & 7073 DP 93778, Nos. 10-12 Boondah Road & 2-6 Jacksons Road, Warriewood.

The proposal is located on land mapped by *Northern Beaches Council* as being bushfire prone. *Direction 4.4, Planning for bush fire protection* identifies matters for consideration for planning proposals that will affect, or are in proximity to land mapped as bushfire prone.

As such, the proposal is subject to the requirements of Section 9.1(2) of *the Environmental Planning and Assessment Act 1979 (EP&A Act)* which requires Council to consult with the Commissioner of the NSW Rural Fire Service and to take into account any comments by the Commissioner.

## 1.1 Aims of the assessment

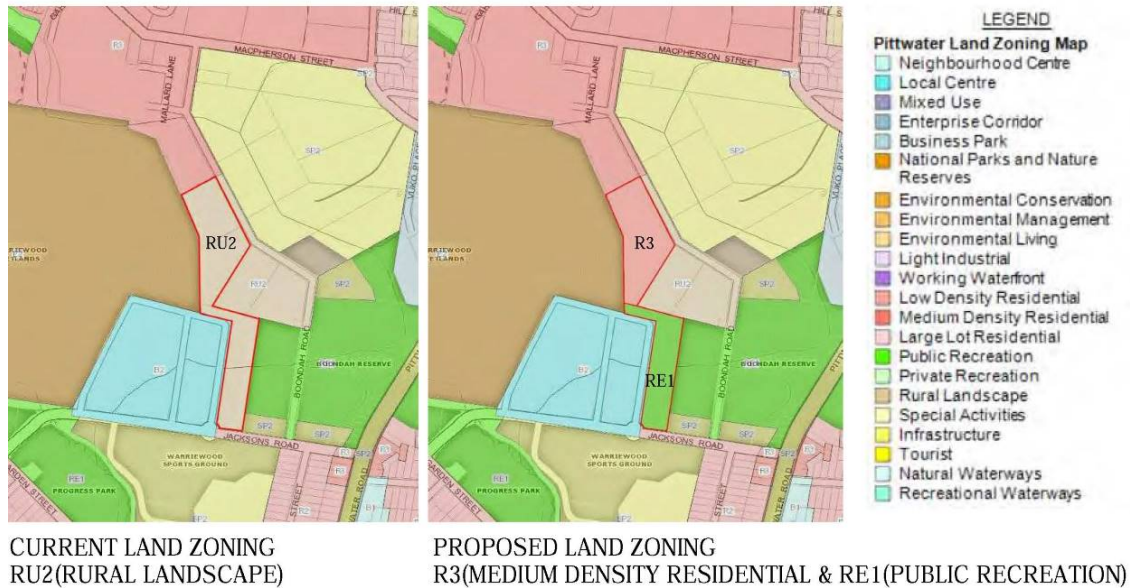
The aims of the bushfire protection assessment are to:

- review the bushfire threat to the landscape
- undertake a bushfire attack assessment in accordance with *Pre-release PBP 2018*
- provide advice on planning principles, including the provision of perimeter roads, asset protection zones (APZs) and other specific fire management issues
- review the potential to carry out hazard management over the landscape, taking into consideration the proposed retention of trees within the final development plans.

## 1.2 Project synopsis

The proposed rezoning aims to facilitate medium density residential, open space and recreational open space.

The site is currently zoned RU2 – Rural Landscape. The proposal seeks a rezoning of the site to R3 – Medium Density Residential and RE1 – Public Recreation (Figure 1.1).



**Figure 1.1** – Current and proposed zoning  
(Source: Travers bushfire & ecology from client correspondence)

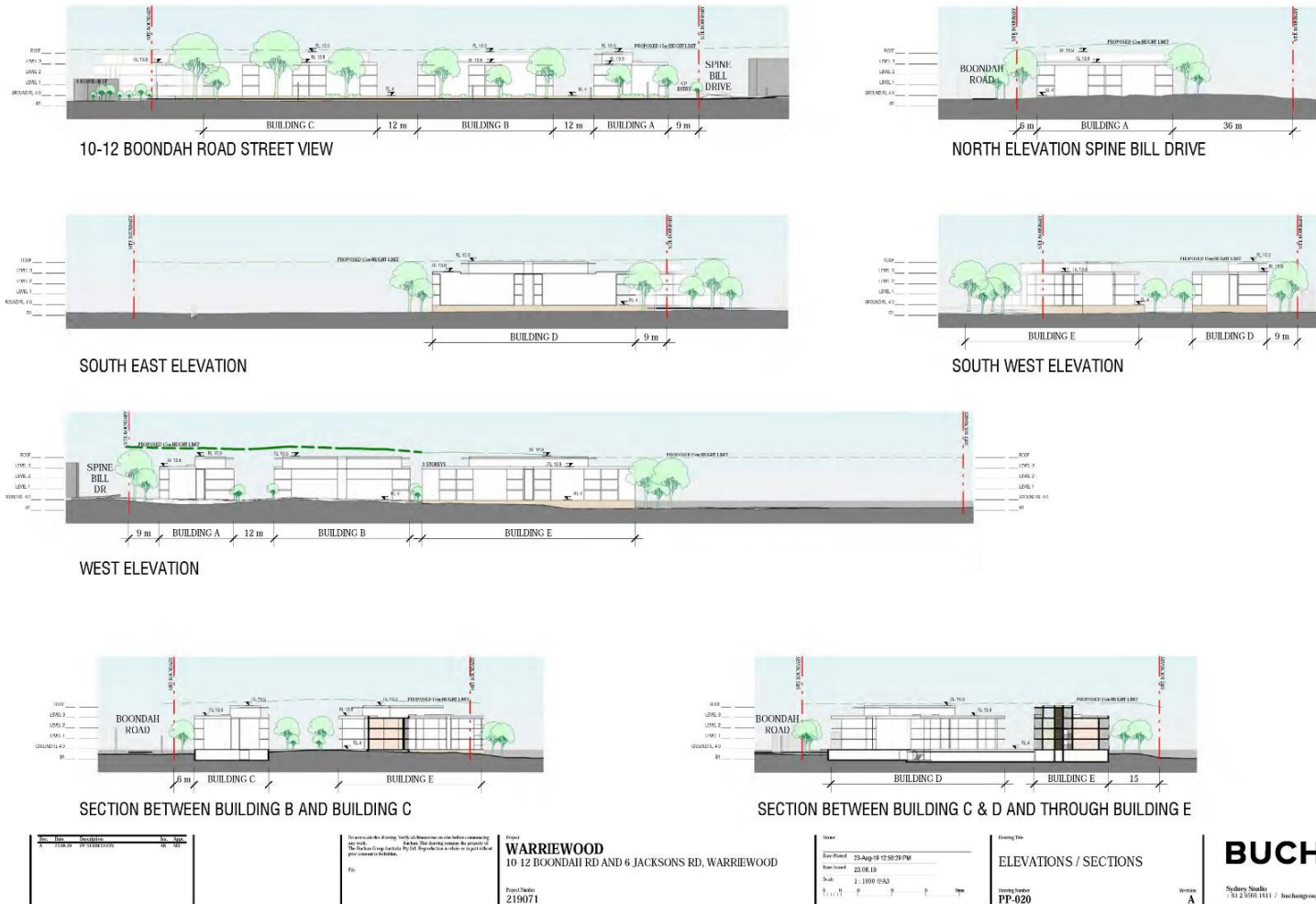
This report has been prepared for the proposed R3 zone portion of the site.

The ground floor plan (refer Figure 1.2) provides for approximately one hundred and twenty (120) units, spanning over five (5) building blocks. The actual dwelling mix and type will be determined at the development application stage.

The bushfire constraints have been highlighted and asset protection zones (APZs) have been recommended, based on the concept plan. Recommendations have also been made for future road design, building construction and water supply.



Figure 1.2 – Ground floor plan (Source: *Buchan*, project number 219071, dated 23.08.19)



**Figure 1.3 – Basement plan**  
 (Source: *Buchan*, project number 219071, dated 23.08.19)

### 1.3 Information collation

To achieve the aims of this report, a review of the information relevant to the property was undertaken prior to the initiation of field surveys. Information sources reviewed include the following:

- Basement and ground floor plan, prepared by *Buchan Group*, dated 23.08.19
- Biodiversity Constraints Assessment, prepared by *Travers bushfire & ecology* August 2019
- Pittwater Local Environmental Plan 2014
- *NearMap* aerial photography
- Topographical maps *DLPI of NSW* 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas*
- *Pre-release Planning for Bush Fire Protection 2018 – RFS*
- *Community Resilience Practice Notes 2/12 Planning Instruments and Policies.*

An inspection of the proposed development site and surrounds was undertaken by Emma Buxton in June 2019 to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bushfire measures and a visual appraisal of bushfire hazard and risk were also undertaken.

### 1.4 Site description

The proposed residential development site (proposed R3 zone) is confined within 10 & 12 Boondah Road, Warriewood within the local government Area (LGA) of Northern Beaches (refer Figure 1.4). The land to south (Lot 9 DP806132 and Lots 7072 and 7073 DP93778 at 2–6 Jacksons Road) is proposed to expand the existing playing fields.

The property is adjoined to the north by high density residential development, to the south by a managed land and a commercial shopping complex and to the east by Boondah Road and a strip of grazing land. Forested wetland vegetation extends beyond the grazing land to the north-east and adjoins the site boundary to the west, forming part of the broader Warriewood Wetlands landscape.



**Figure 1.4 – Aerial appraisal**  
(source – NearMap 2019)

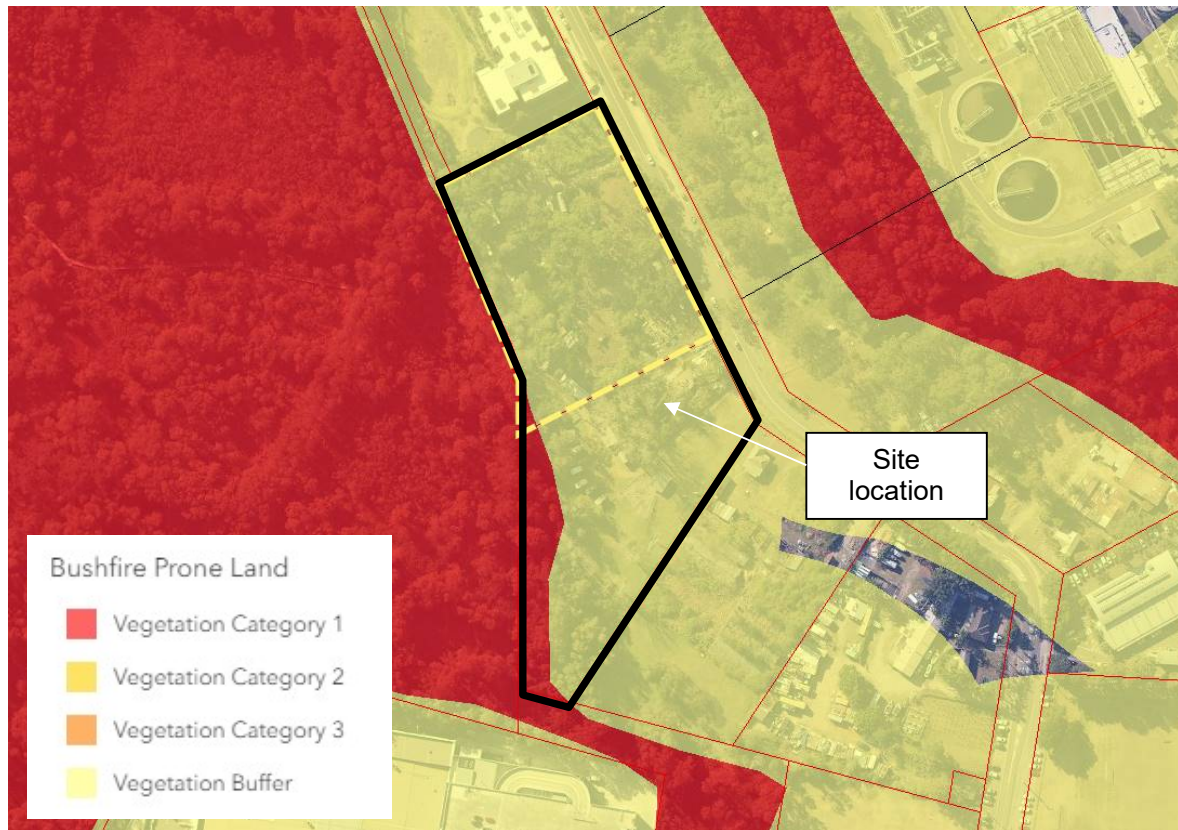
## 1.5 Legislation and planning instruments

### 1.5.1 *Environmental Planning and Assessment Act 1979 (EP&A Act) and bushfire prone land*

The *EP&A Act* governs environmental and land use planning and assessment within New South Wales. It provides for the establishment of environmental planning instruments, development controls and the operation of construction controls through the *National Construction Code (NCC)*. The identification of bushfire prone land is required under Section 10.3 of the *EP&A Act*.

Bushfire prone land maps provide a trigger for the development assessment provisions. The proposed rezoning is located on land that is mapped by Northern Beaches Council as being bushfire prone – Category 1 vegetation (depicted red) and its associated buffer (depicted yellow) (refer Figure 1.5).

*PBP* stipulates that if a proposed amendment to land use zoning or land use affects a designated bushfire prone area then the Section 9.1(2) Direction No 4.4 of the *EP&A Act* must be applied. This requires Council to consult with the Commissioner of the RFS and to take into account any comments by the Commissioner and to have regard to the planning principles of *PBP* (detailed within Section 1.5.3).



**Figure 1.5** – Bushfire prone land map  
(Source: NSW Planning portal)

### **1.5.2 Local Environmental Plan (LEP) and Development Control Plan (DCP)**

An LEP provides for a range of zonings which list development that is permissible or not permissible, as well as the objectives for development within a zone. The proposal is to proceed as an amendment to the current *Pittwater LEP 2014*.

The site is currently zoned RU2 – Rural Landscape (refer Figure 1.1). The proposal seeks a rezoning of the site to R3 – Medium Density Residential and RE1 – Public Recreation.

The proposal, including the provision of APZs, would seek to comply with the objectives of the proposed rezoning.

### **1.5.3 Pre-release Planning for Bush Fire Protection 2018 (PBP)**

Bushfire protection planning requires the consideration of the RFS planning document entitled *PBP*. *PBP* provides planning principles for rezoning to residential land as well as guidance on effective bushfire protection measures.

The proposed concept masterplan has been assessed in compliance with *Pre-release PBP 2018*. This includes a bushfire strategic study (Section 2 of this report) and assessment against the following bushfire protection measures to ensure that future development is capable of complying with *PBP 2018*:

- asset protection zones
- building construction and design

- access arrangements
- water supply and utilities
- landscaping
- emergency arrangements

#### **1.5.4 National Construction Code (NCC) and the Australian Standard AS3959 Construction in bushfire-prone areas 2009 (AS3959)**

The *NCC* is given effect through the *EP&A Act* and forms part of the regulatory environment of construction standards and building controls.

The *NCC* outlines objectives, functional statements, performance requirements and deemed to satisfy provisions. For residential dwellings these include Classes 1, 2 and 3 buildings. The construction manual for the deemed to satisfy requirements is *AS3959*.

Although consideration of *AS3959* is not specifically required in a rezoning proposal, this report (Section 3.3) provides the indicative bushfire attack level (BAL) setbacks based on the current concept plan to guide future planning within the site.

#### **1.6 Environmental constraints**

A review of the Biodiversity Constraints Assessment prepared by this firm (dated August 2019) has been undertaken. The assessment identified two (2) endangered ecological communities (EEC) within the study area:

- Swamp Oak Floodplain Forest
- Bangalay Sand Forest

The threshold for clearing above which the Biodiversity Assessment Method and offsets scheme apply is 0.25 ha or more. Based on the preliminary concept plan, future development is likely to impact 1.18 ha of native vegetation, therefore offsetting will likely be required under this trigger.

As outlined in the Biodiversity Constraints Assessment, the current concept layout follows previous advice to:

- Avoid impacting on lots containing the important winter flowering Swamp Mahogany which may play an important function for providing unique foraging resources in the locality, particularly for the endangered Swift Parrot;
- Retain, and where appropriate restore, riparian habitat along Narrabeen Creek that ensures habitat connectivity is maintained in the locality; and
- Ensure that any proposal does not impact directly or indirectly on the high-quality habitat available in the adjacent Warriewood Wetlands to the west.





# Bushfire Strategic Study

## 2

*Pre-release PBP 2018* includes the requirement to prepare a strategic bushfire study for rezoning applications. The level of information required is dependent upon the nature of the scale of the proposal, the bushfire risk and its potential impact upon the wider infrastructure network.

The Strategic Bush Fire Study is designed to assess whether new development is appropriate in the bushfire hazard context. It also provides the ability to assess the strategic implications of future development for bushfire mitigation and management.

The following Table 2.1 assesses the proposed development in terms of the broader bushfire landscape, land use, access and egress and associated infrastructure.

The following Sections 3-5 outline the relevant performance criteria to be achieved for future development in accordance within *Pre-release PBP 2018*.

**Table 2.1 – Bushfire strategic study.**

Issue	Detail	Assessment considerations	Proposal's compliance
<b>Bushfire landscape assessment</b>	A bushfire landscape assessment considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	<ul style="list-style-type: none"> <li>• The bushfire hazard in the surrounding area, including:               <ul style="list-style-type: none"> <li>○ vegetation</li> <li>○ topography</li> <li>○ weather</li> </ul> </li> <li>• The potential fire behaviour that might be generated based on the above</li> <li>• Any history of bushfire in the area</li> <li>• Potential fire runs into the site and the intensity of such fire runs.</li> </ul>	<p>The site is located within a moderately developed landscape with managed / developed land adjoining the site to the north and south.</p> <p>The land adjoining the site to the west is zoned E2 Environmental Conservation and forms part of the Warriewood Wetlands. The wetlands support existing broad walks and pedestrian tracks which connect to further wetlands in the west. The land beyond Boondah Road to the east supports a narrow (&lt;30 metre) strip of grazed vegetation (horse paddock) with a narrow strip of Coastal Swamp Forest located beyond. This land is owned and managed by <i>Sydney Water</i>.</p> <p>The topography within the adjacent bushland to the west is level to upslope.</p> <p>Figure 2.1 provides fire history information for the site and surrounding area. Whilst wildfire has not impacted the property, the land located &gt;1km to the west (Cottage Point) was impacted by the 1994 wildfires.</p> <p>The bushfire impact from the east is mitigated by Boondah Road and the surrounding managed landscape around the perimeter of the site (i.e. northern and southern aspects).</p>
<b>Land use assessment</b>	The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	<ul style="list-style-type: none"> <li>• The risk profile of different areas of the development layout based on the above landscape study;</li> <li>• The proposed land use zones and the resultant permitted land uses;</li> <li>• The most appropriate siting of different land uses based on risk profiles within the</li> </ul>	<p>The APZs identified in the report are based on a standard residential development, with the bushfire threat (identified as a medium risk) due to the location of the proposed buildings within the site.</p> <p>Appropriate APZs can be provided based on this risk whilst taking into account the ecological constraints (i.e. retention of</p>

Issue	Detail	Assessment considerations	Proposal's compliance
		<p>site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site);</p> <ul style="list-style-type: none"> <li>• The impact of the siting of these uses on APZ provision.</li> </ul>	<p>the EEC vegetation to the south).</p>
<b>Access and egress</b>	<p>A study of the existing and proposed road networks both within and external to the masterplan area or site layout.</p>	<ul style="list-style-type: none"> <li>• The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile;</li> <li>• The location of key access routes and direction of travel;</li> <li>• The potential for development to be isolated in the event of a bushfire.</li> </ul>	<p>Public access into the site will be provided from two (2) access points to Boondah Road to the east. This existing network provides sufficient and safe egress away from the direct threat of bushfire into areas of highly managed land.</p> <p>A fire trail has been provided adjacent to the western site boundary to allow firefighting access to the vegetation.</p>
<b>Emergency services</b>	<p>An assessment of the future impact of new development on emergency services provision.</p>	<ul style="list-style-type: none"> <li>• Consideration of the increase in demand for emergency services responding to a bushfire emergency (including the need for new stations / bridges);</li> <li>• Impact on the ability of emergency services to carry out fire suppression in a bushfire emergency.</li> </ul>	<p>Ingleside Rural Fire Brigade has a station located at King Road, Ingleside, approximately 6km to the north-west. This service is considered adequate and no further stations are required. The proposed development will comply with <i>PBP</i> with the provision of access to the bushfire hazard (perimeter road), APZs and building construction standards to increase the site's resilience to bushfire attack and improve firefighting access.</p>
<b>Infrastructure</b>	<p>An assessment of the issues associated with infrastructure provision.</p>	<ul style="list-style-type: none"> <li>• The ability of the reticulated water system to deal with a major bushfire event (particularly in terms of water pressure);</li> <li>• Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.</li> </ul>	<p>Future water and gas supply will comply with <i>PBP</i>.</p>
<b>Adjoining land</b>	<p>The impact of new development on adjoining landowners and their ability to</p>	<ul style="list-style-type: none"> <li>• Consideration of the implications of a change in land use on adjoining land including; <ul style="list-style-type: none"> <li>◦ The ability of adjoining and</li> </ul> </li> </ul>	<p>The proposed development will provide for <i>PBP</i> complying bushfire protection measures with all measures being implemented within the site. Adjoining landholders are not required to increase their bushfire management responsibility.</p>

Issue	Detail	Assessment considerations	Proposal's compliance
	undertake bushfire management.	<p>nearby land to carry a bushfire;</p> <ul style="list-style-type: none"> <li>○ Consideration of increased pressure on adjoining landowners to introduce or increase BPMs through the implementation of Bush Fire Management Plans as a result of the changes in land use.</li> </ul>	



# Bushfire Threat Assessment

# 3

To assess the bushfire threat and to determine the required width of an APZ for a development, a review of the elements that comprise the overall threat needs to be completed.

*PBP* provides a methodology to determine the size of any APZ that may be required to offset possible bushfire attack. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation.

### 3.1 Hazardous fuels

*PBP* guidelines require the identification of the predominant vegetation formation in accordance with David Keith (2004) to determine APZ distances for new developments.

The hazardous vegetation is calculated for a distance of at least 140m from a proposed development boundary and has been confirmed by ecological studies undertaken by this firm. These plant community types (PCTs) have been converted to vegetation class / formation using the Bionet Vegetation Classification website available via the following link; <http://environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx?ReturnUrl=%2fNSWVCA20PRapp%2fTimeout.aspx>

The vegetation posing a threat to the planning proposal is summarised in Table 3.1 below and is depicted in Schedule 1.

**Table 3.1 – Vegetation communities**

Aspect	PCT code	Vegetation community type (verified by <i>Travers bushfire &amp; ecology</i> , 2019)	Keith vegetation formation ( <i>Pre-release PBP</i> )	Vegetation class / comprehensive vegetation fuel load
North-west, south and east (beyond Boondah Road)	1232	Swamp Oak floodplain swamp forest	Forest	Forested Wetland / Coastal Swamp Forest <b>22.6/34.1 t/ha</b>
West (Warriewood Wetland)	1236	Swamp Paperbark – Swamp Oak tall shrubland	Forested Wetland	Forested Wetland / Riverine Forest <b>8.2/15.1 t/ha</b>
West (refer Note 1)	781	Coastal Freshwater Lagoon	Freshwater Wetland	Freshwater wetland <b>4.4/4.4 t/ha</b>

**Note 1:** The predominant vegetation to the west of Building D has been determined as forested wetland (supports a higher fuel load than freshwater wetland) based on the extensive area and predominance of this vegetation type.

### 3.2 Effective slope

The effective slope is assessed for a distance 100m. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined. The effective slope within the hazardous vegetation is level.

### 3.3 Bushfire attack assessment

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Sydney Region.

Table 3.2 provides a summary of the bushfire attack assessment for future residential development in accordance with Table A1.12.5 of *PBP*. The following table is to be read in conjunction with Schedule 1 attached.

**Table 3.2 – Bushfire attack assessment**

Aspect	Vegetation formation within 140m of development	Effective slope of land	Minimum APZ required <i>Pre-release PBP 2018</i> (metres)	APZ provided (metres)	Indicative bushfire construction standards
<b>BUILDING A</b>					
East	Coastal Swamp Forest (beyond Boondah Road)	Level	24	26	BAL 29
West	Coastal Swamp Forest (within Warriewood Wetland)	Level	24	37	BAL 19
North	Managed	N/A	N/A	>100	BAL 29 (refer Note 1)
South	Managed	N/A	N/A	>100	BAL 29 & 19 (refer Note 1)
<b>BUILDING B</b>					
East	Coastal Swamp Forest (beyond Boondah Road)	Level	24	26	BAL 29
West	Coastal Swamp Forest (within Warriewood Wetland)	Level	24	56	BAL 19 (refer Note 1)
North	Managed	N/A	N/A	>100	BAL 29 & 19 (refer Note 1)
South	Managed	N/A	N/A	>100	BAL 29 & 19 (refer Note 1)
<b>BUILDING C</b>					
East	Coastal Swamp Forest (beyond Boondah Road)	Level	24	26	BAL 29
West	Coastal Floodplain Wetland (Forested Wetland) (within Wetland)	Level	10	66	BAL 19 (refer Note 1)

Aspect	Vegetation formation within 140m of development	Effective slope of land	Minimum APZ required Pre-release PBP 2018 (metres)	APZ provided (metres)	Indicative bushfire construction standards
North	Managed	N/A	N/A	>100	BAL 29 & 19 (refer Note 1)
South	Managed	N/A	N/A	>100	BAL 29 & 19 (refer Note 1)
<b>BUILDING D</b>					
West	Coastal Floodplain Wetland (Forested Wetland) (within Warriewood Wetland)	Level	10	15	BAL 19
East	Coastal Swamp Forest (beyond Boondah Road)	Level	24	69	BAL 12.5 (refer Note 1)
North	Managed	N/A	N/A	>100	BAL 19 & 12.5 (refer Note 1)
South	Coastal Swamp Forest (Conservation area)	Level	24	58	BAL 19 & 12.5 (refer Note 1)
<b>BUILDING E</b>					
North & north-east	Coastal Swamp Forest (beyond Boondah Road)	Level	24	30	BAL 29
East	Managed land	N/A	N/A	>100	BAL 29 & 19 (refer Note 1)
South	Coastal Swamp Forest (Conservation area)	Level	24	51	BAL 19 (refer Note 1)
West	Coastal Floodplain Wetland (Forested Wetland) (within Warriewood Wetland)	Level	10	46	BAL 19 (refer Note 1)

**Note 1:** The BAL levels for these aspects are determined by the BAL rating applied to the hazard side of the building. The implementation of the construction standards is such that where a building has direct exposure to a particular level of bushfire attack, then that construction standard shall apply. Where a particular elevation of the same building is completely shielded from the impacts (i.e. on the leeward side), then the construction requirements may be downgraded by one level of construction – for example, a BAL 29 building may have the rear (shielded) elevation downgraded to BAL 19. The roof is required to be constructed to the higher level.

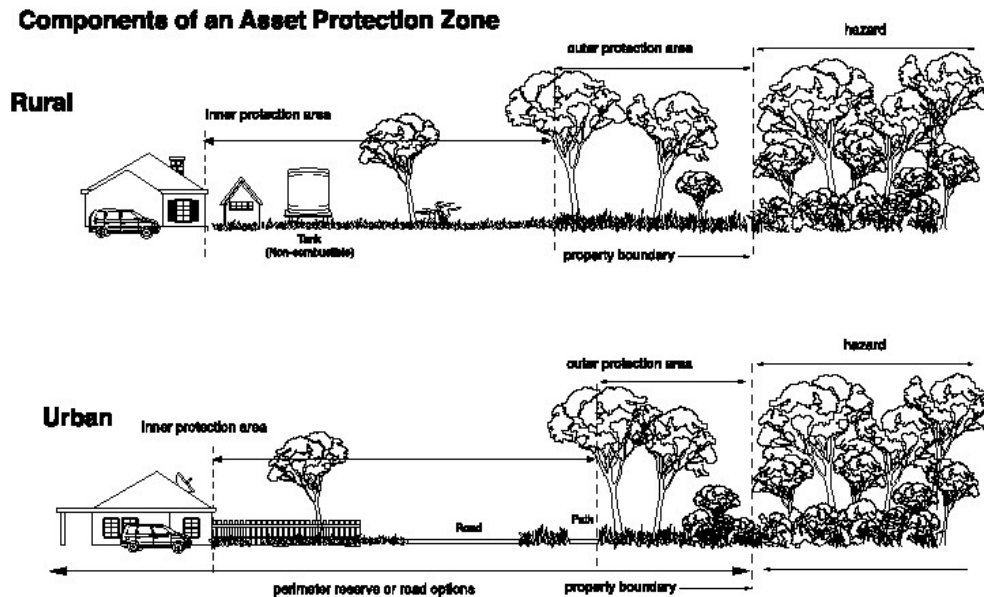


# Specific Protection Issues

## 4

### 4.1 Asset protection zones (APZs)

APZs are areas of defensible space separating hazardous vegetation from buildings. The APZ generally consists of two (2) subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. The IPA cannot be used for habitable dwellings but can be used for all external non-habitable structures such as pools, sheds, non-attached garages, cabanas, etc. A typical APZ and therefore defensible space is graphically represented below:



Source: RFS, 2006

**Note:** Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the *RFS* performance criteria.

*PBP* dictates that the subsequent extent of bushfire attack that can potentially emanate from a bushfire must not exceed a radiant heat flux of  $29kW/m^2$  for residential subdivision. This rating assists in determining the size of the APZ in compliance with Appendix 2 of *PBP* to provide the necessary defensible space between hazardous vegetation and a building.

Table 4.1 outlines the proposal's compliance with the performance criteria for APZs.



**Table 4.1 – Performance criteria for asset protection zones (PBP 2018 guidelines)**

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
Potential building footprints will not be exposed to radiant heat levels exceeding 29 kW/m <sup>2</sup> on each proposed lot.	APZs are provided in accordance with Tables A1.12.2 and A1.12.4 based on the FDI.	☑		Refer Section 2.3. A deemed to satisfy approach has been undertaken using Table A1.12.5 of <i>Pre-release PBP 2018</i> .
APZs are managed and maintained to prevent the spread of a fire towards the building.	APZs are managed in accordance with the requirements of Appendix 4.	☑		The APZ consists of landscaped areas, roads and turfed areas.
The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	☑		APZs are within the site boundary.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees.	☑		APZs are on slopes of <18 degrees.

## 4.2 Building protection

Building construction standards for the proposed future buildings are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)* and *Pre-release Planning for Bush Fire Protection 2018*.

Building construction standards have been outlined within Table 3.2 and are depicted in Schedule 1 attached.

The BAL assessment provided in Table 3.2 is based on a deemed to satisfy approach in compliance with Table A1.12.5 of *PBP 2018*.

## 4.3 Hazard management

In terms of implementing and / or maintaining APZs, there is no physical reason that would constrain hazard management from being successfully carried out by normal means (e.g. mowing / slashing / tree pruning and removal).

The APZ is to be managed as an inner protection area (IPA) in line with the NSW RFS guidelines *Standards for Asset Protection Zones (RFS, 2005)*, with landscaping to comply with Appendix 5 of *PBP*.

A summary of the guidelines for managing APZs is attached as Appendix 1 to this report.

#### **4.4 Access for firefighting operations**

Public access into the site will be provided via two (2) points from Boondah Road in the east.

The current concept plan provides for two (2) public roads which will run adjacent to the northern and south-eastern property boundaries. These roads are to be provided with a minimum 5.5m carriageway width and will be provided with a turning head at the termination of the public road/s.

A fire trail is proposed to provide a link between these roads to allow firefighting access to vegetation adjacent to the western site boundary and to all elevations of the buildings.

Table 4.2 outlines the performance criteria and acceptable solutions for future public roads.

**Table 4.2 – Performance criteria and acceptable solutions for access for residential and rural subdivisions (Pre-release PBP 2018 pg. 44-46)**

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
<b>ACCESS (GENERAL REQUIREMENTS)</b>	Firefighting vehicles are provided with safe, all weather access to structures and hazard vegetation.	Perimeter roads are provided for residential subdivisions of three or more allotments;		☑	Firefighting access to the rear of the property will be provided via a fire trail (with locked gates). This fire trail will be maintained by the body corporate and will comply with the performance criteria.
		Subdivisions of three or more allotments have more than one access in and out of the development;	☑		Access is available via two access points onto Boondah Road.
		Traffic management devices are constructed to not prohibit access by emergency services vehicles;	☑		Future road design is to comply with the acceptable solutions.
		Maximum grades for sealed roads do not exceed 15 degrees and an average grade of no more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient;	☑		Complies.
		All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200m in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	☑		The two (2) dead end roads will have a length of <200m and will be linked via a fire trail to provide through road access.
		Where kerb and guttering are provided perimeter roll top kerbing should be used to the hazard side of the road;	☑		N/A
		Where access / egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system;	☑		N/A

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
	The capacity of access roads is adequate for firefighting vehicles.	The capacity of perimeter and non-perimeter road surfaces and any bridges / causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges / causeways are to clearly indicate load rating;	<input checked="" type="checkbox"/>		Future road design is to comply with the acceptable solutions.
	There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	<input checked="" type="checkbox"/>		
		Hydrants are provided in accordance with <i>AS2419.1:2005</i> ;	<input checked="" type="checkbox"/>		
		There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available;	<input checked="" type="checkbox"/>		
<b>PERIMETER ROADS</b>	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	Perimeter roads are two-way sealed roads;		<input checked="" type="checkbox"/>	An 8m wide perimeter road has not been provided based on the concept design and residential evacuation routes being provided to east.
		8m carriageway width kerb to kerb;		<input checked="" type="checkbox"/>	
		Parking is provided outside of the carriageway width;		<input checked="" type="checkbox"/>	A 4m wide fire trail (with cleared verges of 1m either side) is proposed to provide firefighting access and emergency management on the bushland interface. A passing bay is to be provided every 200m. The fire trail will be maintained by the body corporate and will connect to the public roads via a locked gate (key/lock system authorised by
		Hydrants are located clear of parking areas;		<input checked="" type="checkbox"/>	
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m;		<input checked="" type="checkbox"/>	

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		Curves of roads have a minimum inner radius of 6m;		<input checked="" type="checkbox"/>	the local RFS). Safe evacuation by residents can occur via the public road system and onto Boondah Road in compliance with the performance criteria.
		The maximum grade road is 15° and average grade is 10°;		<input checked="" type="checkbox"/>	
		The road crossfall does not exceed 3°;		<input checked="" type="checkbox"/>	
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.		<input checked="" type="checkbox"/>	
<b>NON-PERIMETER ROADS</b>	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating.	Minimum 5.5m width kerb to kerb;	<input checked="" type="checkbox"/>		Future road design is to comply with the acceptable solutions.
		Parking is provided outside of the carriageway width;	<input checked="" type="checkbox"/>		
		Hydrants are located clear of parking areas;	<input checked="" type="checkbox"/>		
		Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	<input checked="" type="checkbox"/>		
		Curves of roads have a minimum inner radius of 6m;	<input checked="" type="checkbox"/>		
		The road crossfall does not exceed 3°;	<input checked="" type="checkbox"/>		
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	<input checked="" type="checkbox"/>		

## 4.5 Water supplies

Table 4.3 outlines the proposal's compliance with the acceptable solutions for reticulated water supply.

**Table 4.3 – Performance criteria for reticulated water supplies (PBP 2018 guidelines)**

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
A water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available;	<input checked="" type="checkbox"/>		Future water supply is to comply with the acceptable solutions.
	A static water supply is provided where no reticulated water is available;	N/A		
Water supplies are located at regular intervals.  The water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the <i>Australian Standard AS2419.1:2005</i> ;	<input checked="" type="checkbox"/>		
	Hydrants are not located within any road carriageway;	<input checked="" type="checkbox"/>		
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads;	<input checked="" type="checkbox"/>		
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with <i>AS2419.1:2005</i> ;	<input checked="" type="checkbox"/>		
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps;	<input checked="" type="checkbox"/>		

## 4.6 Gas

Table 4.4 outlines the required performance criteria for the gas supply.

**Table 4.4 – Performance criteria for gas supplies (PBP 2018 guidelines)**

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used;	☑		Future gas supply is to comply with the acceptable solutions.
	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;	☑		
	Polymer-sheathed flexible gas supply lines are not used;	☑		
	Above-ground gas service pipes are metal, including and up to any outlets.	☑		

## 4.7 Electricity

Table 4.5 outlines the required performance criteria for electricity supply.

**Table 4.5 – Performance criteria for electricity services (PBP 2018 guidelines)**

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where practicable, electrical transmission lines are underground;	☑		Future electricity supply is to comply with the acceptable solutions.
	Where overhead, electrical transmission lines are proposed as follows: <ul style="list-style-type: none"> <li>lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas;</li> <li>no part of a tree is closer to a power line than the distance set out in accordance with the specifications in <i>ISSC3 Guideline for Managing Vegetation Near Power Lines</i>.</li> </ul>	☑		



# Conclusion & Recommendations

## 5

### 5.1 Conclusion

*Travers bushfire & ecology* has been engaged to undertake a bushfire assessment for the planning proposal located at No. 10-12 Boondah Road & 2-6 Jacksons Road, Warriewood.

Our assessment found that bushfire attack can potentially affect the development site from the Coastal Floodplain Wetland and Coastal Swamp Forest (EEC) located within Warriewood Wetlands to the west, the retained Coastal Swamp Forest to the south and to a lesser extent the Coastal Swamp Forest associated with the creek line beyond Boondah Road to the east, resulting in possible ember and radiant heat attack.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures;

- APZs in accordance with the acceptable solutions outlined within *Pre-release PBP 2018*;
- Provision of access in accordance with the performance requirements outlined in *Pre-release PBP 2018*;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *Pre-release PBP 2018*;
- Future dwelling construction in compliance with the appropriate construction sections of *AS3959-2018*, and *Pre-release PBP 2018*.
- Creation of 88B easements to ensure the ongoing maintenance of APZs and the proposed fire trail within the property.

The following recommendations are provided to ensure that future residential development is in accordance with, or greater than, the requirements of *PBP*.

### 5.2 Recommendations

**Recommendation 1** - APZs are to be provided to the future residential development as generally depicted in Schedule 1 attached.

**Recommendation 2** - The APZ is to be managed as an IPA as outlined within Section 4.1.3 and Appendix 4 of *Pre-release Planning for Bush Fire Protection 2018* and the NSW Rural Fire Service document '*Standards for asset protection zones*'.

**Recommendation 3** - Building construction standards for the proposed future buildings are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas*



(2018) or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas - 2014* as appropriate and *Pre-release PBP 2018*.

**Recommendation 4** - Access is to comply with the performance criteria outlined in Section 5.3 of *Pre-release Planning for Bush Fire Protection 2018*.

**Recommendation 5** - Water, electricity and gas supply is to comply with the acceptable solutions as provided within Section 5.3c of *PBP 2018* (refer Sections 4.5, 4.6 and 4.7 of this report).

## REFERENCES

- Australian Building Codes Board (2010) – *Building Code of Australia*, Class 1 and Class 10 Buildings Housing Provisions Volume 2.
- Chan, K.W. (2001) – *The suitability of the use of various treated timbers for building constructions in bushfire prone areas*. Warrington Fire Research.
- Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bush fire-prone areas*.
- Hon Brad Hazzard (7 June 2012) – *Planning proposal to rezone land at Boundary Road, Medowie from 1 (c1) Rural Small Holdings Zone to 1(c5) Rural Small Holdings, 1(c4) Rural Small Holdings and 7(a) Environmental Protection*.
- Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change.
- Rural Fire Service (2006) - *Planning for bush fire protection– a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service.
- Rural Fire Service (2018) – *Pre-release Planning for bushfire protection– a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service.
- Rural Fire Service (2006) - Bushfire Attack Software on RFS Web site.
- Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack*. RFS Development Control Service.
- Travers, J. (2003) *The Ecological Management of Asset Protection Zones at Wallarah Peninsula – A Case Study*.
- Umwelt, 2012. *Ecological Assessment for Rezoning Application Lots 93 – 96 Boundary Road, Medowie*.



# Plan of Bushfire Protection Measures

S1



Construct 4m wide fire trail with 1m wide verges on either side.

RETAINED VEGETATION (EEC)

DISCLAIMER - CAD NOT GEOREFERENCED

Legend		Bushfire Construction Standards	Vegetation Classification
	Development site boundary	<b>AS3959* (2009)</b>	<b>(verified by TBE, July 2019)</b>
	Contours - 1m (source: LiDAR)	BAL 29	Coastal Swamp Forest (22.6-34.1 t/ha)
	Proposed Buildings	BAL 19	Freshwater Wetland (4.4 t/ha)
	Asset Protection Zone (APZ)	BAL 12.5	Coastal Floodplain Wetland (8.2-15.1 t/ha)

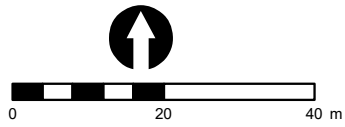
Aerial source: Nearmap



PROJECT & MXD REFERENCE  
10 & 12 Boondah Road,  
Warriewood

DATE & ISSUE NUMBER  
22/08/2019  
Issue 1

SCALE & COORDINATE SYSTEM  
1:1,000 @ A3  
GDA 1994 MGA Zone 56



TITLE  
**Schedule 1 - Bushfire Protection Measures**

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.



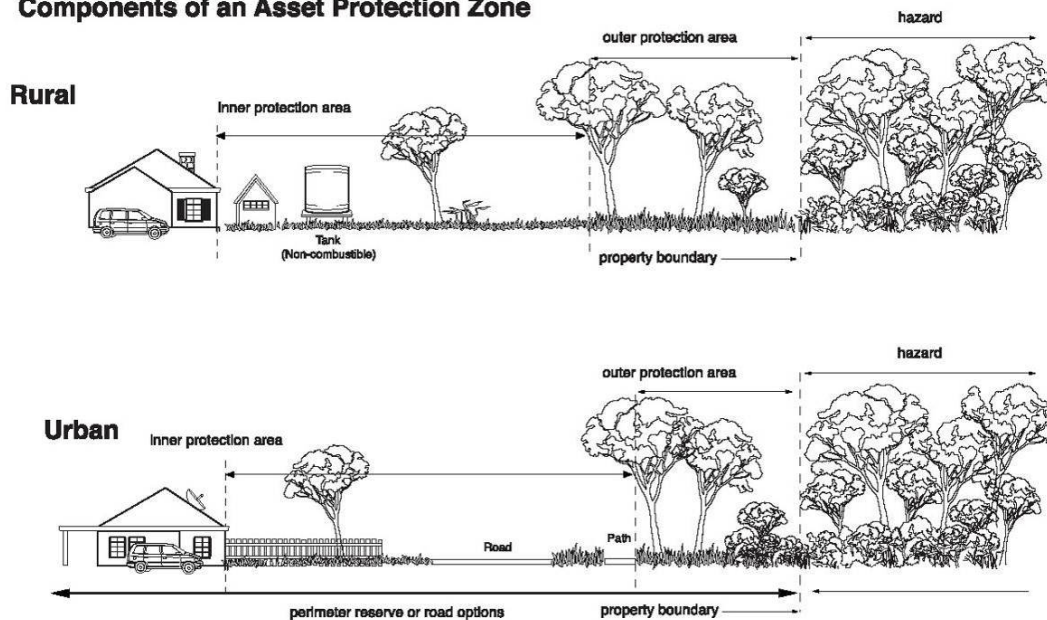
# Management of Asset Protection Zones

# A1

The RFS provides basic advice in respect of managing APZs through documents such as, *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 5 of *PBP*.

The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. A typical APZ is graphically represented below:

## Components of an Asset Protection Zone



APZs and progressive reduction in fuel loads (Source: RFS, 2006)

**Note:** Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the RFS performance criteria.

The following provides maintenance advice for vegetation within the IPA.

### Inner protection area (IPA)

Fuel loads within the IPA are to be maintained so it does not exceed 4t/ha.

Trees are to be maintained to ensure;

- canopy cover does not exceed 15%
- trees (at maturity) do not touch or overhang the building
- tree canopies (at maturity) should be well spread out and not form a continuous canopy

- there should be no unmanaged vegetation within 10m of windows, doorways, eaves and gutters
- lower limbs should be removed up to a height of 2m above ground

Shrubs are to be maintained to ensure;

- large discontinuities or gaps in vegetation
- shrubs should not be located under trees
- shrubs should be in clumps no greater than 5m<sup>2</sup>
- shrubs should be no closer than 10m from an exposed window or door.

Grass is to be maintained to ensure:

- a height of 10cm or less
- leaves and debris are removed.

Landscaping to the site is to comply with the principles of Appendix 5 of *PBP*. In this regard the following landscaping principles are to be incorporated into the development:

- suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways;
- restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come in contact with the building;
- when considering landscape species consideration needs to be given to estimated size of the plant at maturity;
- avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies;
- use smooth bark species of trees species which generally do not carry a fire up the bark into the crown;
- avoid planting of deciduous species that may increase fuel at surface / ground level (i.e. leaf litter);
- avoid climbing species to walls and pergolas;
- locate combustible materials such as woodchips / mulch, flammable fuel stores away from the building;
- locate combustible structures such as garden sheds, pergolas and materials such timber garden furniture way from the building; and
- use of low flammability vegetation species.