TRAVERS BUSHFIRE & ECOLOGY

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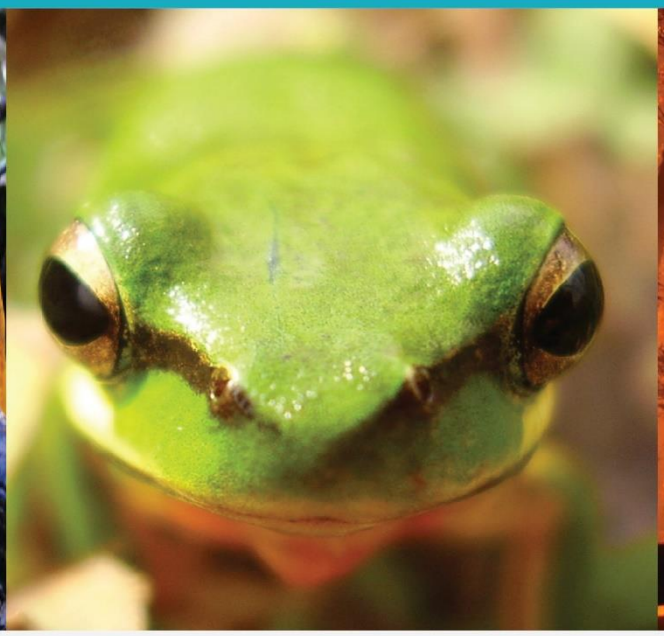


BUSHFIRE PROTECTION ASSESSMENT

Proposed Residential Subdivision

Lot B DP 370222

4 Forest Road

Warriewood

Under Section 100B of the Rural Fires Act (1997)

20 December 2022

(REF: 21BMN02)

BUSHFIRE PROTECTION ASSESSMENT

Proposed residential subdivision

Lot B DP 370222

4 Forest Road, Warriewood

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Date:	20/12/22
File:	21BMN02

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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. This report advises on policies and specifications published by the NSW Rural Fire Service e.g. Planning for Bush Fire Protection 2019.

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.

EXECUTIVE SUMMARY

This bushfire protection assessment has been undertaken for the proposed residential subdivision of 4 Forest Road, Warriewood.

The development is categorised by the NSW Rural Fire Service (RFS) as subdivision of bushfire prone land that can lawfully be used for residential purposes. This requires that a bushfire safety authority (BSA) must be obtained from NSW RFS in accordance with the *Rural Fires Act 1997* and *Planning for Bush Fire Protection 2019 (PBP 2019)* prior to the granting of development consent.

This assessment has found that bushfire can potentially affect the proposed development from forest vegetation to the west and remnant vegetation to the south, resulting in future buildings being exposed to potential radiant heat and ember attack.

The proposed residential subdivision must ensure that the extent of bushfire attack that can potentially impact a building envelope should not exceed a radiant heat flux of 29kW/m^2. This rating assists in determining the size of the asset protection zone (APZ), which provides the necessary defendable space between hazardous vegetation and a building.

In recognition of the requirements of *PBP 2019* and the bushfire risk posed to the site by the nearby bushland, *Travers Bushfire & Ecology* propose the following combination of bushfire measures;

- Asset protection zones in compliance with the performance criteria for residential subdivision outlined in *PBP 2019;*
- Access in compliance with the performance criteria for residential subdivision outlined in *PBP 2019;*
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *PBP 2019;* and
- Future dwelling construction in compliance with *PBP 2019* and the appropriate construction sections of *AS3959-2018* or *NASH Standard*.

GLOSSARY OF TERMS

AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
AS1596	*Australian Standard – The storage and handling of LP Gas*
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2018*
BAL	*bushfire attack level*
BCA	*Building Code of Australia*
BSA	bushfire safety authority
DA	development application
DLUP	Development Land Use Plan
EEC	Endangered ecological community
EP&A Act	*Environmental Planning & Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
FFDI	forest fire danger index
IPA	inner protection area
LEP	Local Environmental Plan
LGA	local government area
m	metres
NCC	*National Construction Code*
OPA	outer protection area
PBP 2019	*Planning for Bush Fire Protection 2019*
RF Act	*Rural Fires Act 1997*
RFS	NSW Rural Fire Service
SFR	short fire run
SFPP	special fire protection purpose
TBE	*Travers bushfire & ecology*

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ATTACHMENTS

1. INTRODUCTION

Travers bushfire & ecology has been engaged to undertake a bushfire protection assessment for the proposed subdivision development located at 4 Forest Road, Warriewood. The proposed development includes land identified as bushfire prone on the Northern Beaches bushfire prone land map (refer Figure 1-1). This triggers a formal assessment by Council in respect of the NSW Rural Fire Service (RFS) policy against the provisions of *Planning for Bush Fire Protection (PBP).*

Note: This report has been updated with revised plans on 20/12/22. The original assessment remains unaltered.

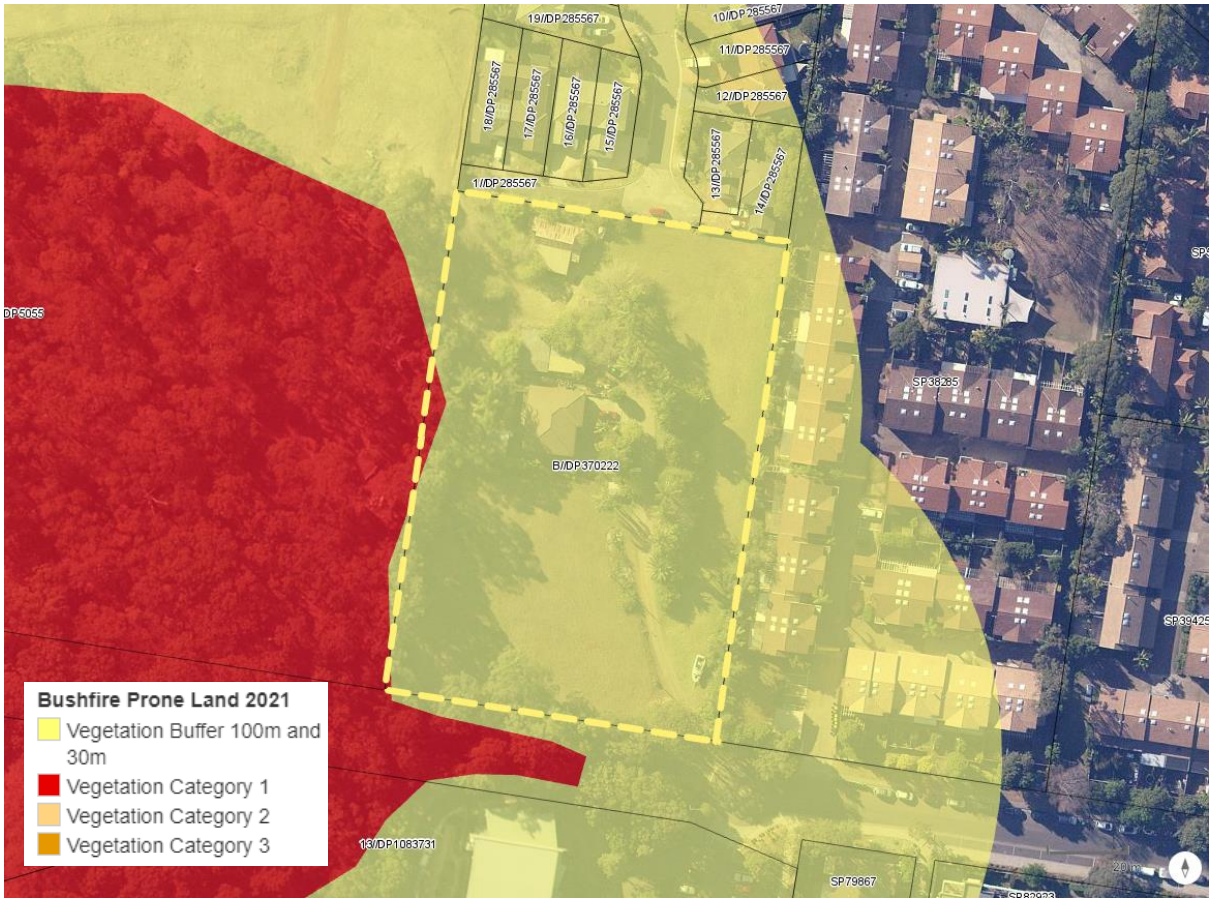

Figure 1-1 – Bushfire Prone Land Map
(Source: NSW Planning Portal, 2021)

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 *PBP*
- provide advice on mitigation measures, including the provision of asset protection zones (APZs), construction standards and other specific fire management issues

1.2 Proposed development

The current proposal is for the creation of thirteen (13) new residential allotments, roads and associated landscaping (Figure 1-2).

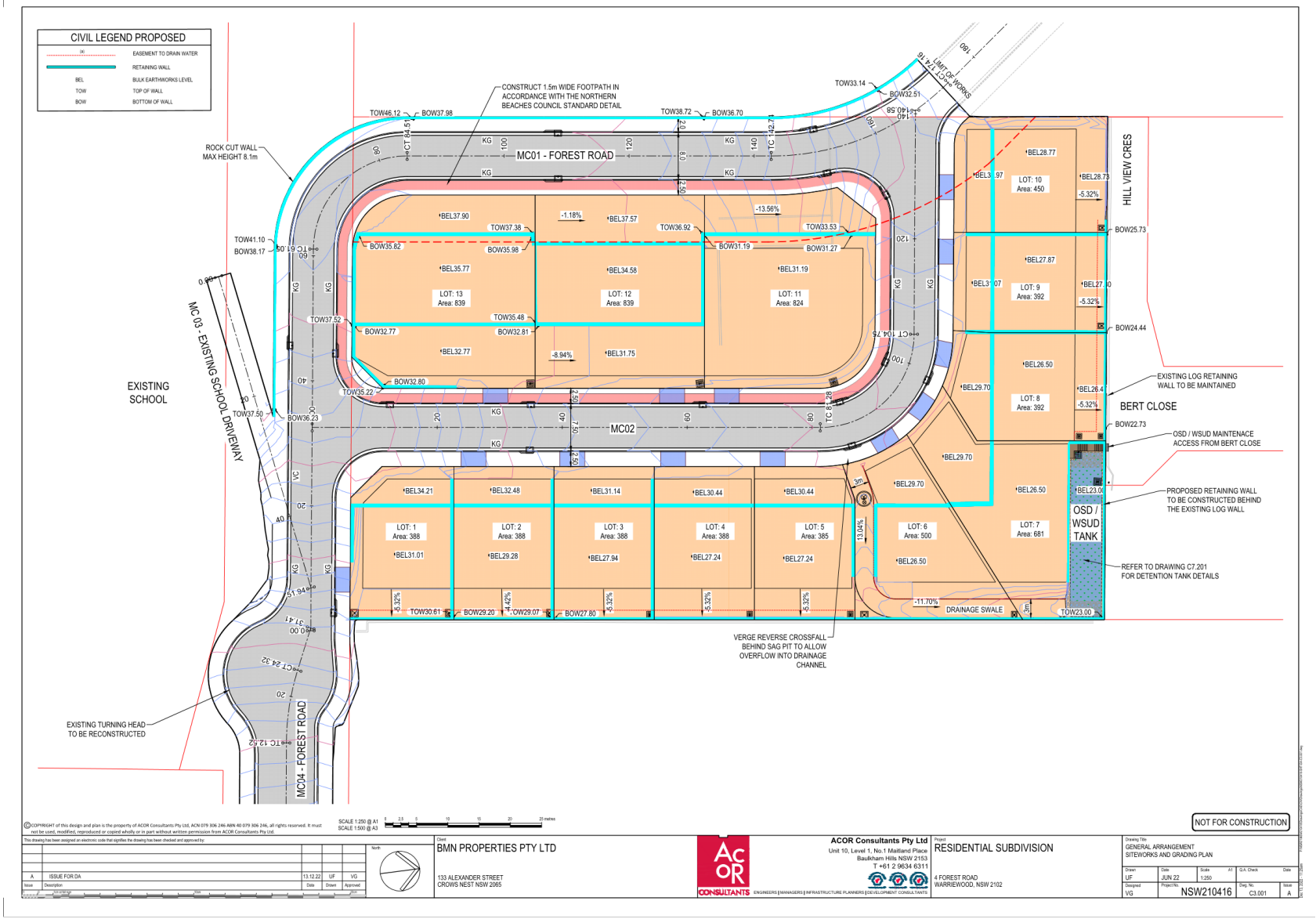

Figure 1-2 – Subdivision Plan – 4 Forest Road, Warriewood

1.3 Information collation

Information sources reviewed for the preparation of this report include the following:

- Proposed subdivision plans (source: ACOR Consultants dwg no. C3.001-June 2022)
- *NearMap* aerial photography
- Topographical maps DLPI of NSW 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas (2018)*
- *Planning for Bush Fire Protection 2019 (PBP)*

1.4 Site description

The subject land is located at Lot B DP 370222, known as 4 Forest Road, Warriewood. The development site is located within the Northern Beaches local government area (LGA).

The site is bounded to the north and east by existing residential development, to the south by Forest Road and Mater Maria Catholic College, and to the west by native vegetation contiguous with Ingleside Chase Reserve.

The proposed development site sits within a broader subdivision masterplan, with adjoining land to the north-west identified for future subdivision.

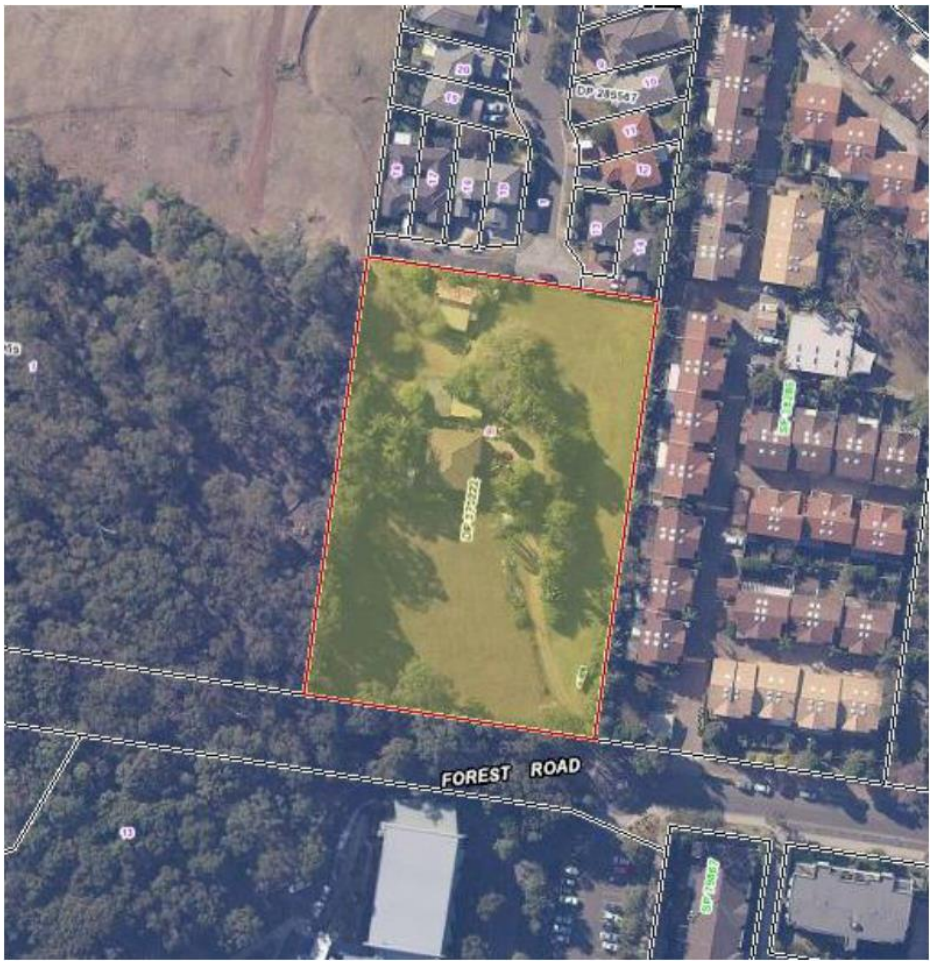

Figure 1-3 – Aerial appraisal
(source: SIX Maps, 2021)

1.5 Legislation and planning instruments

Is the site mapped as bushfire prone?	Yes
Proposed development type	Residential subdivision
Is the development considered integrated for the purposes of Section 100B of the *Rural Fires Act 1997*?	Yes – referral to and approval by the NSW RFS is required for the issue of a bushfire safety authority (BSA)
Is the proposal located in an Urban Release Area as defined under Clause 273 of the EP&A Regulations?	No
Zoning	R3 – Medium Density Residential
Significant environmental features	No
Details of any Aboriginal heritage	None (AHIMS ID 609492)
Does the proposal rely on an alternative solution?	Yes –Method 2 of AS3959 to calculate minimum separation distances.

Figure 1-4 - Concept Masterplan

2. BUSHFIRE THREAT ASSESSMENT

To assess the bushfire threat and to determine the required width of an APZ for a development, an assessment of the potential hazardous vegetation and the effective slope within the vegetation is required. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation.

2.1 Hazardous fuels

PBP guidelines require the identification of vegetation formation in accordance with David Keith (2004) if using the simplified acceptable solutions in *PBP 2019*, or alternatively the vegetation class if adopting the comprehensive vegetation fuel loads (as allowable when undertaking an assessment under Method 2 of AS3959). The hazardous vegetation is assessed for a distance of at least 140m from a proposed building envelope. The results of this assessment are detailed in Table 2-1.

2.2 Effective Slope

The effective slope has been assessed for up to 100m from the development site. 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 is described within Table 2-1.

2.3 Bushfire attack assessment

The following assessment has determined the minimum required APZ distances via the following methods;

- Method 2 of *AS3959 Construction of buildings in bushfire-prone areas* and Flamesol minimum distance calculator

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

Table 2-1 - Bushfire Attack Assessment

Aspect	*Vegetation Formation*	*Effective Slope*	*Minimum APZ (Table A1.12.2 of PBP 2019)*	*APZ provided*	*BAL Rating*
West & south-west	North Coast Wet Sclerophyll Forest	4 – 10 degrees upslope	24m	20m††	20-<28m (BAL-29) 28-<38m (BAL-19) 38-<100m (BAL-12.5)
South	Remnant vegetation	Level	11m	16m	16-<23m (BAL-19) 23-<100m (BAL-12.5)
North & east	Low threat vegetation†	N/A	N/A	N/A	N/A

† **Note 1:** "Maintained lawns and existing managed gardens within curtilage of buildings" are identified as low threat vegetation not required to be considered for the purposes of *PBP*

†† **Note 2:** A performance based assessment using Appendix B of *AS3959* was undertaken to determine the minimum required asset protection zones & BAL based on North Coast Wet Sclerophyll Forest vegetation (22 / 35.98 t/ha) on an upslope of 4^{o} (determined to be the worst case scenario). The results of the assessment, provided below was prepared using Flamesol software.

Calculated July 28, 2021, 4:27 pm (MDc v.4.9)

West and south-west

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	2 km/h
Vegetation classification	Forest	Flame length	17.33 m
Understorey fuel load	22 t/ha	Flame angle	52 °, 62 °, 70 °, 74 °, 75 ° & 82 °
Total fuel load	35.98 t/ha	Elevation of receiver	6.83 m, 7.65 m, 8.140000000000001 m, 8.33 m, 8.369999999999999 m & 8.58 m
Vegetation height	n/a	Fire intensity	37,240 kW/m
Effective slope	-4 °	Transmissivity	0.867, 0.846, 0.8179999999999999, 0.792, 0.78 & 0.721
Site slope	0 °	Viewfactor	0.6044, 0.4485, 0.3048, 0.2069, 0.1682 & 0.0455
Flame width	100 m	Minimum distance to < 40 kW/m²	14.2 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	19.1 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	27.3 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	37.9 m
		Minimum distance to < 10 kW/m²	44.5 m

3. SPECIFIC PROTECTION ISSUES

3.1 Asset protection zones (APZs)

Table 3.1 outlines the proposal's compliance with the performance criteria for APZs.

Table 3-1 – Performance criteria for asset protection zones (PBP 2019 guidelines pg. 43)

Performance criteria	*Acceptable solutions*	*Acceptable solution*	*Performance solution*	*Comment*
Potential building footprints will not be exposed to radiant heat levels exceeding 29kW/m^2 on each proposed lot	APZs are provided in accordance with Tables A1.12.2 and A1.12.4 based on the FFDI	☐	☑	Complies. APZ distances determined via Method 2 (Appendix B of AS3959).
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	☑	☐	Can be made a condition of consent.
The APZ is provided in perpetuity	APZs are wholly within the boundaries of the development site	☐	☑	The APZ is partially within the road reserve to the south and the adjoining lot to the north-west. All parts of the APZ *not* within the development site will be comprised of public road, nature strip and associated infrastructure.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	The APZ is located on lands with a slope of less than 18^o	☑	☐	Complies. All slopes are less than 18 degrees
Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions	Landscaping is in accordance with Appendix 4	☑	☐	Can be a condition of consent
	Fencing is constructed in accordance with section 7.6	☑	☐	Can be a condition of consent. See note below.

Note 2: All fences in bush fire prone areas should be made of either hardwood or non-combustible material. However, in circumstances where the fence is within 6m of a building or in areas of BAL 29 or greater, they should be made of non-combustible material only.

3.2 Building protection

Building construction standards for the proposed future dwellings located within 100m of bushfire prone land are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)* and Section 7.5 of *Planning for Bush Fire Protection 2019*.

Bushfire attack levels (BAL) have been determined for the subject site in accordance with a performance approach in accordance with Appendix B of AS3959 (Method 2). The results are depicted within Table 2.1.

3.3 Access for firefighting operations

The proposal's compliance with the acceptable solutions outlined in *PBP 2019* is detailed within Table 3-2 below

Table 3-2 – Performance criteria for access within Residential Subdivisions (PBP 2019) Guidelines pg. 44)

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all weather access to structures.	Property access roads are two-wheel drive, all-weather roads	☑	☐	All proposed allotments have direct access to the public road network.
		Perimeter roads are provided for residential subdivisions of three or more allotments.	☑	☐	Complies.
		Subdivisions of three or more allotments have more than one access in and out of the development.	☐	☑	One access/egress point is provided initially. A second will be provided upon completion of the development on the adjoining lot to the north-west (DA2020/1480 – being assessed).
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.	☑	☐	Can be made a condition of consent.
		Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards,	☑	☐	Complies

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
	whichever is the lesser gradient.			
	All roads are through roads	☑	☐	Proposal includes a perimeter loop road and a diverging road that continues onto the adjoining lot to the north-west. This will possibly result in a stub of road ~10m long diverging from the proposed loop road, depending on timing of adjacent development. This will have no impact on access to the proposed allotments.
	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.	☑	☐	
	Where kerb and guttering are provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.	☑	☐	Can be made a condition of consent.
	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	N/A	Access/egress roads transits managed land only.
	One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	N/A	N/A	All roads are two (2) way

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.	☑	☐	Can be made a condition of consent.
	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.	☑	☐	Can be made a condition of consent.
		Hydrants are provided in accordance with *AS 2419.1:2005.*	☑	☐	Can be made a condition of consent.
		There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	N/A	N/A	Reticulated water is provided
PERIMETER ROADS	Access roads are designed to allow safe access and egress for 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.	Are two-way sealed roads.	☑	☐	Complies.
		Minimum 8m carriageway width kerb to kerb.	☑	☐	Complies.
		Parking is provided outside of the carriageway width.	☑	☐	Can be made a condition of consent.
		Hydrants are located clear of parking areas.	☑	☐	Can be made a condition of consent.
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	☑	☐	Perimeter road is initially a loop road (single access/egress); becoming a through road upon development of adjoining land to the north-west (DA2020/1480 – being assessed)
		Curves of roads have a minimum inner radius of 6m.	☑	☐	Complies.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		The maximum grade road is 15° and average grade is 10°.	☑	☐	Complies.
		The road crossfall does not exceed 3°.	☑	☐	Complies.
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☑	☐	Can be made a condition of consent.
NON-PERIMETER ROADS	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating.	Minimum 5.5m carriageway width kerb to kerb.	☑	☐	Complies.
		Parking is provided outside of the carriageway width.	☑	☐	Can be made a condition of consent.
		Hydrants are located clear of parking areas.	☑	☐	Can be made a condition of consent.
		Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	☑	☐	Complies
		Curves of roads have a minimum inner radius of 6m.	☑	☐	Complies
		The road crossfall does not exceed 3°.	☑	☐	Complies
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☑	☐	Complies
PROPERTY ACCESS	Firefighting vehicles can access the dwelling and exit the property safely.	There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of	☑	☐	All allotments are provided with direct frontage to the public road system. No further requirements are necessary.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		emergency firefighting vehicles.			

3.4 Water supplies

The intent of measures is to provide adequate services of water for the protection of buildings during and after the passage of bushfire. Table 3-3 outlines the proposal's compliance with the acceptable solutions for reticulated water supply.

Table 3-3 – Performance criteria for reticulated water supplies (PBP guidelines pg. 47)

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Adequate water supplies is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available.	☑	☐	Reticulated water is available to the development
	A static water supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed	N/A	N/A	
	Static water supplies shall comply with Table 5.3d.	N/A	N/A	
Water supplies are located at regular intervals.	Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard *AS 2419.1:2005.*	☑	☐	Can be made a condition of consent.
The water supply is accessible and reliable for firefighting operations.	Hydrants are not located within any road carriageway.	☑	☐	Can be made a condition of consent.
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	☑	☐	Can be made a condition of consent.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of *AS 2419.1:2005.*	☑	☐	Can be made a condition of consent.
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps.	☑	☐	Can be made a condition of consent
	Above ground water storage tank shall be of concrete or metal	☑	☐	Can be made a condition of consent.

3.5 Gas

The intent of measures is to locate gas so as not to contribute to the risk of fire to a building. Table 3-4 outlines the required acceptable solutions for gas supply.

Table 3-4 – Performance criteria for gas supplies (PBP Guidelines pg. 47)

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Location of gas services will not lead to the ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas bottles are to be installed and maintained in accordance with *AS/NZS 1596 (2014)*, the requirements of relevant authorities and metal piping is to be used.	☑	☐	Can be made a condition of consent
	All fixed gas cylinders are to be kept clear of flammable materials to a distance of 10m and shielded on the hazard side.	☑	☐	Can be made a condition of consent
	Connections to and from gas cylinders are metal.	☑	☐	Can be made a condition of consent
	Polymer sheathed flexible gas supply lines are not used.	☑	☐	Can be made a condition of consent
	Above ground gas service pipes are metal, including and up to any outlets.	☑	☐	Can be made a condition of consent

3.6 Electricity

The intent of measures is to locate electricity so as not to contribute to the risk of fire to a building. Table 3-5 outlines the required acceptable solutions for the subdivision's electricity supply.

Table 3-5 – performance criteria for electricity services (PBP guidelines pg. 47)

Performance criteria	Acceptable Solutions	Acceptable solution	Performance solution	Comment
Location of electricity services limit the possibility of ignition of	Where practicable, electrical transmission lines are underground.	☑	☐	Can be made a condition of consent

Performance criteria	Acceptable Solutions	Acceptable solution	Performance solution	Comment
surrounding bushland or the fabric of buildings.	Where overhead electrical transmission lines are proposed: lines are installed with short pole spacing (30m), 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 Managing Vegetation Near Power Lines.	☑	☐	Can be made a condition of consent.

4. CONCLUSION & RECOMMENDATIONS

4.1 Conclusion

This assessment has found that bushfire can potentially affect the proposed development from forest vegetation to the west and remnant vegetation to the south, resulting in future buildings being exposed to potential radiant heat and ember attack.

The proposed residential subdivision must ensure that the extent of bushfire attack that can potentially impact a building envelope should not exceed a radiant heat flux of 29kW/m^2. This rating assists in determining the size of the asset protection zone (APZ), which provides the necessary defendable space between hazardous vegetation and a building.

In recognition of the requirements of *PBP 2019* and the bushfire risk posed to the site by the nearby vegetation, *Travers Bushfire & Ecology* propose the following combination of bushfire measures;

- Asset protection zones in compliance with the performance criteria for residential subdivision outlined in *PBP 2019;*
- Access in compliance with the performance criteria for residential subdivision outlined in *PBP 2019;*
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *PBP 2019;* and
- Future dwelling construction in compliance with *PBP 2019* and the appropriate construction sections of *AS3959-2018* or *NASH Standard*.

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

4.2 Recommendations

Recommendation 1 – The development is as generally indicated on the attached SCHEDULE 1.

Recommendation 2 – Creation of a suitably worded instrument in accordance with section 88b of the *Conveyancing Act 1919* for the establishment and maintenance of APZs as indicated in SCHEDULE 1

Recommendation 3 –The entire development site is managed as an inner protection area (IPA) with landscaping carried out in accordance with Appendix 1 throughout the lifetime of the development.

Recommendation 4 – Water, electricity and gas supply is to comply with Section 5.3.3 of *Planning for Bush Fire Protection 2019.*

Recommendation 5 – Building construction standards for the proposed future dwellings within 100m of bushfire prone land are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)*, and *Planning for Bush Fire Protection 2019.*

Recommendation 6 – Fencing is to comply with Section 7.6 of PBP. All fences in bush fire prone areas should be made of either hardwood or non-combustible material. However, in circumstances where the fence is within 6m of a building or in areas of BAL 29 or greater, they should be made of non-combustible material only.

5. REFERENCES

AMBS (2011) *Indigenous Heritage Assessment Project: Austral & Leppington North Precincts, South West Growth Centres.* Consultancy report to NSW Department of Planning and Infrastructure. Australian Museum Business Services.

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Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack.* RFS Development Control Service.

SCHEDULE 1. PLAN OF BUSHFIRE PROTECTION MEASURES

Legend

- Site boundry (source:CAD)
- Contour 1m (source:LiDAR)
- Asset Protection Zone

Bushfire Attack Level

AS3959 (2018)*

- BAL 12.5
- BAL 19
- BAL 29

* Please refer to additional construction requirements for BAL levels which are contained in *'Planning for Bushfire Protection'* (2019).

Aerial source: Nearmap

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PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
4 Forest Rd, Warriewood 21BMN02_BF001	20/12/2022 Issue 1 SC	1:1,000 GDA 1994 MGA Zone 56

0 20 40 m

TITLE

Schedule 1 - Bushfire Protection Measures

Document Path: N:\GIS STORAGE\N Drive\21BMN02_ForestRd_Warriewood\MXDs\21BMN02_BF001.mxd

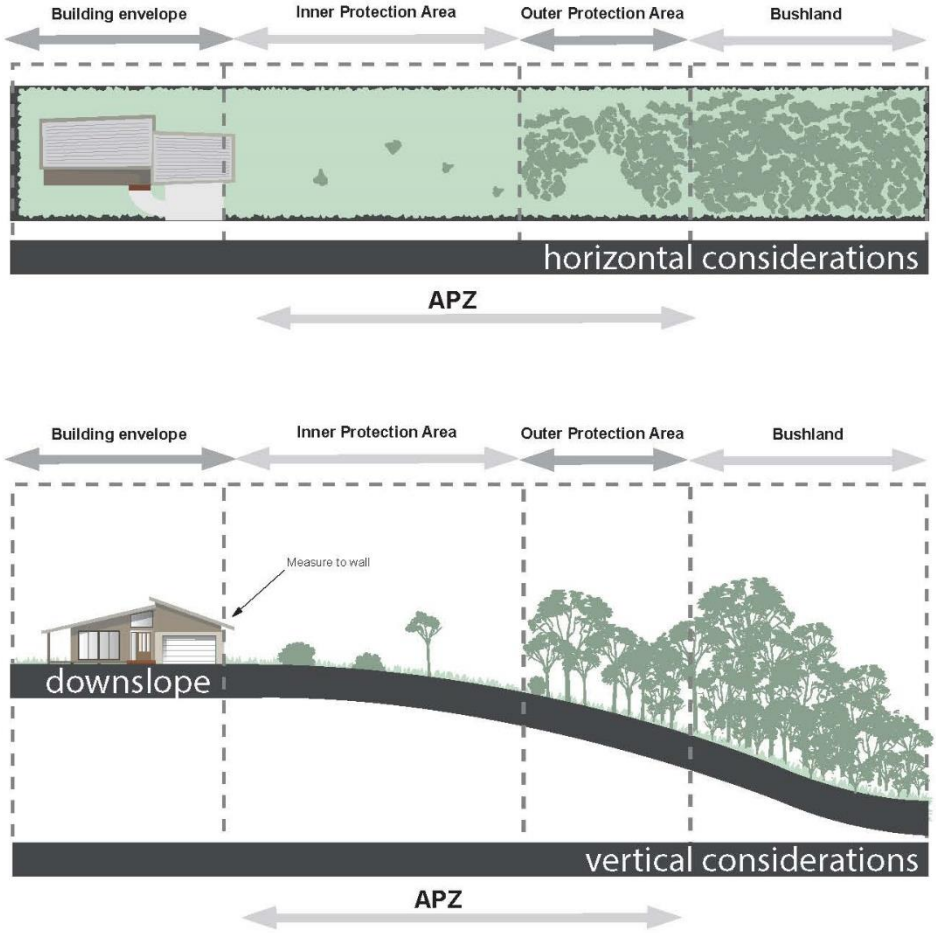
Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered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

APPENDIX 1. MANAGEMENT OF ASSET PROTECTION ZONES

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 4 of *PBP*.

In forest vegetation an APZ may consist of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The IPA is the area immediately surrounding the building and the OPA (up to 30% of the total APZ width) is between the IPA and the hazard.

A typical APZ is graphically represented below.



APZs and progressive reduction in fuel loads
(Source: PBP, 2019)

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

The following table adapted from *PBP 2019* provides maintenance advice for vegetation within the IPA and OPA. The APZ is to be maintained in perpetuity and maintenance should be undertaken regularly, particularly in advance of the bushfire season.

	Inner Protection Area	Outer Protection Area
Trees	➢ Tree canopy cover should be **less than 15%** at maturity; ➢ Trees at maturity should not touch or overhang the building; ➢ Lower limbs should be removed up to a height of **2m above the ground**; ➢ Tree canopies should be separated by **2 to 5m**; and ➢ Preference should be given to retaining smooth barked and evergreen trees.	➢ Tree canopy cover should be **less than 30%;** and ➢ Canopies should be separated by **2 to 5m**.
Shrubs	➢ Large discontinuities or gaps in the vegetation should be provided to slow down or break the progress of fire towards buildings; ➢ Shrubs should not be located under trees; ➢ Shrubs should form **less than 10%** ground cover; and ➢ Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.	➢ Shrubs should not form a continuous canopy; and ➢ Shrubs should **form less than 20%** of ground cover.
Grass and Leaf Litter	➢ Grass should be kept mown to a height of **less than 100mm**; and ➢ Leaves and other debris should be removed	➢ Grass should be kept mown to a height of **less than 100mm**; and ➢ Leaf and other debris should be removed.

	All Management Zones
Weeds	➢ All weeds should be removed in accordance with best practice guidelines, and measures taken to prevent their further spread
Landscaping	➢ 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 into 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.