

A stylized, light green topographic map with concentric contour lines, resembling a hill or mountain range, positioned on the left side of the page.

# Bushfire Opportunities and Constraints Advice, Indicative Layout Plan, Moss Vale Road Urban Release Area

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**Shoalhaven City Council**

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## DOCUMENT TRACKING

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## Abbreviations

Abbreviation	Description
APZ	Asset Protection Zone
BOCA	Bushfire Opportunities and Constraints Advice
DA	Development Application
DCP	Development Control Plan
ELA	Eco Logical Australia
IPA	Inner Protection Area
PBP	Planning for Bushfire Protection 2019
RFS	NSW Rural Fire Services
SFR	Short Fire Run

## 1. Introduction

This Bushfire Opportunities and Constraints Advice (BOCA) is an update of the bushfire constraints previously provided by Eco Logical Australia (ELA 2018) and applies to the PPO48 Planning Proposal Indicative Layout Plans (ILP) 1 and 2 (Figure 1). It is based upon a review of background information provided by Shoalhaven City Council on the ILPs, and the workshops and site inspections undertaken in 2018 and desktop analysis of spatial data.

The updated BOCA is based upon new advice from Shoalhaven City Council and concerns the change in vegetation type for the proposed revegetation of the E2 zoned riparian corridors. The previous advice (ELA 2018) provided was based on the riparian corridors being revegetated to 'rainforest' whereas new advice from Shoalhaven City Council confirms the revegetation as 'wet sclerophyll forest'.

The updated BOCA has been prepared by bushfire consultant Natalie South and Senior Principal Bushfire Consultant Rod Rose (FPAA BPAD-Level 3 Certified Practitioner No. BPAD1940-L3).

## 2. Bushfire threat assessment

The subject land is identified as bush fire prone land by Shoalhaven City Council. A Bushfire Protection Assessment and Strategic Bushfire Study is required for the rezoning and future development in accordance with the *Environmental Planning and Assessment Act 1979*, Section 100B of the *Rural Fires Act 1997* and *Planning for Bush Fire Protection 2019* (RFS 2019), herein referred to as PBP. A Strategic Bushfire Study will also be required under PBP 2019 for the Planning Proposal; this BOCA may form part of that Study but does not address all of the issues required. Appendix A is a summary table from PBP 2019 that identifies the minimum requirements of a Strategic Bushfire Study.

A Bushfire Safety Authority, issued by the NSW Rural Fire Service (RFS), will be required for future subdivision and their concurrence will be required by Council for the Masterplanning and DCP.

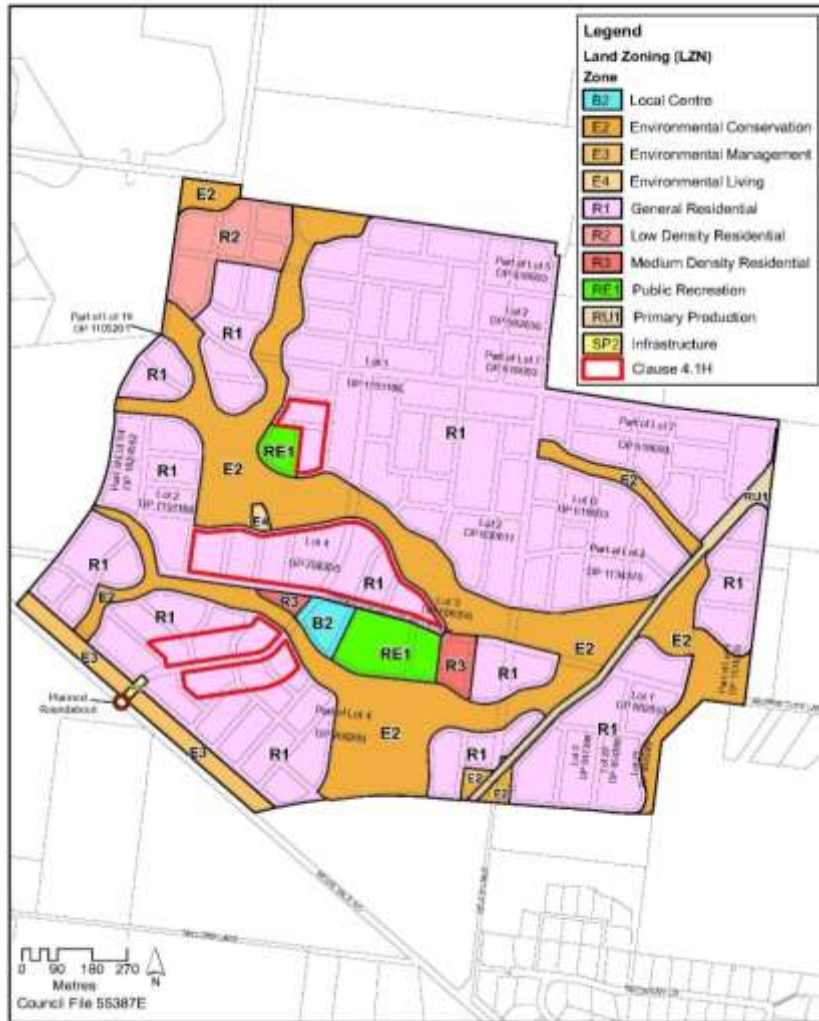
The vegetation and slope have been assessed around the development footprint from a preliminary concept plan. In accord with PBP the predominant vegetation class has been calculated for a distance of at least 140 m out from each potential development site and out from the boundary of the subject land, and the slope class "*most significantly affecting fire behaviour having regard for vegetation found [on it]*" determined for a distance of at least 100 m in all directions.

The bushfire hazards external to the development footprint in the ILPs are a mix of managed and unmanaged grasslands which is classified as 'grassland' in accordance with PBP and patches of Wet Sclerophyll Forest which is classified as 'forest' under PBP. The internal E2 zoned riparian corridors are to be revegetated as Wet Sclerophyll Forest, however, where corridors do not provide a direct fire run of greater than 50 m they are classified as 'low hazard' which is assigned the equivalent hazard as 'rainforest' under PBP. Where RU1 zoned corridors are proposed within the PPO48 Planning Proposal Indicative Layout Plans (ILP) 1 and 2 (Figure 1), it is assumed these will remain as 'grassland'.

Figure 2 shows patches of Wet Sclerophyll Forest to be retained outside of the riparian corridor. The central south patch is less than 1 ha in size and classified as 'low hazard' and assessed in the same manner as 'rainforest' under PBP. If this area is retained it will require an APZ managed as an Inner Protection Area (IPA) (Appendix 4 of PBP). If the area of the retained vegetation exceeds 1 ha, it will be classified as 'forest' and the required APZ will increase. The two patches retained within the east and west are also less than 1 ha in size, however they are classified as forest as the 'low hazard' classification cannot be applied due to their proximity to other larger patches of vegetation.

As per Rod Rose email advice dated 20 April 2021, the visual vegetation buffer to be planted between the subdivision and Moss Vale Road is classified as 'low hazard' which is assigned the equivalent hazard as 'rainforest' under PBP.

PP048  
Planning Proposal  
Indicative Layout Plan No. 1



PP048  
Planning Proposal  
Indicative Layout Plan No. 2

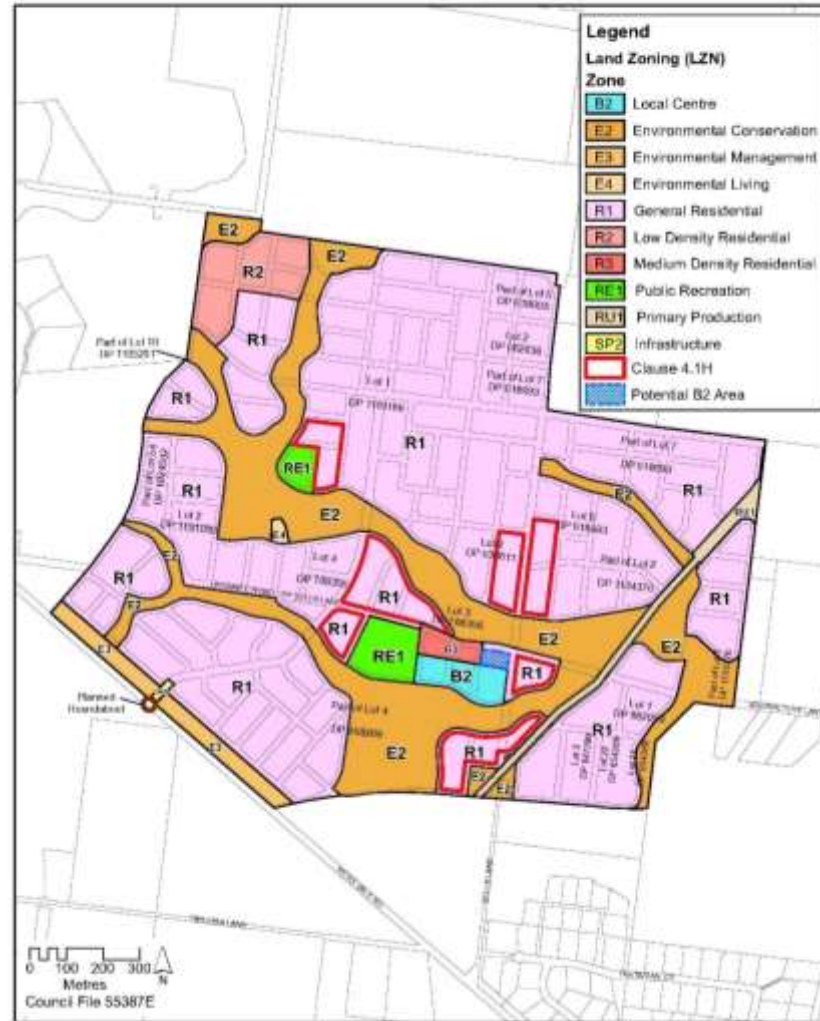


Figure 1: PPO48 Planning Proposal Indicative Layout Plans (ILP) 1 and 2

### 3. Asset protection zones (APZ)

APZ for the ILP have been determined in two ways; firstly under the Acceptable Solutions within PBP and secondly under the Performance Solutions within PBP.

#### *APZ based upon PBP Acceptable Solutions*

Table A1.12.2 of PBP has been used to determine the width of APZ for the proposed development using site specific vegetation and slope data. Figure 2 identifies the Acceptable Solution APZ for residential development. Larger APZs are required for Special Fire Protection Purpose developments such as schools and child care centres. As a specific site for these type of developments (if being considered) are not known the APZ cannot be site specifically determined; however, if they are located in the B2 zoned area abutting the southern riparian corridor then the APZs required are likely to be in the order of 79 m.

#### *APZ based upon PBP Performance Solution*

A short fire run (SFR) model has been used to provide indicative APZ under the Performance Solution process within PBP. SFR is a more accurate way of determining APZ in situations where there is small or narrow parcels of vegetation that are less likely to support fully developed bushfires. Application of Performance Solutions in strategic planning requires discussions with the RFS and the preparation of Bushfire Design Brief (BFDB). This BOCA is not a Design Brief, (or a Strategic Bushfire Study) but it does provide preliminary information suitable for considering whether a Design Brief process is likely to provide a desirable development outcome. Bushfire Strategic Studies are more complex when they require a Design Brief and Performance Solutions.

Notably, performance solutions may enable smaller APZ along the 'forest' classified riparian corridors and an increase yield for the site as a whole. Initial SFR modelling suggests a reduction in APZ width of between 1 m – 7 m for slopes of >0-5° downslope and 3 m – 10 m for slopes of >5-10° downslope (see Figure 3). This reduction in APZ over a long length of riparian hazard interface potentially provides a significant increase in developable area.

SFR modelling was not explored for areas with the potential for a greater than 350 m fire run as the results do not achieve a better outcome than Acceptable Solutions or riparian areas of 'low hazard' and 'grassland' classification where the Acceptable Solution APZ can be accommodated within the proposed public roads.

**Table 1: Comparison of APZ for riparian areas using Acceptable Solutions and Performance Solutions under PBP**

Slope	Vegetation	Acceptable Solution	Performance Solution (SFR model)	Length of interface	Reduction in APZ area achieved by Performance Solution
>0-5° downslope	Forest	29 m	22-28 m	8,057 m	8,057 m <sup>2</sup> to 56,399 m <sup>2</sup>
>5-10° downslope	Forest	36 m	26-33 m	458 m	1,374 m <sup>2</sup> to 4,580 m <sup>2</sup>
Upslope	Grassland	10 m	N/A		
>0-5° downslope	Grassland	12 m	N/A		
Upslope	Low hazard	11 m	N/A		
>0-5° downslope	Low hazard	14 m	N/A		

\* See Figures 1 and 2 for the indicative footprint of the two APZ options



## 4. APZ maintenance plan

APZs that are not roadways or similar developed areas will require a vegetation management regime to the satisfaction of the RFS. Vegetation management within an APZ would need to achieve the specifications of an Inner Protection Area (IPA) as described in PBP and as outlined below:

### *Trees*

- 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 2 m above ground;
- canopies should be separated by 2 to 5 m; and
- preference should be given to smooth barked and evergreen trees.

### *Shrubs*

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings;
- shrubs should not be located under trees;
- shrubs should not form more 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.

### *Grass*

- should be kept mown (as a guide grass should be kept to no more than 100 mm in height); and
- leaves and vegetation debris should be removed.

Wherever possible APZ are to be located within lot boundaries unless the adjoining area is a roadway or similarly devoid of bushfire hazard. Managed parkland and landscaped areas can theoretically be considered part of an APZ provided the responsibility and reliability for its maintenance in perpetuity exists.

If APZs extend beyond lot boundaries in a manner other than described above, an easement may be required for each lot owner to perform APZ maintenance on the adjoining land. The lot owner benefiting from the APZ is to be legally responsible for fuel management within an APZ created under an easement. This is also considered a performance solution and requires assessment accordingly.

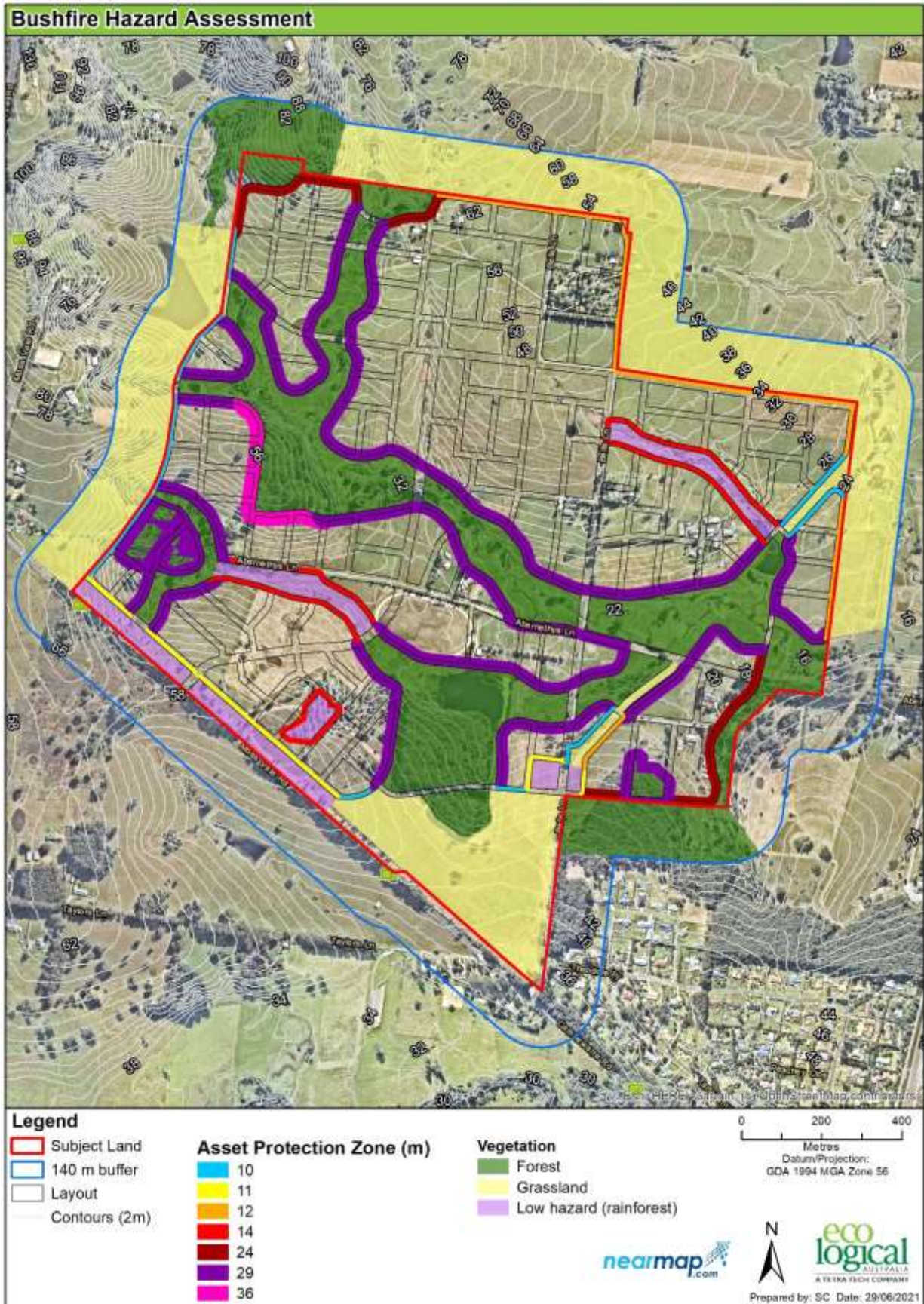


Figure 2: Acceptable Solution Asset Protection Zones



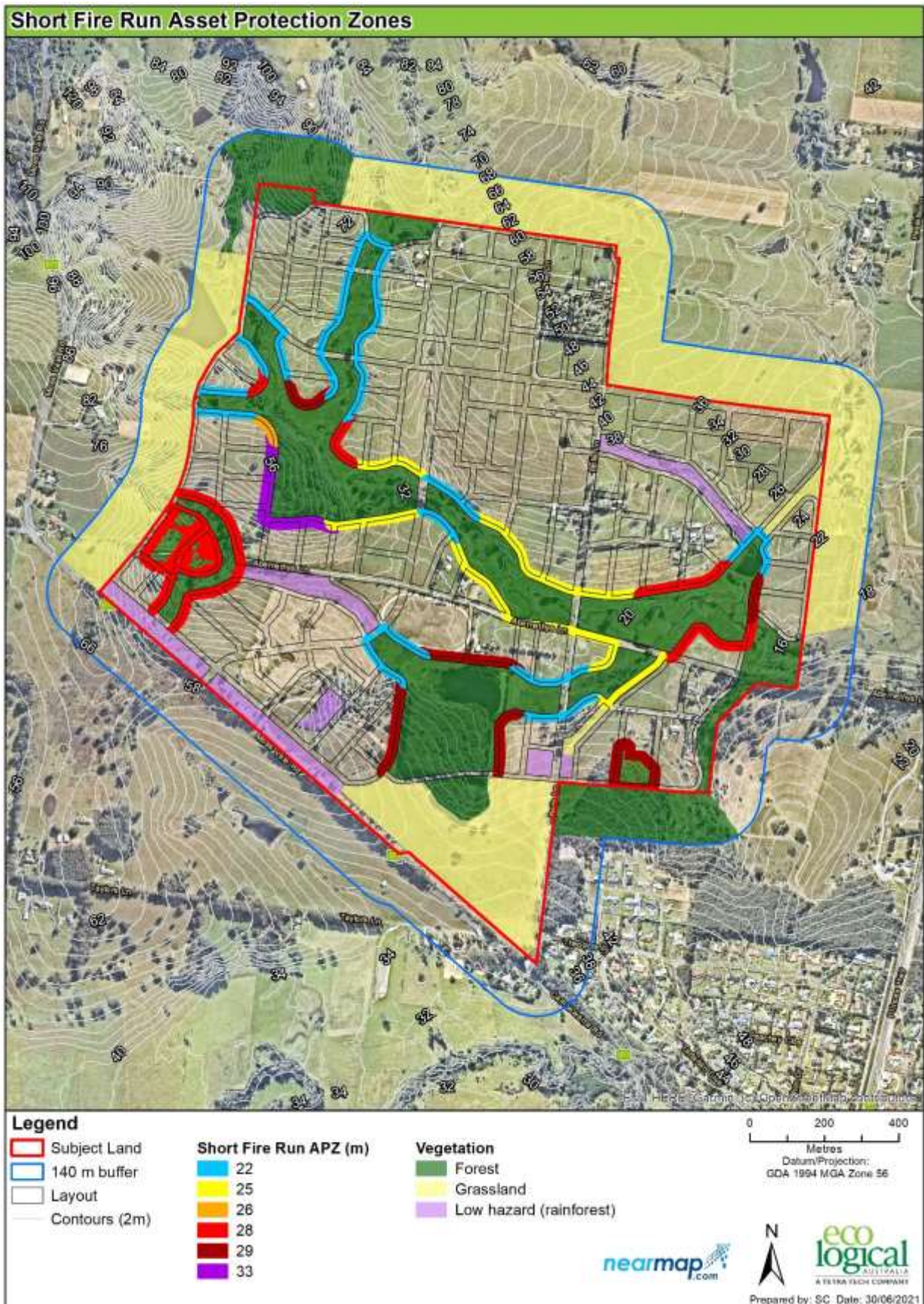


Figure 3: Short Fire Run Model Asset Protection Zones

## 5. Water supply

It is assumed that the subject land will be serviced by reticulated water. The furthest point from any future dwellings to a hydrant is to be less than 70 m. These services will need to be

- designed and installed according to PBP and fire hydrant spacing, design, sizing and pressure must comply with AS 2419:2017 'Fire hydrant installations – System design, installation and commissioning' (Standards Australia 2017);
- hydrants are not located within any road carriageway; and
- reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.

## 6. Electricity and gas supplies

In accordance with PBP, electricity should be underground wherever practicable.

Gas services will need to be designed and installed according to PBP:

- Any gas services are to be installed and maintained in accordance with AS/NZS 1596:2014 'The storage and handling of LP Gas' (Standards Australia 2014);
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
- connections to and from gas cylinders are metal;
- if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2 m away from any combustible material, so they do not act as a catalyst to combustion;
- polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used; and
- above-ground gas service pipes external to the building are metal, including and up to any outlets.

## 7. Access

The critical access constraints can be summarised as:

- The current roading concepts shows single access onto Moss Vale Road and this does not comply with PBP as two alternate egress routes to a safer place are required e.g. Nowra or Cambewarra. Two alternate egress routes onto Moss Vale Road is often the design solution in such situations; however if this is not feasible or desired then a Strategic Study and Design Brief could investigate the Village Centre as an appropriate destination, but much depends on the risk associated with the riparian corridors.
- Alternate routes need to be available from every potential dwelling and workplace. Cul-de-sacs are only permissible where they are <200 m in length and provide a 12 m outer radius turning circle.
- Given the size of the development, more than two egress routes is fundamentally important. The revegetation of the E2 land with Wet Sclerophyll Forest instead of rainforest (in the previous concept design) not only enlarges the APZ but creates a higher locality risk and potentially removes the option of evacuation to the Village Centre suggested in the previous Concept Plan
- Additional information is required on potential egress routes out of the site as the ILPs do not adequately show if options other than the single egress onto Moss Vale Road exist.



- Perimeter roads need to adjoin all internal bushfire prone lands i.e. low hazard and forest areas. Perimeter roads normally require an 8 m wide trafficable surface, however given the lower risk abutting the riparian areas/forest it may be feasible to justify a lesser width road under a Design Brief and Strategic Study.
- A perimeter road between the external lots/development areas and the surrounding grassland is required and appears to be provided in the Concept Plan. It may be possible to negotiate with the RFS a lesser standard of road adjoining managed grassland e.g. a fire trail, but this cannot be assumed a certain outcome. The Acceptable Solution in PBP requires 8 m wide perimeter roads around the full perimeter of the DCP developed area. A low Bushfire Attack Level (BAL LOW) may also exist for site specific managed grassland (grazing) and these could be explored under Design Brief and Strategic Study e.g. some horse stud lands.

All public roads should comply with the PBP design requirements in Table 2. Performance Solutions may be proposed where roads do not fully comply with the Acceptable Solutions, however these are subject to an accepted Design Brief and Strategic Study.

**Table 2: Performance criteria for proposed public roads (PBP)**

Performance Criteria		Acceptable Solutions	Constraint can be satisfied
The intent may be achieved where:			
ACCESS (GENERAL REQUIREMENTS)	<ul style="list-style-type: none"> <li>• firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• property access roads are two-wheel drive, all-weather roads; and</li> </ul>	Yes
		<ul style="list-style-type: none"> <li>• perimeter roads are provided for residential subdivisions of three or more allotments; and</li> </ul>	Yes
		<ul style="list-style-type: none"> <li>• subdivisions of three or more allotments have more than one access in and out of the development; and</li> </ul>	No – refer Section 7
		<ul style="list-style-type: none"> <li>• traffic management devices are constructed to not prohibit access by emergency services vehicles; and</li> </ul>	Yes
		<ul style="list-style-type: none"> <li>• 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; and</li> </ul>	Yes
		<ul style="list-style-type: none"> <li>• all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; and</li> </ul>	Yes – see recommendation in Section 7.
		<ul style="list-style-type: none"> <li>• where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; and</li> </ul>	Yes
		<ul style="list-style-type: none"> <li>• 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.</li> </ul>	Yes – see recommendation in Section 7.
	<ul style="list-style-type: none"> <li>• the capacity of access roads is adequate for firefighting vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways</li> </ul>	Yes
		<ul style="list-style-type: none"> <li>• is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.</li> </ul>	Yes

	Performance Criteria	Acceptable Solutions	Constraint can be satisfied
PERIMETER ROADS	• 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;	Yes
		• hydrants are provided in accordance with AS 2419.1:2017;	Yes
		• there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	Yes
	• access roads are designed to allow safe access and egress for medium rigid emergency vehicles where residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface	• perimeter roads are two-way sealed roads; and	Yes
		• 8m carriageway width kerb to kerb; and	Yes
		• parking provided outside of the carriageway width; and	Yes
		• hydrants are located clear of parking areas; and	Yes
		• there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and	Yes
		• curves of roads have a minimum inner radius of 6m; and	Yes
		• the maximum grade road is 15° and average grade is 10°; and	Yes
		• the road crossfall does not exceed 3°; and	Yes
		• a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Yes
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 width kerb to kerb; and	Yes
		• parking is provided outside of the carriageway width; and	Yes
		• hydrants are located clear of parking areas; and	Yes
		• roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and	Yes
		• curves of roads have a minimum inner radius of 6m; and	Yes
		• the road crossfall does not exceed 3°; and	Yes
		• a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Yes

## 8. Staging

The stage development of areas often exposes the edge of each stage to a temporary bushfire risk. Clear information on how these risks are managed will be required e.g. temporary APZ maintained beyond buildings to the extent that the longer term Bushfire Attack Level (BAL) is achieved for the effected buildings. Similarly, temporary perimeter roads may be required to ensure no building is inadequately protected by a road between it and the hazard. Alternate egress routes are also essential for each stage of development.

## 9. Conclusion

Revegetation of the E2 land as Wet Sclerophyll Forest instead of rainforest (as in original concept) results in a significant loss of development yield. If the PBP Acceptable Solutions are used in the next steps in concept design, wider APZ are required (Figure 2). The potential for smaller APZ exists if Performance Solutions such as Short Fire Run models are used as an alternate solution but this process is likely to be a complex one and although it may not be fully accepted in a Design Brief and Strategic Bushfire Study process it will likely achieve a useful improvement in the accuracy of bushfire risk assessment and increase the development yield.

Two alternate egress routes are an essential component of ameliorating the bushfire risk and compliance with PBP. Clarification of the options is required and potentially some justification of the options using Performance Solutions and a Design Brief.

It is recommended that a Strategic Bushfire Study and Design Brief process begin with concepts agreed to by Council prior to preliminary discussions with the NSW Rural Fire Service.



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## 10. References

Eco Logical Australia (ELA). 2018. *Bushfire Constraints Advice for Masterplan and DCP*. Version 1 dated 9 March 2018.

Industry Safety Steering Committee. 2016. *ISSC3 Guideline for Managing Vegetation Near Power Lines*. (updated from Energy Australia. 2002. Network Standard NS 179 (Vegetation Safety Clearances)).

NSW Rural Fire Service (RFS). 2019. *Planning for Bush Fire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Homeowners - issued December 2019*. Australian Government Publishing Service, Canberra.

Standards Australia (SA). 2005. *Fire hydrant installations - System design, installation and commissioning*, AS 2419.1:2005, SAI Global, Sydney.

Standards Australia (SA). 2014. *The storage and handling of LP Gas*, AS/NZS 1596:2014. SAI Global, Sydney.

## Appendix A: Strategic Bushfire Study

**Table 3: Minimum requirements of a Strategic Bushfire Study**

ISSUE	DETAIL	ASSESSMENT CONSIDERATIONS
<b>Bush landscape assessment</b>	<b>fire</b> 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.	<p>The bush fire hazard in the surrounding area, including:</p> <ul style="list-style-type: none"> <li>Vegetation</li> <li>Topography</li> <li>Weather</li> </ul> <p>The potential fire behaviour that might be generated based on the above;</p> <p>Any history of bush fire in the area;</p> <p>Potential fire runs into the site and the intensity of such fire runs; and</p> <p>The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.</p>
<b>Land assessment</b>	<b>use</b> The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	<p>The risk profile of different areas of the development layout based on the above landscape study;</p> <p>The proposed land use zones and permitted uses;</p> <p>The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site); and</p> <p>The impact of the siting of these uses on APZ provision.</p>
<b>Access and egress</b>	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	<p>The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile;</p> <p>The location of key access routes and direction of travel; and</p> <p>The potential for development to be isolated in the event of a bush fire.</p>
<b>Emergency services</b>	An assessment of the future impact of new development on emergency services.	<p>Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades; and</p> <p>Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.</p>
<b>Infrastructure</b>	An assessment of the issues associated with infrastructure and utilities.	<p>The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants; and</p> <p>Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.</p>

<b>Adjoining land</b>	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.
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