Travers

bushfire & ecology

bushfire protection assessment

Proposed Rezoning

Lot 217 DP 755242
18 Gosford Road, Wyee

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

December 2020
(REF:18OD14B)

Bushfire Protection Assessment

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Date:	18/12/2020
File:	18OD14B

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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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.

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EXECUTIVE SUMMARY

This bushfire protection assessment has been undertaken for the proposed rezoning of Lot 217 DP 755242, No. 18 Gosford Road, Wyee.

The planning proposal ultimately seeks to rezone this land from RU2 - Rural Landscape to R2 - Low Density Residential as an amendment to LM LEP 2014 and to facilitate its subdivision into a potential forty-two (42) residential allotments and OSD basin.

This report identifies matters for consideration for the planning proposal and highlights the required bushfire protection measures, including asset protection zones (APZs), for future development under the *Environmental Planning and Assessment Act 1979 (EP&A Act), Section 9.1(2) Direction 4.4* and in accordance *Planning for Bush Fire Protection 2019* (*PBP*) and *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 *PBP*. Planning principles for the proposal include the provision of adequate access including perimeter roads, 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 rezoning proposal from the forest vegetation located the immediate west and beyond Gosford Road to south resulting in possible ember and radiant heat attack.

The bushfire risk posed to the planning proposal can be mitigated if appropriate bushfire protection measures (including APZs) are put in place and managed in perpetuity. This bushfire risk will be reduced further when the land to the south of Gosford Road is developed as part of the planning proposal submitted by *Darkinjung Local Aboriginal Land Council* (DLALC).

The assessment has concluded that future development on site will provide compliance with the planning principles of *PBP* and *Community Resilience Practice Note 2/12 – Planning Instruments and Policies*.

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*
BCA	*Building Code of Australia*
BSA	Bushfire safety authority
CA	Community Association
DA	development application
DCP	Development Control Plan
EEC	endangered ecological community
FDI	fire danger index
FMP	fuel management plan
IPA	inner protection area
LEP	*Local environmental plan*
OPA	outer protection area
PBP 2019	*Planning for bush fire protection 2019*
RFS	NSW Rural Fire Service
SFPP	special fire protection purpose

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Introduction 1

Travers bushfire & ecology has been requested to undertake a bushfire protection assessment for the proposed rezoning of Lot 217 DP 755242, No. 18 Gosford Road, Wyee.

The proposal is located on land mapped by *Lake Macquarie City Council* as being bushfire prone (refer Figure 1.1). *Direction 4.4, Planning for Bush Fire Protection 2019 (PBP)* 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 (RFS) and to take into account any comments by the Commissioner.

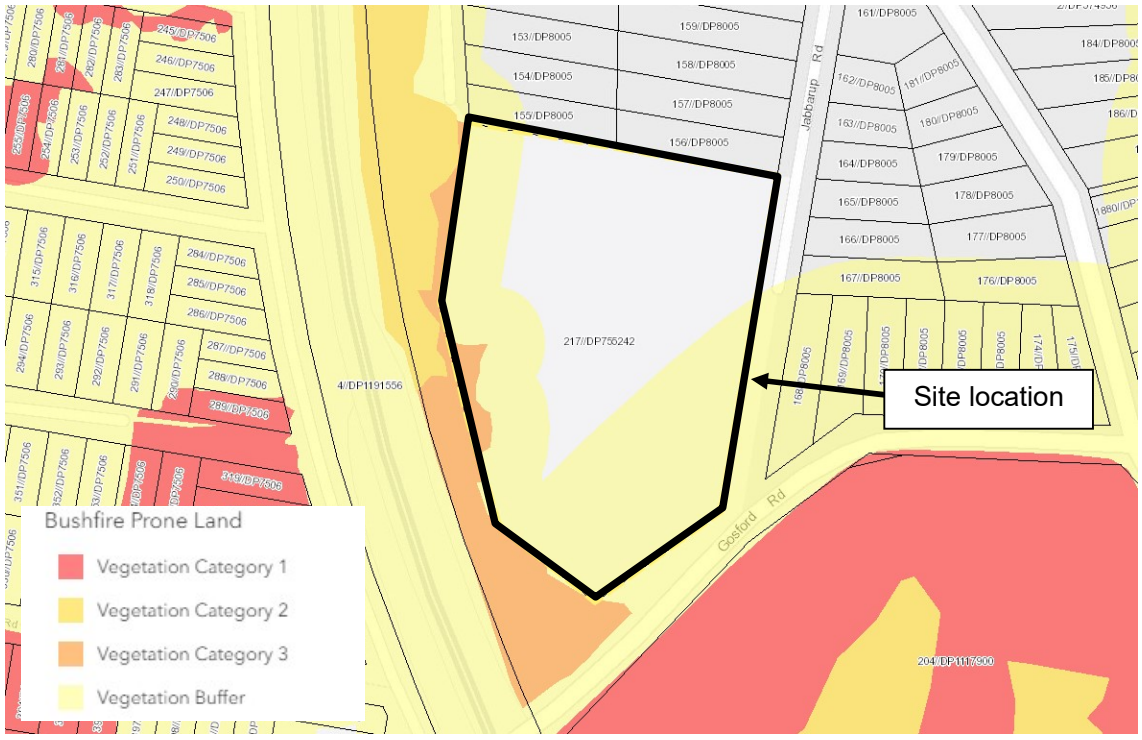


Figure 1.1 – Bushfire prone land map
(Source: NSW Planning portal 2020)

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 2019;*
- provide advice on planning principles, including the provision of perimeter roads, APZs and other specific fire management issues; and
- 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 aim of the Planning Proposal is to seek an amendment to the Lake Macquarie Local Environmental Plan (LMLEP) 2014. The proposal seeks approval for the rezoning of the subject site from RU2 – Rural Landscape to R2 – Low Density Residential (see Figure 1.2) to facilitate its subdivision into approximately forty-two residential allotments.

The proposed subdivision plan has been provided in Figure 1.3 and Schedule 1 attached. Bushfire constraints have been highlighted and minimum APZs have been recommended.

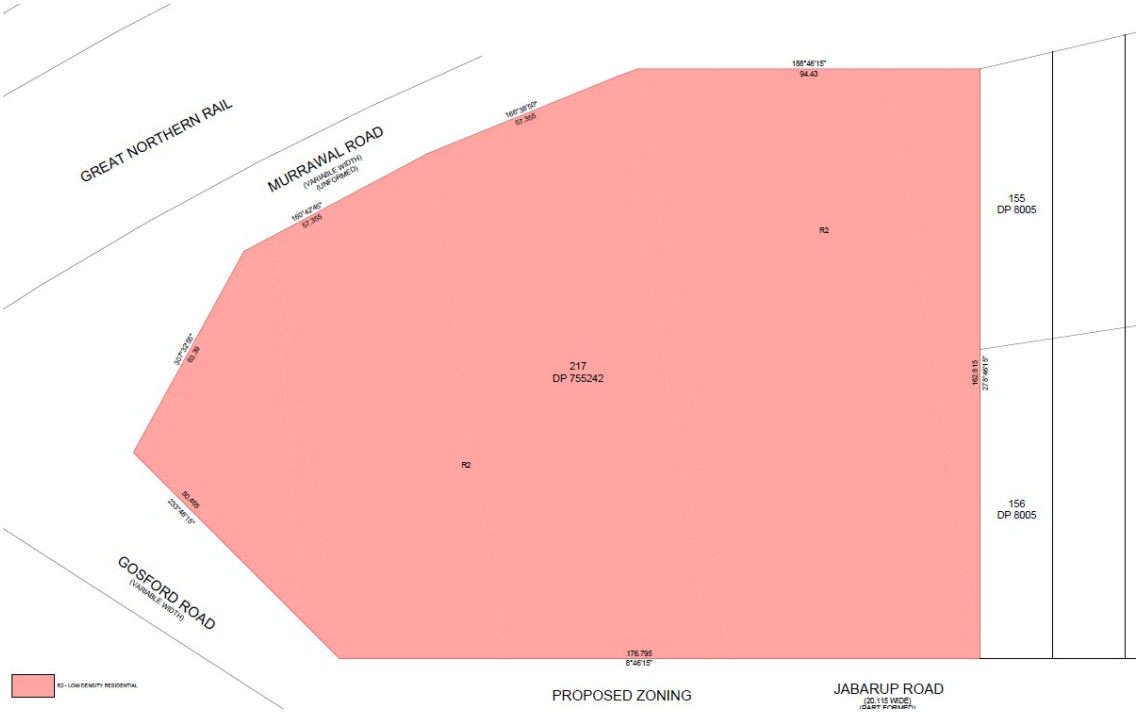


Figure 1.2 – Proposed zoning
(Source: Intrax, ref: 149418, dated 07.09.2020)

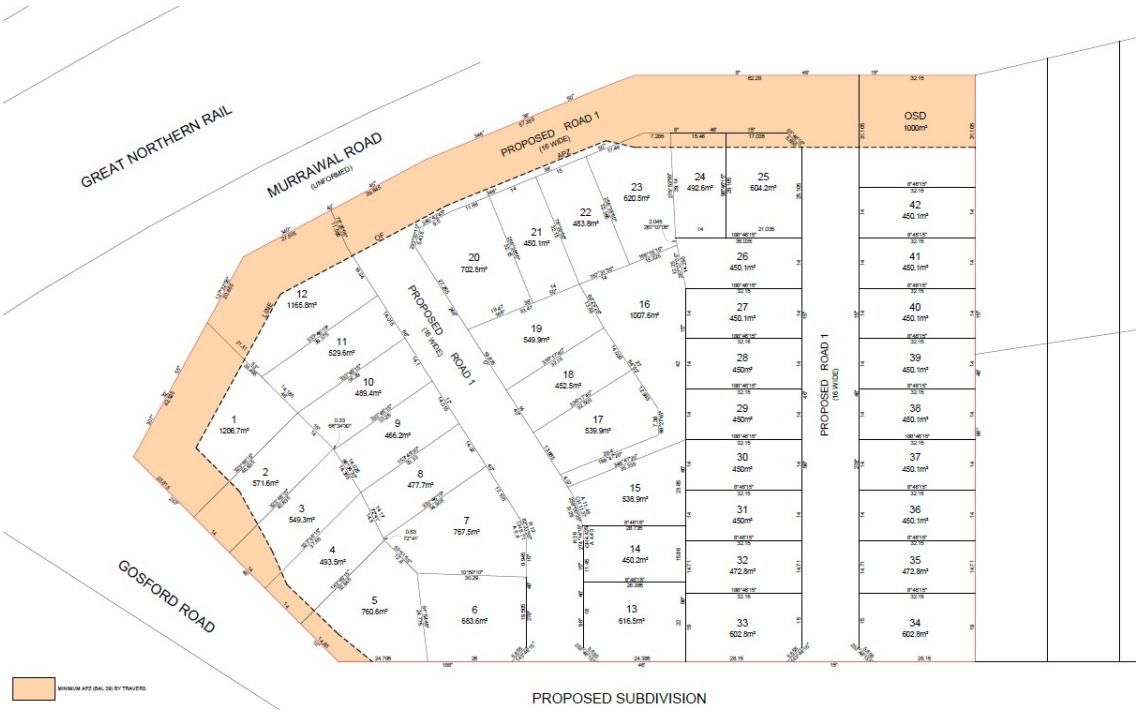


Figure 1.3 – Proposed subdivision
(Source: Intrax, ref: 149418, dated 07.09.2020)

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:

- Proposed zoning and subdivision prepared by *Intrax*, dated 07.09.2020
- Lake Macquarie Local Environmental Plan 2014
- Lake Macquarie Bush Fire Management Committee (LMBFMC), Bush Fire Risk Management Plan 2011
- *NearMap* aerial photography
- Topographical maps *DLPI of NSW* 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas*
- *Planning for Bush Fire Protection 2019 (PBP)*
- *Community Resilience Practice Notes 2/12 Planning Instruments and Policies.*

1.4 Site description

The proposed rezoning site is located at No. 18 Gosford Road, Wyee (refer Figure 1.4). The site supports a single residential dwelling and associated outbuilding.

The property is adjoined by residential land to the north and east and supports remnant parcels of vegetation within the north-eastern portion of the site. The land beyond Gosford Road to the south as well as to the west and north-west supports forest vegetation.

This land to the south is owned by the *Darkinjung Local Aboriginal Land Council* (DLALC) and is subject to a Planning Proposal with the *Department of Planning, Industry and Environement* (DoPIE) and has a Gateway determination. Once this site is developed as

proposed then the bushfire risk from this aspect will be reduced considerably (refer Figure 1.5).

Figure 1.4 – Aerial appraisal
(source – NearMap, 2020)

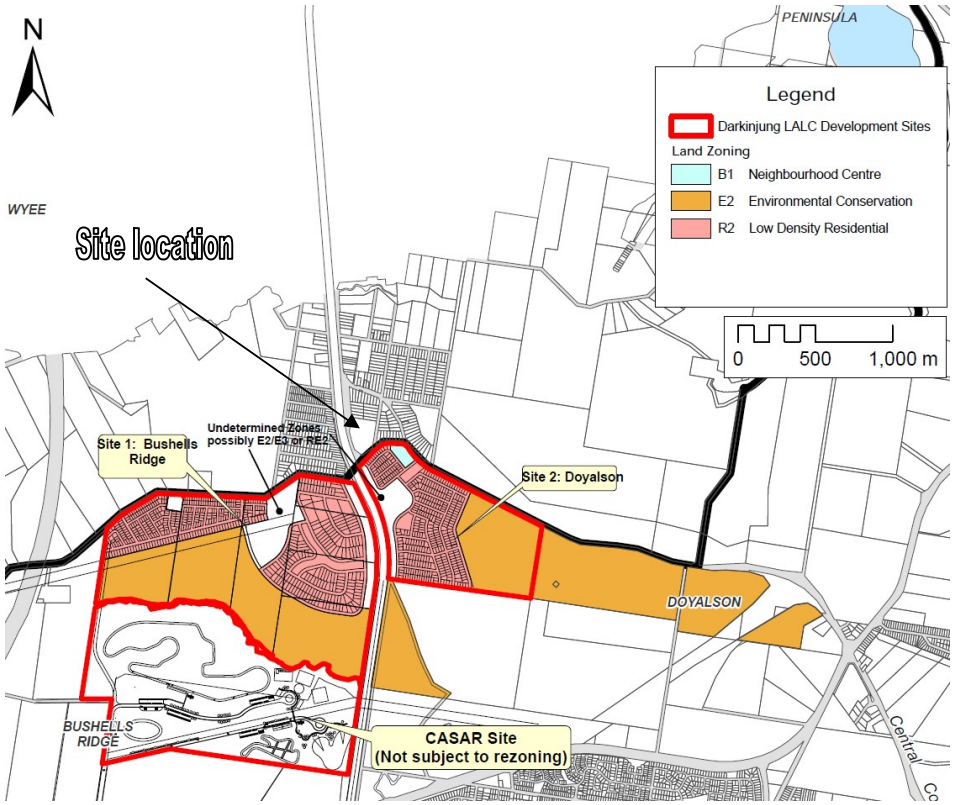


Figure 1.5 – DLALC Planning Proposal

1.5 Legislation and planning instruments

Is the site mapped as bushfire prone?	Yes
Proposed development type	Rezoning
Must the development consider Section 9.1(2) Direction No 4.4 of the *EP&A Act?*	Yes – the relevant authority must consult with the Commissioner of the NSW RFS.
Significant environmental features	The proposed development (including APZs) will involve the removal / management of native vegetation.
Details of any Aboriginal heritage	No known.
Does the proposal rely on an alternative solution?	Yes – Method 2 AS3959 to determine APZ distances to the north-west

Bushfire Strategic Study 2

PBP 2019 includes the requirement to prepare a Strategic Bush Fire 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 bush fire hazard context. It also provides the ability to assess the strategic implications of future development for bushfire mitigation and management.

Table 2.1 assesses the proposed development in terms of the broader bushfire landscape, land use as well as access and egress and associated infrastructure in accordance with Table 4.2.1 of *PBP 2019*.

Sections 3–5 outlines the relevant performance criteria to be achieved for future development in accordance with Section 5 of *PBP 2019*.

Table 2.1 – Bushfire Strategic Study.

Issue	Detail	Assessment Considerations	Proposal's compliance

Bushfire landscape assessment	A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	• The bush fire hazard in the surrounding area, including:
		  ○ Vegetation
		  ○ Topography
		  ○ Weather
		• The potential fire behaviour that might be generated based on the above;
		• Any history of bush fire in the area,
		• Potential fire runs into the site and the intensity of such fire runs.
		• The difficulty in accessing and suppressing a fire, the continuity of bush fire hazard or the fragmentation of land scape fuels and the complexity of the associated terrain.
			The site is bound by residential land to the north and east and Gosford Road to the immediate south.
			
			The north-eastern portion of the site contains remnant vegetation (scheduled for removal) whilst the land beyond Gosford Road to the south supports bushland with slopes of 0 to 5 degrees downslope. The land to the south-west support unmanaged grassland associated with an existing gas line. The vegetation to the north-west consist of a narrow strip of forest vegetation. This vegetation spans a maximum width of 50m and is restricted by existing residential land to the east and railway line to the west.
			
			The typical / average climate in the Lake Macquarie area is for subtropical with the bushfire season generally running from August to March. Prevailing weather conditions associated with the bush fire season in the Lake Macquarie area are north-westerly winds accompanied by high day time temperatures and low relative humidity (source: Lake Macquarie Bush Fire Risk Management Plan 2011)
			
			Figure 2.1 provides fire history information for the site and surrounding area. A review of the fire history information from The Central Resource for Sharing and Enabling Environmental Data in NSW (SEED) reveals no fire history data for the site. The nearest record shows a wildfire ('Bushell's Ridge') impacting the vegetation 400m to the south during 2006 – 2007.
			
			The bushfire impact and potential fire runs into the site are mitigated by the current fragmentation of bushland parcels and the surrounding managed land.

Issue	Detail	Assessment Considerations	Proposal's compliance
			The hazardous vegetation to the west is restricted to a width of less than 50m by Great Northern Rail Corridor, which runs parallel to the proposed development site. This vegetation is further fragmented by an existing gas main / unformed Murrawal Road to the immediate south-west which currently supports grassland vegetation. Moreover, the bushland to the south is fragmented by Gosford Road creating an adequate fire break. This bushfire risk will be reduced further when the land to the south of Gosford Road is developed as part of the planning proposal submitted by *Darkinjung Local Aboriginal Land Council* (DLALC). The provision of compliant access and asset protection zones will provide safe firefighting access to all bushland areas.
Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	• The risk profile of different areas of the development layout based on the above landscape study; • The proposed land use zones and the resultant permitted land uses; • The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridgetops, SFPP development to be located in lower risk areas of the site); and • The impact of the siting of these uses on APZ provision.	The Planning seeks approval for the rezoning of the subject site from RU2 – Rural Landscape to R2 – Low Density Residential to facilitate its subdivision into approximately forty-two (42) residential allotments. Based on the low density residential coupled with the provision of future bushfire protection measures; the proposed development is capable of supporting the required asset protection zones equivalent to the bushfire risk exposure.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	• The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile; • The location of key access routes and	Future access to the site will be provided via two (2) entry points off Jabbarup to the east. This egress route provides options to the north and of the development. Access for Lots 1-5 will be provided directly via Gosford Road (south). The proposed development of not expected to have a significant impact on the existing road network.

Issue	Detail	Assessment Considerations	Proposal's compliance
		direction of travel, and • The potential for development to be isolated in the event of a bush fire.	These egress routes allow for evacuation to the north and away from the direct threat of bushfire.
Emergency services	An assessment of the future impact of new development on emergency services provision.	• Consideration of the increase in demand for emergency services responding to a bush fire emergency (including the need for new stations / bridges); and • Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.	Fire and Rescue NSW has a station located at 49-51 Pacific Highway, Doyalson, a 3-minute (3.7km) drive to the east, as well as at 68 Newcastle Street, Morisset approximately 10.6 km (11 min. drive) to the north. The proximity of both services is considered adequate and no further stations are required. The proposed development will comply with *PBP* with the provision of access to the bushfire hazard, APZs and building construction standards to increase the site's resilience to bushfire attack and improve firefighting access.
Infrastructure	An assessment of the issues associated with infrastructure provision.	• The ability of the reticulated water system to deal with a major bush fire event (particularly in terms of water pressure); and • Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.	There are no high voltage power lines or natural gas supply lines traversing the site. A hydraulic consultant will be engaged at DA stage to ensure the reticulated water supply will comply with *PBP*.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.	Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans.	The proposed development will provide for *PBP* complying bushfire protection measures with all measures being implemented within the site. Adjoining landholders are not required to increase their bushfire management responsibility.

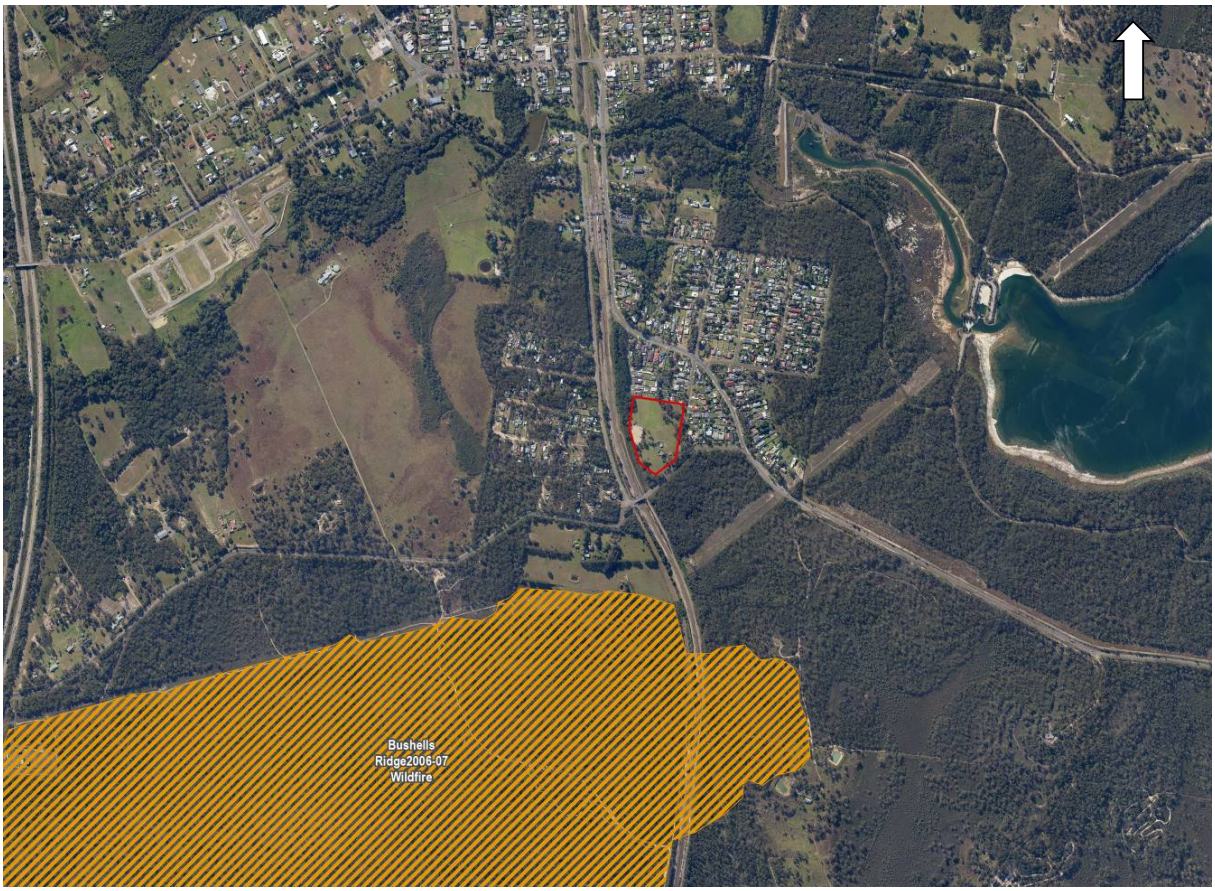


Figure 2.1 – Fire History
(Source: National Parks & Wildlife Services, 2019 & SEED 2020)

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) 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 calculated for a distance of at least 140m from a proposed building envelope.

The hazardous vegetation within 140m of the planning proposal is identified by Lake Macquarie City Council Vegetation Community and Plant Community Types Map as follows:

Table 3.1 – Vegetation communities

Aspect	Vegetation community	Vegetation formation	Vegetation class	Comprehensive fuel loads (t/ha)	Acceptable solution fuel loads (t/ha) *(PBP 2019)*
North-west	Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast (PCT 1718)	Forested Wetland	Coastal Swamp Forest	22.6/34.1	22/36.1
West & south (refer Note 1)	Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast (PCT 1636)	Dry Sclerophyll Forest (shrubby)	Sydney Coastal Dry Sclerophyll Forest	21.3/27.3	22/36.1

Note 1 – The vegetation to the west and south-west has a limited fire run of <50m. *PBP* describes remnant vegetation as a parcel of vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 50m. The vegetation to the west exhibits these qualities and therefore the threat posed is considered low and APZ setbacks for this aspect are the same as for the rainforest category (i.e. Fuel load of 10/13.2t/ha) as outlined in *PBP*.

The following assessment has used the comprehensive fuel loads for Coastal Swamp Forest to the north-west, with the remaining aspects using the acceptable solution fuel loading.

Plant Community Type (PCT) & Confidence	1718 - Swamp Mahogany Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast-High confidence	Plant Community Type (PCT) & Confidence	1636 - Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast-High confidence
Keith Class	Coastal Swamp Forests	Keith Class	Sydney Coastal Dry Sclerophyll Forests

Figure 3.1 – Vegetation community
(Source: LMCC Vegetation Mapping, 2020)

Photo 1– Coastal Swamp Forest vegetation located to the north-west

Photo 2 – Forest beyond Gosford Road in the south

Photo 3 – Remnant vegetation (including grassland associated with gas line)

3.2 Effective slope

The effective slope is determined by reviewing the slopes within 100m of the development boundary. 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 depicted in Table 3.2 & Schedule 1.

3.3 Bushfire attack assessment

The following assessment has determined the APZ and BAL levels via the following approaches;

- Table A1.12.2 & A1.12.5 of *PBP 2019*; and
- Appendix B Method 2 (alternative solution) of *AS3959 Construction of buildings in bushfire prone areas* (2009).

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Hunter region. Table 3.2 provides a summary of the

bushfire attack assessment based on residential development and the methodologies identified above.

Table 3.2 – Bushfire attack assessment

Aspect	Vegetation formation within 140m of development	Effective slope of land	APZ provided (metres)	Building construction standards (metres)
North & east	Managed lands	N/A	N/A	N/A
West	Coastal Swamp Forest	1.5^{0D}	25.3 (refer Note 1)	BAL 29 (25.3-<36) BAL 19 (36 - <48) BAL 12.5 (48-<100)
South-west (including managed Gosford Road verge)	Remnant forest (refer Note 2)	0-5 ^{0D}	14-16	BAL 29 (14-<21) BAL 19 (21 - <29) BAL 12.5 (29-<100)
South-east	Forest	0-5 ^{0D}	29	BAL 29 (29-<40) BAL 19 (40 - <54) BAL 12.5 (54-<100)

*Notes: * Slope is either 'U' meaning up slope or 'C' meaning cross slope or 'D' meaning down slope*

Note 1 - A performance-based assessment using Appendix B of *AS3959* was undertaken to determine the required APZ and BAL levels based on the comprehensive fuel loads associated with Coastal Swamp forest and a slope of 1.5 degrees. The results of the assessment are provided below and were prepared using the bushfire attack level calculator developed by *Flamesol.*

FPA AUSTRALIA | FLAMESOL

Calculated December 19, 2020, 6:27 am (MDc v.4.9)

West

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	3 km/h
Vegetation classification	Forest	Flame length	23.64 m
Understorey fuel load	22.6 t/ha	Flame angle	51 °, 60 °, 67 °, 71 °, 73 ° & 80 °
Total fuel load	34.1 t/ha	Elevation of receiver	9.18 m, 10.23 m, 10.88 m, 11.17 m, 11.3 m & 11.64 m
Vegetation height	n/a	Fire intensity	52,991 kW/m
Effective slope	1.5 °	Transmissivity	0.857, 0.832, 0.803, 0.777, 0.765 & 0.71
Site slope	0 °	Viewfactor	0.6115, 0.456, 0.3109, 0.211, 0.1717 & 0.0462
Flame width	100 m	Minimum distance to < 40 kW/m²	19.2 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	25.3 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	35.3 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	47.7 m
		Minimum distance to < 10 kW/m²	55.2 m

Note 2 - *PBP* describes remnant vegetation as a parcel of vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 50m. The vegetation within the golf course to the east exhibits these qualities and therefore the threat posed is considered low and APZ setbacks for this aspect are the same as for the rainforest category outlined in *PBP*.

Specific Protection Issues

4

4.1 Asset protection zones (APZs)

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

Table 4.1 – 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	☐	☑	Refer Section 2.3. APZ's for the north-western aspect have utilised an alternative solution ensuring radiant heat exposure of less than 29kW/m^2.
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 will consist of road reserves and landscaped areas.
The APZ is provided in perpetuity	APZs are wholly within the boundaries of the development site	☑	☐	APZ's are confined within the boundary of the site and / or road reserves.
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 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.				

4.2 Building protection

In terms of future subdivision approval, the minimum APZ must be provided in accordance with *PBP.* The APZs provided in Table 3.2 (Section 3.3) are based on a BAL 29 for those allotments fronting the hazard.

Although not required in terms of a planning proposal, the following advice in relation to building construction levels can be used for future planning and subdivision design.

The construction classification system is based on five (5) bushfire attack levels (BAL). These are BAL – Flame Zone (FZ), BAL 40, BAL 29, BAL 19 and BAL 12.5 AS3959 – *Construction of buildings in bushfire-prone areas (2018).* The lowest level, BAL 12.5, has the longest APZ distance while BAL – FZ has the shortest APZ distance. These allow for varying levels of building design and use of appropriate materials.

Table 3.2 and Schedule 1 provides an indication of the BAL setbacks that are likely to apply for future building construction. These BAL levels are for planning purposes only and will be assessed / confirmed prior to building construction stage. The APZ depicted in Schedule 1 attached is based on BAL 29 building construction (for those lots fronting the hazard).

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).

APZs are required to be managed as an IPA in accordance with RFS guidelines *Standards for Asset Protection Zones* (RFS, 2005), with landscaping design to comply with Appendix 4 of *PBP*. Appendix 2 provides maintenance advice for vegetation within the APZ

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

Minimum APZs have been recommended and are depicted in Schedule 1.

4.4 Access for firefighting operations

The proposed internal road layout will include the construction of proposed Road 1 which will provide through road connection with two (2) access points to Jabbarup Road in the east.

Private access to Lots 1-5 will be achieved directly from Gosford Road in the south.

Table 4.2 below outlines the performance criteria and acceptable solutions for future access within residential subdivision design.

Table 4.2 – Performance criteria for access within residential subdivisions

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	☑		Complies.
		Perimeter roads are provided for residential subdivisions of three or more allotments.		☑	A perimeter road is provided for Lots 20-25. Lots 1 & 12 do not have a perimeter road (refer Note 1 below)
		Subdivisions of three or more allotments have more than one access in and out of the development.	☑		Complies
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.	☑		Can be 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, whichever is the lesser gradient.	☑		Complies. All roads will be sealed.
		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.	☑		All roads are through roads.
		Where kerb and guttering are provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.	☑		Can be 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.	☑		Complies.
		One way only public access roads are no less	N/A	N/A	All roads are two (2) way.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		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.			
	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 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 a condition of consent.
		Hydrants are provided in accordance with *AS 2419.1:2005.*	☑		Can be 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.
Note 1: A perimeter road has not been provided for proposed Lots 1 & 12 due to restrictions imposed by Council / RTA limiting future access points to Jabbarup Road only. It should be noted that the number of lots without a perimeter road is less than the minimum three (3) allotments outlined in the acceptable solutions. The proposal maintains compliance with the performance requirements as firefighting vehicles are provided with safe, all weather access to structures (via the internal private driveways) as well as to the bushfire hazard via the existing fire trail associate with the electrical easement and gasline to the west.					

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
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	Are two-way sealed roads.	☑		Complies.
		Minimum 8m carriageway width kerb to kerb.	☑		Complies. All roads are 8m.
		Parking is provided outside of the carriageway width.	☑		Complies – can be a condition of consent
		Hydrants are located clear of parking areas.	☑		Can be a condition of consent.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
	operational environment for emergency service personnel during firefighting and emergency management on the interface.	There 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.	☑		Can be a condition of consent.
		The maximum grade road is 15° and average grade is 10°.	☑		Can be a condition of consent.
		The road crossfall does not exceed 3°.	☑		Can be a condition of consent.
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☑		Can be a condition of consent

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
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 emergency firefighting vehicles.	☑		Complies. All allotments are provided with direct frontage to the public road system. The future dwelling within proposed Lot 16 (battle-axe allotment) will be located within 70m of the public road system.

4.5 Water supplies

Town reticulated water supply is available to the property in the form of an existing underground reticulated water system.

Table 4.3 – Performance criteria for reticulated water supplies

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. The water supply is accessible and reliable for firefighting operations.	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.
	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 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	N/A	N/A	

4.6 Gas

The intent of measures is to provide adequate services of water for the protection of buildings during and after the passage of bushfire. Table 4.4 outlines the proposal's compliance with the acceptable solutions for reticulated water supply.

Table 4.4– 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.

4.7 Electricity

The intent of measures is to locate electricity so as not to contribute to the risk of fire to a building. Table 4.5 outlines the required acceptable solutions for the subdivision's electricity supply.

Table 4.5 – 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 surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	☑	☐	The majority of electrical lines will be underground
	Where overhead electrical transmission lines are proposed: • lines are installed with short pole spacing	☑	☐	Complies – to be condition of consent.

Performance criteria	Acceptable Solutions	Acceptable solution	Performance solution	Comment
	(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.			

Conclusion & Recommendations 5

5.1 Conclusion

This bushfire protection assessment has been undertaken for the proposed rezoning of Lot 217 DP 755242, No. 18 Gosford Road, Wyee.

Our assessment found that bushfire attack can potentially affect the rezoning proposal from the forest vegetation located the immediate west and beyond Gosford Road to south resulting in possible ember and radiant heat attack.

The bushfire risk posed to the planning proposal can be mitigated if appropriate bushfire protection measures (including APZs) are put in place and managed in perpetuity.

The assessment has concluded that future development on site will provide compliance with the planning principles of *PBP* and *Community Resilience Practice Note 2/12 – Planning Instruments and Policies* as outlined below.

Table 5.1 – Planning principles

Planning principles	Recommendations
Ensuring land is suitable for development in the context of bush fire risk	The proposed zoning is suitable for the site. With the application of bushfire protection measures the bushfire risk posed can be mitigated.
Ensuring new development on BFPL will comply with PBP	New development is capable of complying with *PBP*.
Minimising reliance on performance-based solutions	The majority of APZ's have been provided in compliance with the acceptable solutions. The use of a performance based assessment for the north-west APZ is considered appropriate based on the bushfire risk (i.e. limited fire run).
Providing adequate infrastructure associated with emergency evacuation and firefighting operations	The proposed new access road/s and provision of utilities (gas and water) will support safe evacuation of residents and access by fire fighters.
Facilitating appropriate ongoing land management practices.	APZ's have been restricted within development allotments.
Strategic planning should provide for the exclusion of inappropriate development in bush fire prone areas as follows:	
The development is exposed to a high bush fire risk and should be avoided	The development site can support appropriate bushfire protection measures in response to the bushfire risk.
The development is likely to be difficult to evacuate during a bushfire due to landscape, access limitations, fire history and /or size and	Adequate access will be provided to the existing road network. The proposal adjoins existing development to the north and east and is

Planning principles	Recommendations
scale	confined by railway to the west. The small scale of the development and lack of recent wildfire history will support evacuation efforts if required.
The development will adversely affect other bush fire protection strategies or place existing development at increased risk	The proposal will not increase the bushfire risk to the surrounding development.
The development is within an area of high bush fire risk where density of existing development may cause evacuation issues for both existing and new occupants: and	The proposal is not expected to cause evacuation issues for the existing population. The existing and proposed road network is capable of supporting the proposed rezoning.
The development has environmental constraints to the area which cannot be overcome.	An Ecological Assessment has been prepared by this firm to address the ecological constraints.

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 - The development is as generally indicated on the attached Schedule 1 – Plan of Bushfire Protection Measures.

Recommendation 2 - APZs are to be provided to the proposed development as outlined in Table 3.2 and as generally depicted within Schedule 1.

Recommendation 3 - The entire development area is managed as an inner protection area (IPA) throughout the lifetime of the development and until each lot is sold / developed and the hazard is removed.

Recommendation 4 - Access is to comply with the performance requirements outlined in Section 5.3.2 of *Planning for Bush Fire Protection 2019.*

Recommendation 5 - Building construction standards for the proposed future dwellings 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 - Water, electricity and gas supply is to comply with Section 5.3.3 of *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.

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 (2018) – *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 (2019) –*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.

Plan of Bushfire Protection Measures

S1

Legend

- Site Boundary (Source: CAD)
- Contour 1m (source:LiDAR)
- Track

Asset Protection Zone (APZ)

- Minimum APZ
- APZ within OSD Basin

Bushfire Construction Standards

AS3959 (2018)* * Please refer to additional construction requirements for BAL levels which are contained in *'Planning for Bushfire Protection'* (2019).

- BAL 29
- BAL 19
- BAL 12.5

Aerial source: Nearmap

Travers bushfire & ecology
www.traversecology.com.au

PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
Gosford Road, Wyee 18OD14B_BF001	19/12/2020 Issue 1 BT /EB	1:1,500 @ A3 GDA 1994 MGA Zone 56

0 25 50 m

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.

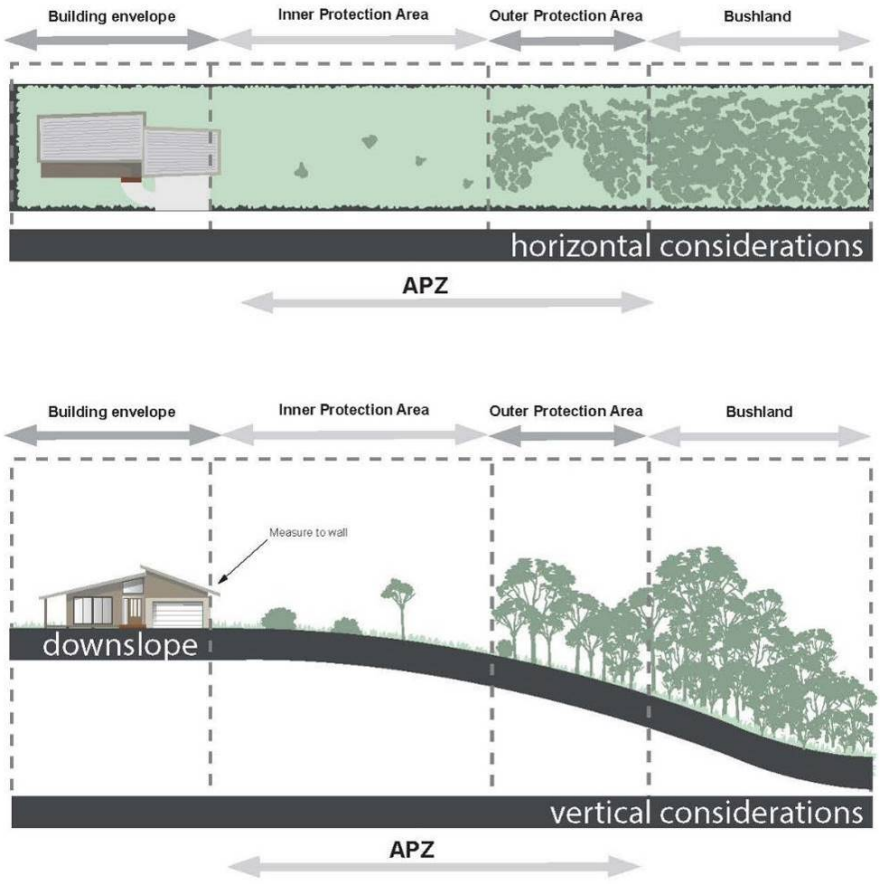
Document Path: N:\GIS STORAGE\N Drive\18OD14B_GosfordRoad_Wyee\MXDs\18OD14B_BF001.mxd

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. The property is to be managed to IPA standards only. 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 provides maintenance advice for vegetation within the IPA and OPA. The APZ is to be maintained in perpetuity and should be undertake regularly, particularly in advance of the bushfire season.

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% at maturity;
- trees (at maturity) do not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

- create large discontinuities or gas in the vegetation to slow sown or break the progress of fire towards buildings should be provides;
- shrubs should not be located under trees;
- shrubs should not form more than 10% of ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of vegetation.

Grass is to be maintained to ensure:

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed (litter fuel within the IPA should be kept below 1cm)

General advice for landscaping is provided below:

- 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.