TRAVERS BUSHFIRE & ECOLOGY

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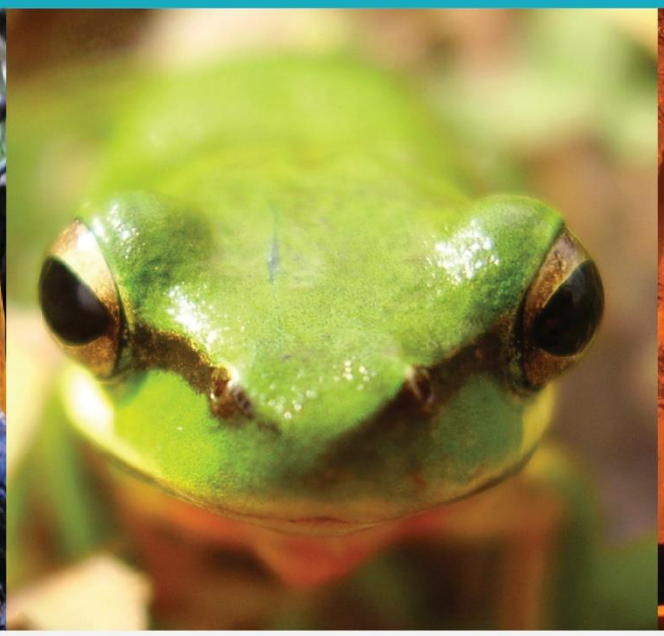


BUSHFIRE PROTECTION ASSESSMENT

Proposed Residential Subdivision (Stage 1)

Lot 4 DP 1213869

192 Narellan Road

Campbelltown

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

8 July 2021

(REF: 18IND04)

BUSHFIRE PROTECTION ASSESSMENT

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Lot 4 DP 1213869

192 Narellan Road, Campbelltown

Report Authors:	Heath Fitzsimmons B. Sc.
Plans prepared:	Emma Buxton B.Sc.
Checked by:	Nicole van Dorst B. App. Sc., Grad. Dip., BPAD-L3 23610
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File:	18IND04

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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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 Stage 1 of the proposed 4-stage residential subdivision of 192 Narellan Road, Campbelltown.

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. In accordance with the *Rural Fires Act 1997* and *Planning for Bush Fire Protection 2019 (PBP 2019)*, development consent cannot be granted unless a bushfire safety authority (BSA) is first obtained from NSW RFS.

This assessment has found that bushfire can potentially affect the proposed development from grassland vegetation surrounding the site, 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.

The proposed development forms part of Campbelltown City Council's approved Part 13: Maryfields Estate Development Control Plan (DCP) Masterplan with the adjoining land to the south and west subject to future development. This assessment has taken into consideration the Maryfields Estate DCP and provides temporary APZs to those aspects which will be developed in the future.

In recognition of the requirements of *PBP 2019* and the relatively low 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 acceptable solutions for residential subdivision outlined in *PBP 2019;*
- Provision of access in accordance with the acceptable solutions outlined in PBP 2019;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *PBP 2019;*
- Future dwelling construction in compliance with *PBP 2019* and the appropriate construction sections of *AS3959-2018* or *NASH Standard*; and
- Creation of suitably worded 88B instruments including appropriate sunset clauses to ensure the ongoing maintenance of APZs within the overall development site until the commencement of future planned stages.

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 Stage 1 subdivision development located at 192 Narellan Road, Campbelltown. The proposed development site does not include land identified as bushfire prone on the Campbelltown City bushfire prone land map (refer Figure 1-1), however, Council may request a bushfire assessment against the provisions of PBP under Section 4.15 of the EP&A Act if they believe that a bushfire risk is evident.

TBE have undertaken a review of the surrounding bushfire risk in accordance with the 'Guide for Bush Fire Prone Land Mapping Version 5b' (2015). Based on the existing forest to the north, grassland (south) and proposed revegetation of the riparian vegetation (west) the proposed development is exposed to a bushfire risk. It is acknowledged that the risk to the south (grassland) will be removed following the future development of the land in accordance with the Maryfields Estate Precinct DCP, and risks to the north, east and west will be removed with the commencement of Stages 2, 3 and 4.

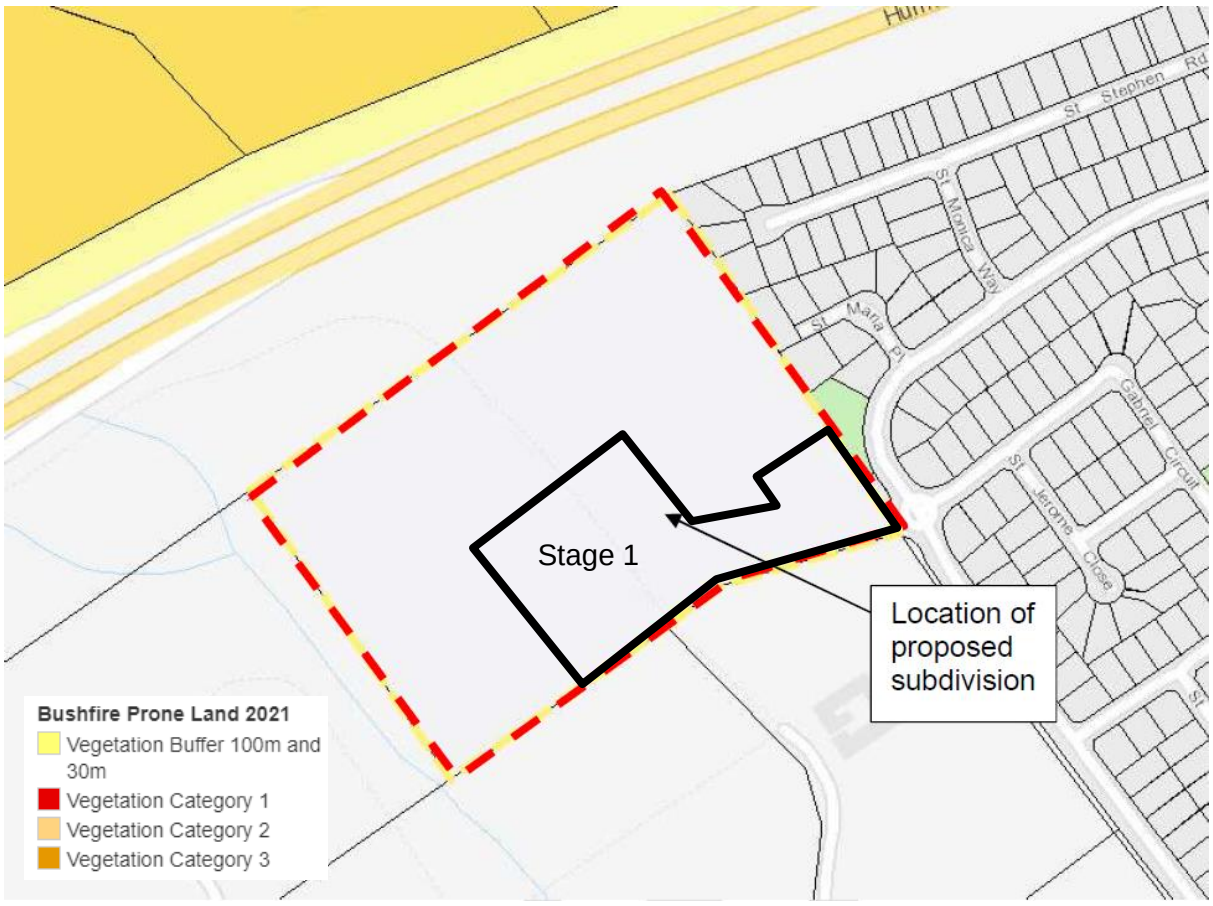

Figure 1-1 – Bushfire Prone Land Map
(Source: Liverpool City Council, 2021)

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

Stage 1 (the subject of this assessment) involves the creation of twenty (20) new residential allotments, two (2) residue lots (including public open space and an on-site detention (OSD) basin), and associated roads and landscaping. The overall 4-stage proposal is for the creation of a total of one hundred and thirty-one (131) new residential allotments, shops and four (5) residue lots (Figure 1-2).

The proposed development forms part of Campbelltown City Council's approved Part 13: Maryfields Estate Development Control Plan (DCP) Masterplan with the adjoining land to the south and west subject to future development (refer Figure 1-3). The DCP illustrates the broad level development outcomes within Mayfield Estate Precinct such as development footprints, land uses, open spaces, major transport linkages, habitat corridors and parks.

Schedule 1 depicts the proposed subdivision development and bushfire protection measures, including APZs for Stage 1 only, incorporating the surrounding land uses as identified within the Mayfield's Estate DCP.

1.3 Information collation

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

- Plan of Boundaries – 192 Narellan Road Campbelltown, RPS Group, Job No. D367SW, Dated 01/07/2021
- Part 13: Maryfields DCP, Campbelltown Development Control Plan (2015)
- *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)*

An inspection of the proposed development site and surrounds was undertaken by Nicole Van Dorst in September 2020 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

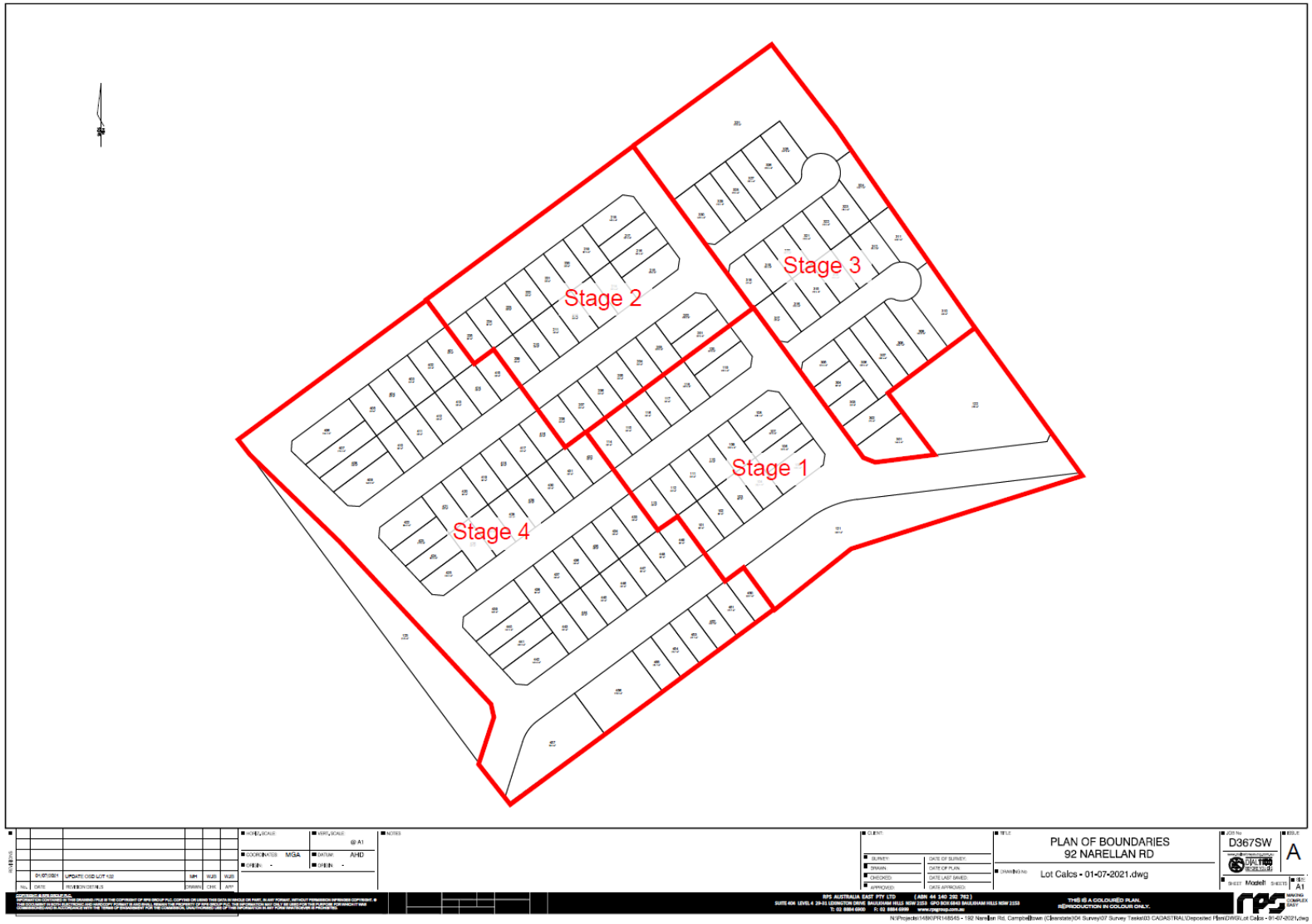

Figure 1-2 – Subdivision Layout and Staging Plan – 192 Narellan Road Campbelltown

(source: RPS Group Job no. D367SW, Dated 01/07/2021)

Site description

The subject land is located at Lot 4 DP 1213869, known as 192 Narellan Road, Campbelltown. The development site is located within the Campbelltown City local government area (LGA). The site is located within the north-eastern portion of the Maryfields Estate Precinct DCP (Figure 1-3).

The Stage 1 development footprint is bounded on all sides by grassland subject to future development. (Figure 1-4).

Figure 1-3 Maryfields Estate Masterplan – Precinct Staging
(Source: Part 13: Maryfields's DCP, Campbelltown Council, 2015)

Figure 1-4 – Aerial appraisal
(source: Nearmap, 2021)

1.4 Legislation and planning instruments

Is the site mapped as bushfire prone?	No
Proposed development type	Residential subdivision (Stage 1 only)
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?	Yes – Maryfields Urban Release Area
Zoning	R3 – Medium Density Residential
Significant environmental features	None.
Details of any Aboriginal heritage	None (AHIMS ID 591583)
Does the proposal rely on an alternative solution?	Yes – acceptable solutions regarding perimeter roads are not applicable due to the development being contained within a broader subdivision plan.

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 summarised in Table 2-1.

The vegetation posing a bushfire threat to the proposed development includes:

- The surrounding grassland located within the broader subdivision site (i.e. future Stages 2, 3 & 4);
- Unmanaged grassland located to the south of the development. This vegetation is scheduled for future development in accordance with Maryfields Estate Precinct DCP, and will support a managed parkland;

Figure 2-1 Grassland south-west of the subject site

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 in Table 2-1.

2.3 Bushfire attack assessment

The following assessment has determined the minimum required APZ distances via the following approaches:

- Table A1.12.2 of *PBP 2019*

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 provides a summary of the bushfire attack assessment and the resulting minimum APZ distance specified for residential subdivision.

Table 2-1 – Bushfire attack assessment

Aspect	*Vegetation Formation*	*Effective Slope*	*Minimum APZ required*	*APZ provided*	*BAL Rating*
South-east	Low threat vegetation†	N/A	N/A	N/A	N/A
North-west	Grassland	Flat/Upslope	10m	30m	22m-<50m (BAL-12.5)
North-east		0-5°	12m	30m	25m-<50m (BAL-12.5)
South-west				50m	N/A

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

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.
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 of *PBP 2019*	☑	☐	Complies. Can be made a condition of consent for APZs within the development site.
The APZ is provided in perpetuity	APZs are wholly within the boundaries of the development site	☑	☐	Complies
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 of *PBP 2019*	☑	☐	Can be a condition of consent
	Fencing is constructed in accordance with section 7.6	☑	☐	Can be a condition of consent (see note 1 below)
Note 1: Section 7.6 of PBP states that 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 deemed to satisfy approach in compliance with Table A1.12.5 (FFDI 100) of *PBP 2019*. The results are depicted within Table 2.1 and Schedule 1 attached.

These BAL levels are indicative only based on the current bushfire threat posed by the surrounding grassland vegetation. The adjoining surrounding land is subject to staged development and the grassland hazard will be removed in the future. Final BAL levels will be determined prior to dwelling construction which may result in the removal of the BAL 12.5 rating currently affecting Stage 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 will have direct access to the public road network.
		Perimeter roads are provided for residential subdivisions of three or more allotments.	☑	☐	A perimeter road is provided adjacent to the forest hazards in later stages of the development.
		Subdivisions of three or more allotments have more than one access in and out of the development.	☐	☑	Only a single access road is provided initially. A second access road will be provided upon completion of Stage 4 and development of the adjoining Lot 6 DP1213869 in accordance with the approved Maryfields Estate DCP Masterplan. In the interim, the single access road is ~100m in length and adjoined by a grassland hazard on one side only

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
				(south). Safe egress is provided away from the direct threat of bushfire.
	Traffic management devices are constructed to not prohibit access by emergency services vehicles.	☑	☐	Complies.
	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, whichever is the lesser gradient.	☑	☐	Complies
	All roads are through roads	☐	☑	The internal roads within Stage 1 will temporarily be dead end roads until subsequent stages are developed. Provision of turning heads in accordance with the acceptable solutions can be made a condition of consent (Figure 3-1).
	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	No access/egress roads transit through forest, woodland or heath vegetation

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		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
	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.	☑	☐	Complies
	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	Are two-way sealed roads.	☐	☑	No perimeter road proposed for Stage 1. Final subdivision layout complies with the performance criteria.
		Minimum 8m carriageway width kerb to kerb.	☐	☑	
		Parking is provided outside of the carriageway width.	☐	☑	
		Hydrants are located clear of parking areas.	☐	☑	
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	☐	☑	

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
	personnel during firefighting and emergency management on the interface.	Curves of roads have a minimum inner radius of 6m.	☐	☑	
		The maximum grade road is 15° and average grade is 10°.	☐	☑	
		The road crossfall does not exceed 3°.	☐	☑	
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☐	☑	
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.	☐	☑	Stage 1 includes roads that will temporarily be dead ends. Provision of turning heads in accordance with the acceptable solutions can be made a condition of consent (Figure 3-1).
		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	Firefighting vehicles can access the dwelling and	There are no specific access requirements in an urban area where an unobstructed path (no	☑	☐	All allotments are provided with direct frontage to the public road

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
exit the property safely.	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 emergency firefighting vehicles.			system. No further requirements are necessary.

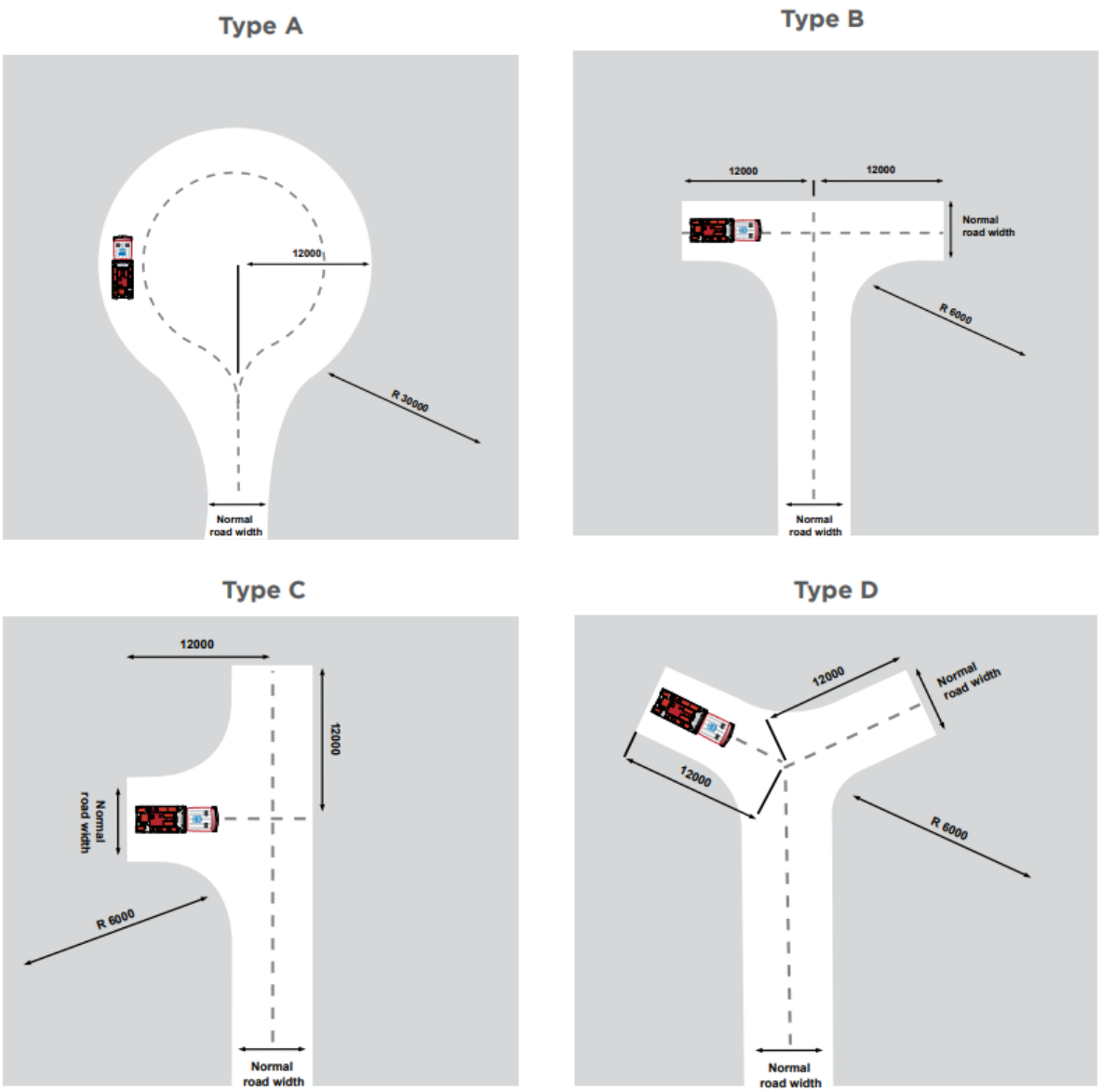

Figure 3-1 – Dead end road design

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 grassland vegetation surrounding the site, 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 relatively low 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 acceptable solutions for residential subdivision outlined in *PBP 2019;*
- Provision of access in accordance with the acceptable solutions outlined in PBP 2019;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *PBP 2019;*
- Future dwelling construction in compliance with *PBP 2019* and the appropriate construction sections of *AS3959-2018* or *NASH Standard*; and
- Creation of suitably worded 88B instruments including appropriate sunset clauses to ensure the ongoing maintenance of APZs within the overall development site until the commencement of future planned stages.

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 –The entire Stage 1 area aside from the proposed on-site stormwater detention basin is managed as an inner protection area (IPA) with landscaping carried out in accordance with Appendix 1 throughout the lifetime of the development.

Recommendation 3 – At the issue of subdivision certificate a suitably worded instrument shall be created over future Stage 2, 3 and 4 to Section 88 of the *Conveyancing Act 1919* which:

- Ensures that the APZ as shown on the plan titled Schedule 1 – Bushfire Protection Measures prepared by *Travers bushfire & ecology* referenced 18IND04_BF001 dated 7 July 2021 is managed as an IPA as outlined within section 4.1.3 and Appendix 4 of *Planning for Bush Fire Protection 2019* and the NSW Rural Fire Service document *'Standards for asset protection zones'.*

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

Recommendation 5 – Access is to comply with Section 5.3.2 of *Planning for Bush Fire Protection 2019* with the provision of temporary turning heads for all dead end roads in accordance with the acceptable solutions.

Recommendation 6 – 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 7 – 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

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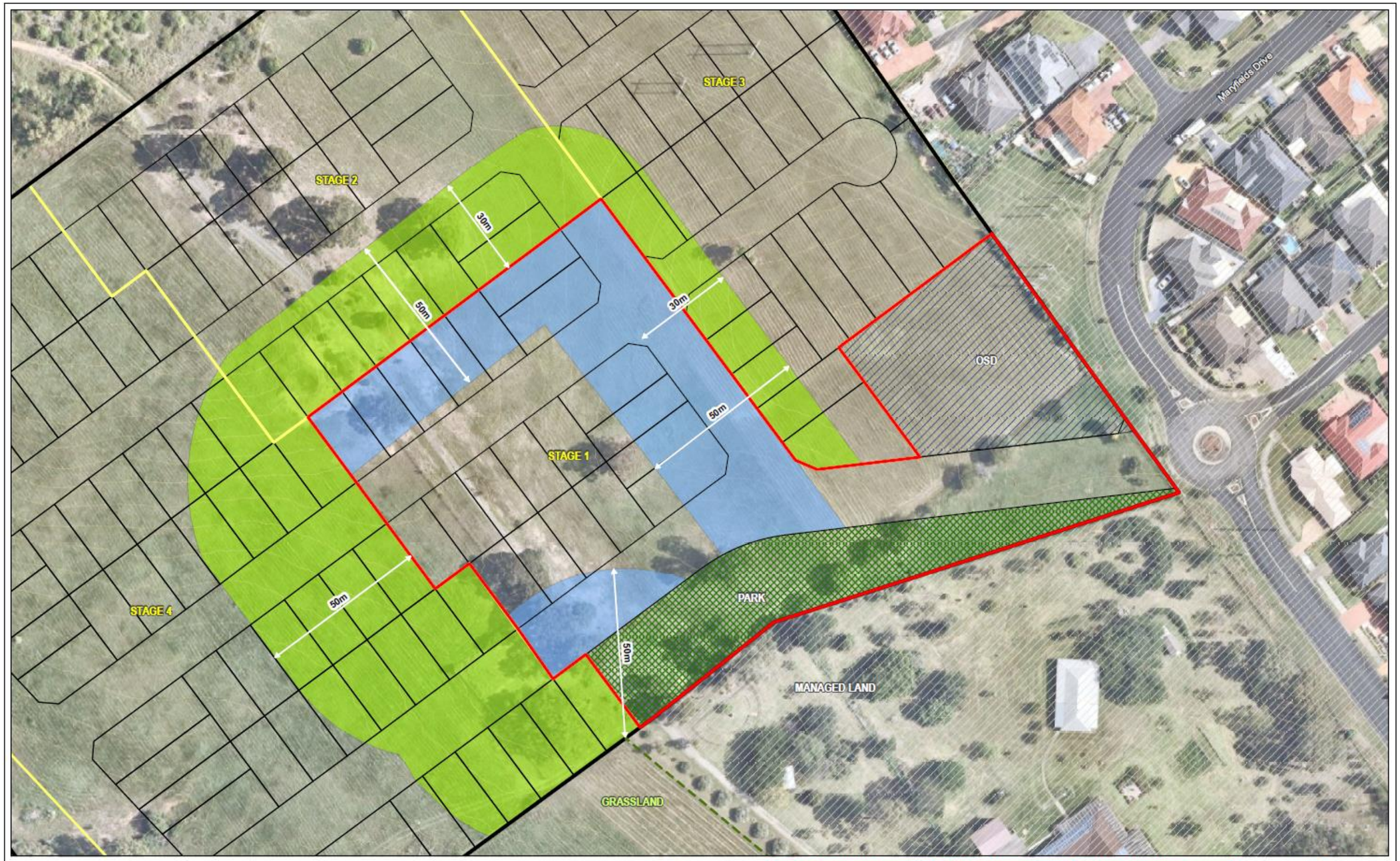
SCHEDULE 1. PLAN OF BUSHFIRE PROTECTION MEASURES



Legend

Aerial source: Nearmap

- Stage 1 Boundary
- Site boundary
- Contour 1m (source:LiDAR)
- Managed land
- OSD Basin
- Park
- Asset Protection Zone (APZ) - Stage 1

Bushfire Construction Standards

AS3959 (2018)*

- BAL 12.5

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

0 20 40 m

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.

PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
192 Narellan Rd, Campbelltown 18IND04_BFS001	7/07/2021 Issue 1 EB	1:1,000 @A3 GDA 1994 MGA Zone 56

TITLE

Schedule 1 - Bushfire Protection Measures (Stage 1)

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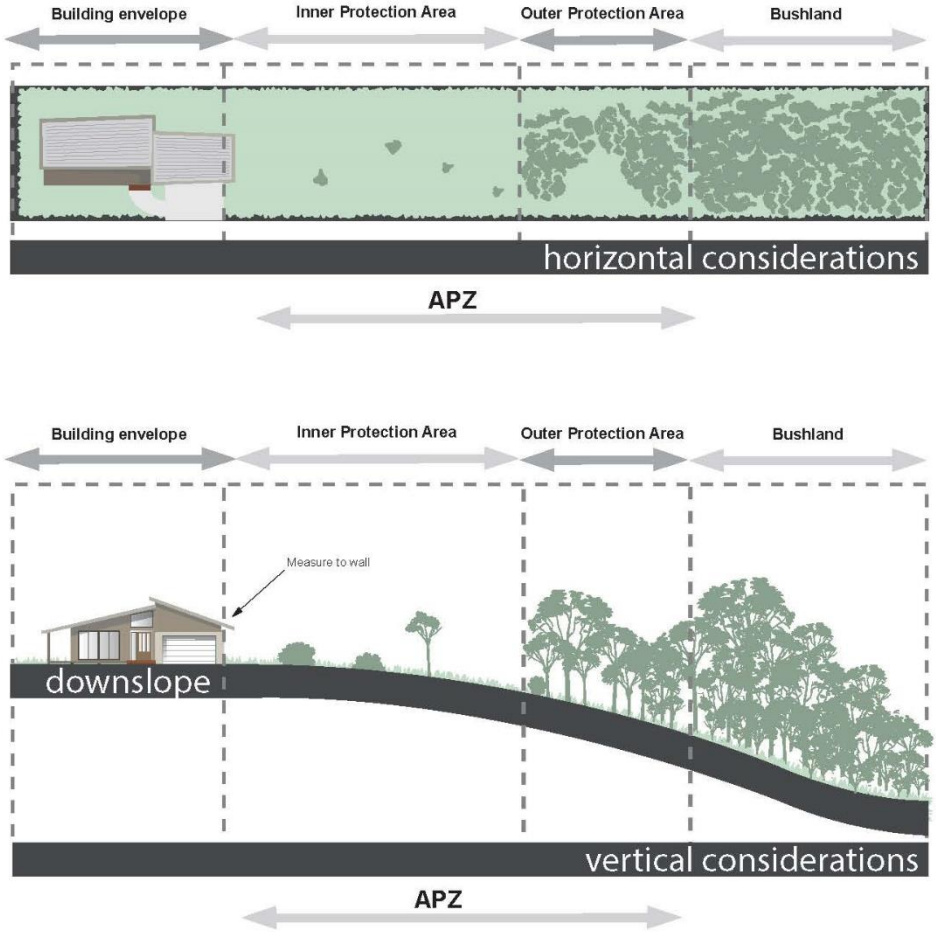
APPENDIX 1. MANAGEMENT OF ASSET PROTECTION ZONES

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.