Bushfire Opportunities/Constraints Analysis

Residential Subdivision
Lot 5 DP 838497 Sutton

Prepared for
Woodbury Ridge Estate

25 May 2018

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Project Manager	Mick George 0400 494 366 Suite 204, Level 2, 62 Moore Street, Austinmer NSW 2515
Prepared by	Mick George
Reviewed by	Bruce Horkings
Approved by	Bruce Horkings FPAA BPAD-A Certified Practitioner No. BPAD29962-L3
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1 Introduction

1.1 Background

This report was commissioned by Woodbury Ridge Estate to investigate the bushfire protection requirements associated with a planning proposal for the re-zoning and potential residential subdivision of Lot 5 DP838497 Sutton NSW (hereafter known as the 'subject land') located as shown in

Figure 1. This report presents a due diligence assessment of a preliminary proposal to subdivide the subject land into:

- 34 low density residential allotments;
- 35 rural residential lots;
- 8 stewardship lots; and
- one environmental management zone.

This report is suitable for the purpose for which it was commissioned. Further assessment may be required if there are significant changes to the development concept and layout, proposed uses or change in State bushfire protection legislation or policy.

The site is not currently mapped as bushfire prone. However, the Department of Planning and Environment, Office of Environment and Heritage and Yass Valley Council requested at a meeting between Canberra Town Planning to include a strategic bushfire assessment with the Planning Proposal submission, particularly in relation to the surrounding grasslands. Clarification was sought from the NSW Rural Fire Service (RFS) by Eco Logical Australia (ELA) on 9 May 2018 to confirm the need and scope of the required study.

Section 4.46 (formerly 91A) *Environmental Planning and Assessment Act 1979* requires a bushfire assessment of residential subdivision proposals on bush fire prone land, following the process and methodology set out within Section 100B of the *Rural Fires Act 1997*, Clause 44 of the *Rural Fires Regulation 2013* and the NSW RFS document 'Planning for Bush Fire Protection 2006' (PBP) (RFS 2006).

This assessment lists the minimum and recommended bushfire requirements required for the proposed subdivision to achieve compliance with the above legislation and policy.

1.2 Location and description of subject land

The subject land (

Figure 1**)** is zoned as R1 Primary Production, with the Planning proposal seeking re-zoning to part R2 Low Density Residential, part E4 Environmental Living and part E3 Environmental Management.

The area of the subject land is approximately 170 hectares and the allotment currently covered in grassy woodland vegetation.

1.3 Preliminary Concept

The preliminary concept is to seek approval for a 34 low density residential allotments (183,757 m^2); 35 rural residential lots and 8 stewardship lots (1,100,000 m^2); and one environmental management zone (420,000 m^2) as shown on **Figure 2**.

Note that schools, child care centres, tourist accommodation, retirement villages or any other development that is classified as Special Fire Protection Purpose (SFPP) development under PBP require significantly larger Asset Protection Zones (APZs) than those specified in this assessment (which relate to residential development only).

None of these uses is currently indicated, and if proposed, these types of developments should consider this additional constraint. SFPP developments also have more stringent requirements for internal access roads which would also need to be considered should this type of development be proposed within the subject land.

Figure 1: Location of subject land

2 Methods and approach

This bushfire assessment followed the methods and approach outlined in **Table 1** below. The preliminary concept plan is contained in **Figure 2**.

'Planning for Bush Fire Protection' (PBP) (RFS 2006) is currently under review, and a revised version may be implemented during the design stage of this development. The advice below includes information relating to the potential changes to PBP, including a potential increase in minimum APZ distances based on BAL-29 under Australian Standard (AS) 3959-2009 'Construction of buildings in bushfire-prone areas'.

Table 1: Methods and approach

Step	Tasks	Considerations
Review	A review of relevant reports and plans occurred.	Yass Valley Council Bush Fire Prone Land Map; Yass Valley Council LEP data
Desk top analysis	Review and analysis of all available mapping layers in GIS relevant to bushfire hazard.	GIS layers include: satellite imagery, vegetation mapping, topographical data (e.g. contours), biodiversity layer, land zoning and other environmental protection layers.
Assessment	Determine all relevant bushfire protection measures.	Assessment in accordance with PBP methodology and RFS requirements.
Reporting	Preparation of bushfire assessment.	Carry out all necessary reporting required for residential subdivision proposals for development of bushfire prone land.

ANNEXURE 6 – CONCEPTUAL DEVELOPMENT SCHEME

LOT 5 DP 838497 SUTTON

AMC ARCHITECTURE+

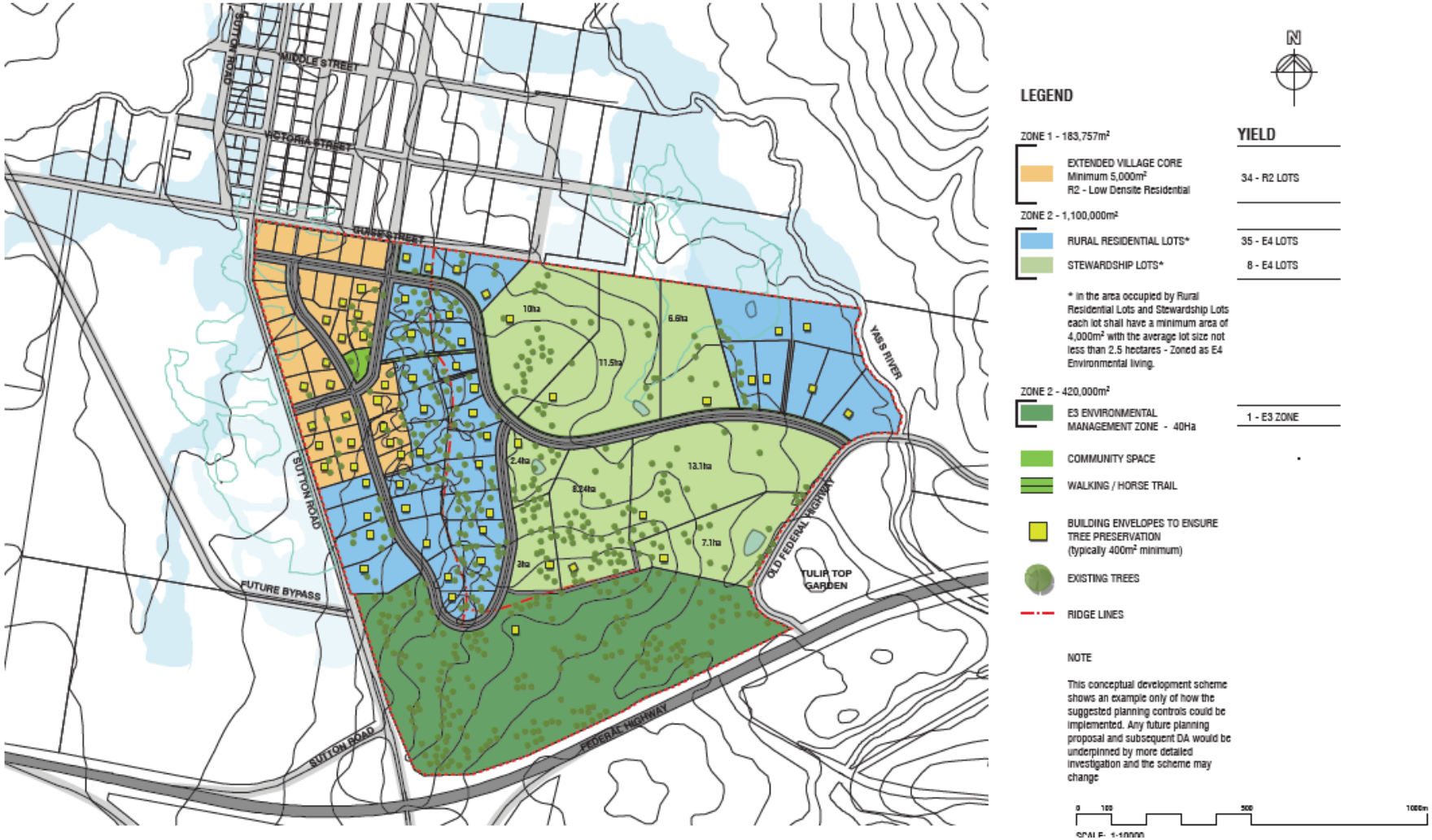

Figure 2: Preliminary concept plan

3 Bushfire hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as APZ location and dimension. The following sub-sections provide a detailed account of the vegetation communities (bushfire fuels) and the topography (effective slope) that combine to create the bushfire hazard that may affect bushfire behaviour impacting the subject land.

3.1 Vegetation communities influencing bushfire

The 'predominant vegetation' influencing fire behaviour approaching and within the subject land has been assessed strictly in accordance with the methodology specified within PBP. While the Yass Valley Council Bush Fire Prone Land Map does not identify bushfire hazard within the subject land, this map was prepared (25 July 2014) before 'grassland' was considered a bush fire prone vegetation type as per the current 'Guide for Bush Fire Prone Land Mapping' Version 5b (GBFPLM) released in November 2015 (RFS 2015). Bush Fire Prone Land mapping is intended to be a planning trigger rather than definitive mapping.

As shown in

Figure 3, the primary bushfire hazard affecting the proposed subdivision primarily consists of 'woodland' vegetation within rural residential lots on the west of the site adjacent to the extended village core and the environmental management lot in the south of the site. Consequently, the bush fire hazard of the subject land is classified as 'woodland' by PBP.

The Stewardship lots in the central part of the site and the rural residential lots in the north east of the site are primarily 'grassland' vegetation, but future vegetation will depend on management of those lots.

There is also a small remnant of riparian vegetation to the east of the subject land along the Yass River. This vegetation is a shape that will provide a potential fire run directly towards buildings not exceeding 50 m and is classified as 'low hazard vegetation' by PBP. Low hazard vegetation uses 'rainforest' setbacks and construction levels as a surrogate for the reduced fire behaviour expected from small and/or narrow areas of vegetation.

In all other directions, there are managed lands in the form of existing managed rural and rural residential properties and Sutton village to the north.

3.2 Slopes influencing bushfire

The 'effective slope' influencing fire behaviour approaching and within the subject land has been assessed strictly in accordance with the methodology specified within PBP. This is conducted by measuring the worst-case scenario slope where the vegetation occurs over 100 m transects from the vegetation boundary.

In the E3 Environmental Management Zone in the south of the subject land, the woodland is on slight downslopes which fall into the PBP slope category '>0-5 degrees downslope'. This slope class also applies to the woodland vegetation to the east of the site where the rural residential and stewardship lots are proposed.

The low hazard riparian vegetation to the east of the subject land is on flat ground which falls into the PBP slope category 'all upslopes and flat land'.

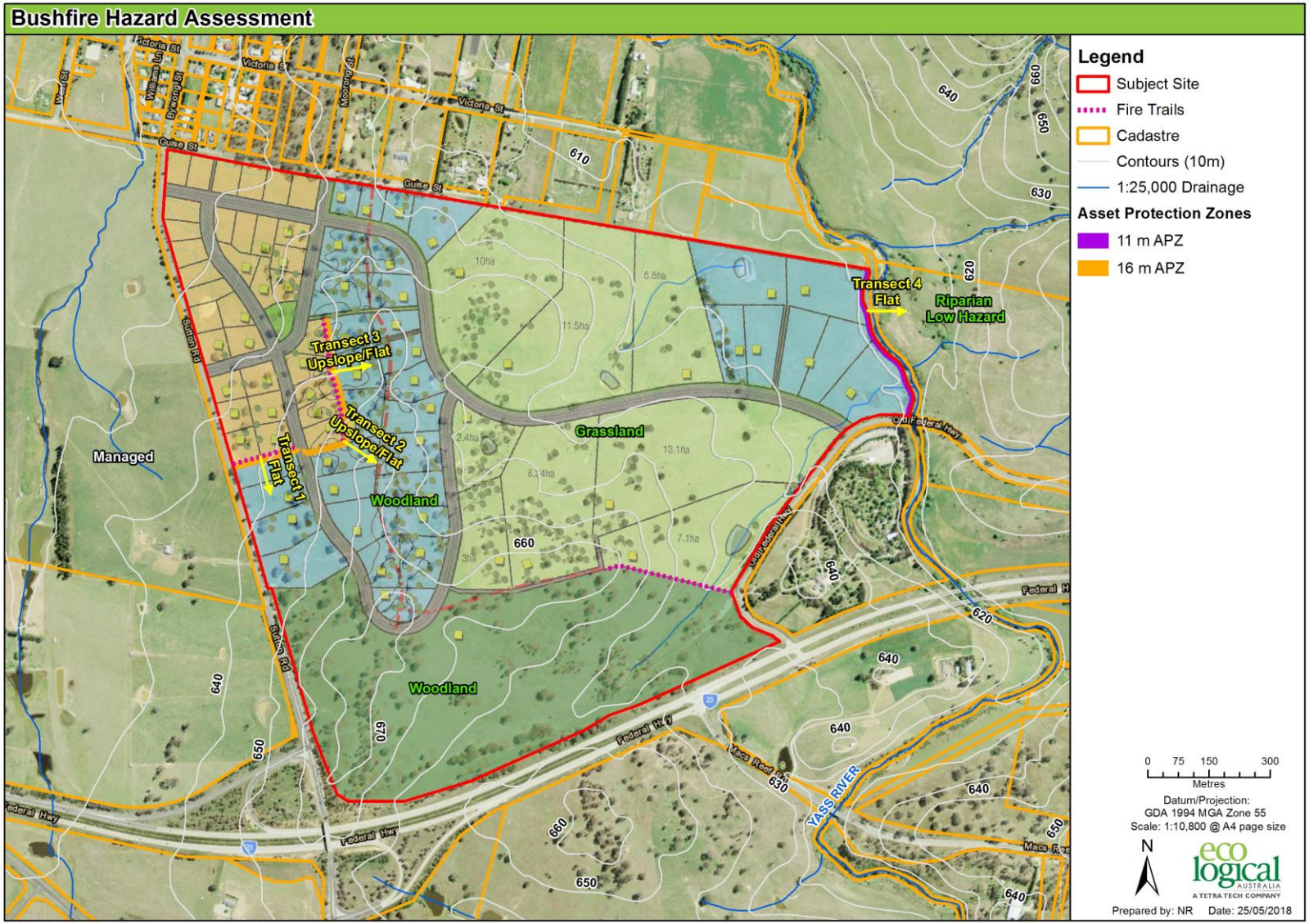

Figure 3: Bushfire hazard assessment

4 Bushfire protection measures

PBP requires the assessment of a suite of bushfire protection measures that in total afford an adequate level of protection. The measures required to be assessed for subdivision are listed in **Table 2** below and are discussed in detail in the remainder of this section.

Table 2: PBP bushfire protection measures

Bushfire protection measures	Considerations
Asset Protection Zones (APZ)	Location and dimension of APZ setbacks from vegetation including prescriptions of vegetation management within the APZ.
Access	Assessment to include access and egress in and out of a developable area such as alternate access, operational response and evacuation options. APZ perimeter access to be considered as is design standards of public roads and any fire trails.
Water supply and other utilities	List requirements for reticulated water supply and hydrant provisions, and any static water supplies for firefighting.
Building construction standards	Provide a guide on the application of construction standards for future buildings.
Landscaping	Principle aim to prevent flame impingement on buildings, provide defendable space for property protection, reduce fire spread, filter embers and reduce wind speed

4.1 Asset Protection Zones (APZ)

4.1.1 APZ location and dimension

Error! Reference source not found. shows the dimensions of the Asset Protection Zones (APZ) required in each of the transect line directions for the extended village core (Zone 1 on concept plan) and for the riparian corridor to the east of the site; and where relevant, information on how the APZ is to be provided is included. The footprint of the required APZ is also shown in **Figure 3**. The final APZ requirements will be dependent on the eventual location of building envelopes. Future development of adjoining land would also influence APZ dimensions and locations.

APZ dimensions for each rural residential, stewardship and environmental management zone lots has not been determined at this planning proposal stage as building envelopes are only indicative at this stage. However, an indication of the APZ dimensions for woodland or grassland vegetation types (which would be the predominant vegetation type influencing fire behaviour for these lots) is provided in **Table 1**. All lots have the ability to provide required APZ dimensions.

APZs are to be provided within property boundaries or by proposed roads and managed lands (e.g. maintained lawns, cultivated gardens). If an APZ was to be proposed on adjoining land, a legally binding mechanism that allowed for ongoing management would be required (e.g. restriction as to user).

Table 3: Threat assessment, APZ and category of bushfire attack

Transect #	Slope	Vegetation	PBP required APZ (residential) (PBP 2006)	BAL-29 required APZ (AS 3959-2009) - residential	Comments
1	All upslopes and flat land	Woodland	10	16	Proposed fire trail along southern boundary of the extended village core would form part of the APZ.
2	All upslopes and flat land	Woodland	10	16	Proposed fire trail along eastern boundary of the extended village core would form part of the APZ.
3	All upslopes and flat land	Woodland	10	16	Proposed fire trail along eastern boundary of the extended village core would form part of the APZ, as would community space to the north (assuming management of this space).
4	All upslopes and flat land	Low Hazard (riparian)	10	11	Further refinement of APZ could be undertaken based on management plan for riparian corridor.
Rural residential and Stewardship lots	All upslopes and flat land	Grassland	10	9	Requirements for APZ for each lot will need to be determined once building envelopes are identified. The APZ specifications here indicate the requirements for based on grassland vegetation and woodland.
	Downslope >0 to 5 degrees	Grassland	10	10	
	All upslopes and flat land	Woodland	10	16	
	Downslope >0 to 5 degrees	Woodland	15	21	

[1] Slope most significantly influencing the fire behaviour of the site having regard to vegetation found as per PBP.

[2] Predominant vegetation is identified, according to PBP.

[3] Assessment according to Table 2.4 and page 52 of PBP.

[4] Assessment according to Table 2.4.2 of AS 3959-2009.

4.1.2 Vegetation management within the APZ

The management the APZ is to achieve the specifications of an Inner Protection Area (IPA) as described by PBP and as outlined below:

- No tree or tree canopy is to occur within 2 m of dwelling rooflines;
- The presence of a few scattered trees in the APZ is acceptable provided that they are well spread out, do not form a continuous canopy, and are located far enough away from future buildings so that they will not ignite the buildings by direct flame contact or radiant heat emission;
- Any landscaping or garden beds should be located away from future buildings;
- The ground fuel is to be maintained to less than 4 tonnes per hectare of fine fuel (4 t/ha is equivalent to a 1 cm thick layer of leaf litter and fine fuel means any dead or living vegetation of less than 6 mm in diameter, e.g. twigs less than a pencil in thickness) by regular mowing or slashing.

Further details on APZ implementation and management can be found on the NSW RFS website including:

https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0010/13321/Standards-for-Asset-Protection-Zones.pdf.

4.1.3 Dwelling construction standard (BAL)

The building construction standard is based on the determination of the Bushfire Attack Level (BAL) in accordance with Method 1 of *Australian Standard AS 3959-2009 'Construction of buildings in bushfire-prone areas'* (Standards Australia 2009). The BAL is based on known vegetation type, effective slope, and separation distance between the development and the bushfire hazard.

The BAL for future buildings within the proposed subdivision will be determined at the individual dwelling Complying Development Certificate (CDC) or Development Application (DA) stage. Residential developments are required to achieve a BAL-29 to meet the planning requirements of PBP. All lots have the ability to achieve a BAL-29.

NSW has a minor variation to AS 3959-2009 which requires consideration in future development applications. The variation is contained within Section A3.7 of the document 'PBP 2006 Appendix 3 Addendum'.

4.2 Access provisions

PBP requires an access design that enables safe evacuation away from an area whilst facilitating adequate emergency and operational response to the area requiring protection. All bush fire prone areas should have an alternate access or egress option depending on the bushfire risk, the density of the development, and the chances of the road being cut by fire for a prolonged period.

4.2.1 Public roads

Public road access to the subdivision is via Sutton Road to the west, Guise Street to the north and Old Federal Highway to the east. The proposed public roads within the development are to comply with all of the PBP design requirements as outlined in **Table 4**.

Based of initial discussions with the NSW RFS on 9 May 2018, consideration should be given to extending the road to the north of the Environmental Management Zone to connect with Old Federal Road in the east to provide additional access and egress. A fire trail may be an alternative. Any fire

trails within the development are to comply with all of the PBP design requirements as outlined in **Table 5**.

The current masterplan layout contains dead end access that is greater than 200 m in length to rural residential lots in the north-east. To address this issue, a turning arrangement that meets the specifications detailed in **Table 4** or loop roads around future dwellings is recommended.

A fire trail that meets the specifications detailed in **Table 5** should formed as part of the APZ will provide additional rear access to lots that do not have a perimeter road where the extended village core adjoins rural residential lots in the west of the site. These lots are located on a public road that will allow egress in an emergency.

4.2.2 Property Access

There are no specific access requirements for property access where a 70 m unobstructed path can be demonstrated between the most distant external part of a proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70 kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply.

These parameters apply to future residential development within the subject land and standard residential driveways would service future dwellings. This complies with PBP.

Property access roads for rural residential, stewardship and Environmental Management Zones lots is required to meet the specifications detailed in **Table 6.**

4.3 Utilities

4.3.1 Water supply

The study area is not currently serviced by reticulated water. If reticulated water was made available to the subject land, the furthest point from most future dwellings to a hydrant should be less than 70 m. The reticulated water supply should comply with the following acceptable solutions within Section 4.1.3 of PBP:

- Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads;
- Fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles;
- Hydrants are not located within any road carriageway;
- All above ground water and gas service pipes external to the building are metal, including and up to any taps; and
- The PBP provisions of parking on public roads are met.

If the study area is not serviced by reticulated water before the proposed subdivision proceeds or where the furthest point of a future dwelling will be more than 70 m from a hydrant, dwellings will require a static water supply to be designed and planned at time of development application. The current standard requires;

- 5,000L for lots < 1,000 m^2;
- 10,000 L for lots between 1,000 and 10,000m^2; and
- 20,000 L for lots > 10,000m^2.

Tanks must not be plastic, must be fitted with a 65 mm Storz fitting and must be accessible by fire tankers.

4.3.2 Electricity and gas

Electricity supply to the subject land is above ground but the supply within the subdivision will be underground which complies with 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).

Electricity and gas supplies do not constrain the proposed development.

Table 4: Performance criteria for proposed public roads (PBP page 21)

Performance Criteria	Acceptable Solutions	Complies
The intent may be achieved where:		
• firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources)	• public roads are two-wheel drive, all weather roads	Can comply
• public road widths and design that allows safe access for firefighters while residents are evacuating an area	• urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle)	Does not comply – potential for performance solution (fire trail) to connect to Old Federal Highway to the east
	• the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas	As above
	• traffic management devices are constructed to facilitate access by emergency services vehicles	Can comply
	• public roads have a cross fall not exceeding 3 degrees	Can comply
	• public 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 direct traffic away from the hazard	Can comply
	• curves of roads (other than perimeter roads) are a minimum inner radius of six metres	Can comply
	• 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	Can comply
	• there is a minimum vertical clearance to a height of four metres above the road at all times	Can comply
• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles	• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicated load rating	Can comply

Performance Criteria	Acceptable Solutions	Complies
• roads that are clearly sign posted (with easy distinguishable names) and buildings / properties that are clearly numbered	• public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression	Can comply
	• public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression	Can comply
• there is clear access to reticulated water supply	• public roads up to 6.5 metres wide provide parking within parking bays and located services outside of the parking bays to ensure accessibility to reticulated water for fire suppression	Not applicable
	• one way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and located services outside of the parking bays to ensure accessibility to reticulated water for fire suppression	Not applicable
• parking does not obstruct the minimum paved width	• parking bays are a minimum of 2.6 metres wide from kerb to kerb edge to road pavement. No services or hydrants are located within the parking bays	None proposed
	• public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road	Can comply

Table 5: Performance criteria for proposed fire trail (PBP page 25)

Performance Criteria	Acceptable Solutions	Complies
The intent may be achieved where:		

• the width and design of the fire trails enables safe and ready access for firefighting vehicles	• a minimum carriageway width of four metres with an additional one metre wide strip on each side of the trail (clear of bushes and long grass is provided.
	• the trail is a maximum grade of 15 degrees if sealed and not more than 10 degrees if unsealed.
	• a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches is provided.
	• the crossfall of the trail is not more than 10 degrees.
	• the trail has the capacity for passing by:
	  • reversing bays using the access to properties to reverse fire tankers, which are six metres wide and eight metres deep to any gates, with an inner minimum turning radius of six metres and outer minimum radius of 12 metres; and/or
	  • a passing bay every 200 metres, 20 metres long by three metres wide, making a minimum trafficable width of seven metres at the passing bay.
	• *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m) and extend for no more than 30m and where obstruction cannot be reasonably avoided or removed.*
		Can comply
		Can comply
		Can comply
		Can comply
		Can comply

• Fire trails are trafficable under all weather conditions. Where the fire trail joins a public road, access shall be controlled to prevent use by non-authorised persons	• the fire trail is accessible to firefighters and maintained in a serviceable condition by the owner of the land. • appropriate drainage and erosion controls are provided. • the fire trail system is connected to the property access road and/or to the through road system at frequent intervals of 200 metres or less. • fire trails do not traverse a wetlands or other land potentially subject to periodic inundation (other than a flood or storm surge). • gates for fire trails are provided and locked	Can comply Can comply Can comply Can comply Can comply
• Fire trails designed to prevent weed infestation, soil erosion and other land degradation	• fire trail design does not adversely impact on natural hydrological flows. • fire trail design acts as an effective barrier to the spread of weeds and nutrients. • fire trail construction does not expose acid-sulphate soils.	Can comply Can comply Can comply

Table 6: Performance criteria for proposed property access roads (PBP page 23)

Performance Criteria	Acceptable Solutions	Complies
The intent may be achieved where:		
• access to properties is provided in recognition of the risk to fire fighters and/ or evacuating occupants.	• at least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 metres from a public through road	Can comply
• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. • •all weather access is provided.	• bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes • roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge).	Can comply Can comply
• road widths and design enable safe access for vehicles	• a minimum carriageway width of four metres for rural-residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint). *Note: No specific access requirements apply in a urban area where a 70 metres unobstructed path can be demonstrated 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 (i.e. a hydrant or water supply).* • in forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making a minimum trafficable width of six metres at the passing bay. • a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches. • internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius. • curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress. • the minimum distance between inner and outer curves is six metres. • the crossfall is not more than 10 degrees. • maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads. *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also*	Can comply Can comply Can comply Can comply Can comply Can comply Can comply Can comply

Performance Criteria	Acceptable Solutions	Complies
	apply to community style development property access roads in addition to the above. • access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way.	None proposed

5 Conclusion

This report presents a Bushfire Opportunities/Constraints Analysis (BOCA) of a planning proposal for proposed residential subdivision of the subject land. Recommendations on how to achieve compliance with s100B *Rural Fires Act 1997*, Clause 44 of the *Rural Fires Regulation 2013* and 'Planning for Bush Fire Protection 2006' are located within **Section 4** – Bushfire Protection Measures. They include the provision of Asset Protection Zones (APZs), adequate access, water supply for firefighting, the safe installation of utilities, and discussion of building construction standards for future dwellings.

All opportunities / constraints identified should be considered in conjunction with any environmental impact and rezoning studies. The most crucial bushfire protection measures that will require careful design of the proposed subdivision relate to the provision of APZs and the provision of safe firefighting access.

It is recommended that the minimum APZs applied to the development are those corresponding with BAL-29 construction under AS 3959-2009 both to pre-empt any likely changes to PBP and also to avoid high construction costs and minimise material/design constraints for future dwellings within the proposed subdivision.

Access to the proposed development requires design in accord with the PBP specifications in **Table 4, Table 5 and Table 6**. Either a layout redesign or performance solution is needed to address the requirement for a perimeter road that adjoins the Environmental Management Zone in the south of the site.

Provision of appropriate APZs and safe firefighting access for the proposed subdivision are critical factors to obtaining approval from the NSW Rural Fire Service for any future residential development of the subject land.

Mick George

Senior Bushfire Consultant

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ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

HEAD OFFICE
Suite 2, Level 3
668-672 Old Princes Highway
Sutherland NSW 2232
T 02 8536 8600
F 02 9542 5622

CANBERRA
Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

COFFS HARBOUR
35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

PERTH
Suite 1 & 2
49 Ord Street
West Perth WA 6005
T 08 9227 1070
F 02 9542 5622

DARWIN
16/56 Marina Boulevard
Cullen Bay NT 0820
T 08 8989 5601
F 08 8941 1220

SYDNEY
Suite 1, Level 1
101 Sussex Street
Sydney NSW 2000
T 02 8536 8650
F 02 9542 5622

NEWCASTLE
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

ARMIDALE
92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

WOLLONGONG
Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
T 02 4201 2200
F 02 4268 4361

BRISBANE
Suite 1 Level 3
471 Adelaide Street
Brisbane QLD 4000
T 07 3503 7191
F 07 3854 0310

HUSKISSON
Unit 1 51 Owen Street
Huskisson NSW 2540
T 02 4201 2264
F 02 4443 6655

NAROOMA
5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

MUDGEE
Unit 1, Level 1
79 Market Street
Mudgee NSW 2850
T 02 4302 1230
F 02 6372 9230

GOSFORD
Suite 5, Baker One
1-5 Baker Street
Gosford NSW 2250
T 02 4302 1220
F 02 4322 2897

1300 646 131
www.ecoaus.com.au