



Bushfire Protection Assessment

Proposed rezoning – Dural

Prepared for
APP Corporation Pty Limited

9 September 2016



DOCUMENT TRACKING

| Item | Detail |
|-----------------|---|
| Project Name | Bushfire Protection Assessment: Proposed rezoning – South Dural |
| Project Number | 15SUT_3064 |
| Project Manager | Danielle Meggos Suite 2, Level 3, 668 Princes Highway, Sutherland NSW 2232 (02) 8536 8600 |
| Prepared by | Danielle Meggos |
| Reviewed by | Daniel Copland (FPAA BPAD Certified Practitioner No. BPD-L3-28853) |
| Approved by | Daniel Copland |
| Status | Final |
| Version Number | 3 |
| Last saved on | 1 August 2016 |

This report should be cited as ‘Eco Logical Australia September 2016. Bushfire Protection Assessment: Proposed rezoning – South Dural. Prepared for APP Corporation Pty Limited.’

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1 Introduction

1.1 Description of proposal

APP Corporation Pty Limited commissioned Eco Logical Australia Pty Ltd (ELA) to prepare a bushfire protection assessment (BPA) for a proposed rezoning of a number of large allotments in South Dural. The proposed rezoning would change land at South Dural from rural to a predominately residential zone.

A Planning Proposal under Section 56 of the *Environmental Planning and Assessment Act 1979* passed through the gateway process in 2014.

1.2 Study area

The study area is approximately 240 hectares in size, within the Hornsby Local Government Area, bounded by New Line Road, Hastings Road and Old Northern Road as shown in **Figure 1**. It comprises of numerous separate land titles with existing dwellings and ancillary buildings located within the majority of lots.

The study area is dominated by a broad bushland/riparian corridor associated with Georges Creek and associated tributaries consisting of open forest and a bushland-development interface areas on downslopes.

Figure 2 shows the indicative structure plan proposed.

1.2.1 Aim and structure of report

ELA has been engaged to investigate the current bushfire risk of the study area and the appropriate combination of bushfire protection measures to mitigate this risk in support of the rezoning. Specifically, this analysis responds to the requirements of *Planning for Bush Fire Protection 2006* (PBP), and *Australian Standard AS 3959 Construction of buildings in bushfire-prone areas* (AS3959). This report details the outcomes of these investigations in the context of the proposed land use.

The overarching objective of this report is to identify all potential bushfire constraints to the future urban development of the study area. The results of this assessment will directly support the preparation of necessary planning documentation. As such the objectives of this report are to:

- Ensure the statutory requirements for bushfire protection are identified and can be adequately met;
- Implement suitable management frameworks for bushfire protection, whilst having consideration of the vegetation and ecological issues for the study area, enabling long term conservation and management of these environmental values while facilitating safe urban development outcomes; and
- Consider the likely rehabilitation of ecological issues and the recommendations of the ecological investigations to preserve and enhance ecological communities on the subject land. This report assesses the potential bushfire hazard across the study area, in the context of existing vegetation (refer to Figure 3 for vegetation coverage). It then identifies planning requirements as per PBP. Management of future asset protection zones (APZ) and environmental areas are also considered.

Future subdivision of land and the construction of buildings will require an assessment against PBP. As such the provisions of this report are to be considered in the planning and design of any development following the rezoning process.

1.3 Legislative requirements

1.3.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for NSW, providing a framework for the overall environmental planning and assessment of development proposals. A variety of other legislation and environmental planning instruments, such as the *Threatened Species Conservation Act 1995* (TSC Act), *Water Management Act 2000* and *Rural Fires Act 1997* (RF Act), are integrated with the EP&A Act.

1.3.2 Threatened Species Conservation Act 1995

The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. The TSC Act is integrated with the EP&A Act and requires consideration of whether a development (assessed under Part 4 of the EP&A Act) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

1.3.3 Rural Fires Act 1997

Bushfire suppression and management is regulated by the RF Act. Both the EP&A Act and the RF Act were modified by the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002* to enhance bushfire protection through the development assessment process. Key requirements of the RF Act include:

- The need for a bushfire safety authority to be issued by the RFS under section 100B of the RF Act for any development applications for subdivision (therefore considered integrated development); and
- All landowners to exercise a duty of care to prevent bushfire from spreading on or from their land under section 63 of the RF Act. This relates to the appropriate provision and maintenance of APZs, landscaping and any retained vegetation when developing land.

1.3.4 Direction 4.4 Planning for Bush Fire Protection

Direction 4.4 Planning for Bushfire Protection identifies matters for consideration for planning proposals that will affect, or are in proximity to land mapped as bush fire prone. In particular a planning proposal where development is proposed must:

- have regard to *Planning for Bush Fire Protection 2006* (PBP),
- provide an Asset Protection Zone (APZ) incorporating at a minimum:
 - an Inner Protection Area (IPA) bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and
 - an Outer Protection Area (OPA) managed for hazard reduction and located on the bushland side of the perimeter road,
- for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service (RFS). If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the RF Act), the APZ provisions must be complied with,

- contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,
- contain provisions for adequate water supply for fire fighting purposes,
- minimise the perimeter of the area of land interfacing the hazard which may be developed,
- introduce controls on the placement of combustible materials in the Inner Protection Area.

Consideration must also be given to NSW RFS *Practice Note 2/12 Planning Instruments and Policies*. It is expected that the RFS, in its assessment of the proposal will consider the requirements of this Practice Note.

1.3.5 Planning for Bush Fire Protection 2006

Rezoning proposals require consultation with the NSW RFS as the lead agency for managing bushfire. As such the requirements of *Planning for Bush Fire Protection* (NSW RFS, 2006) are to be addressed. This includes having regard to the following planning principles of PBP:

- Provision of a perimeter road with adequate two way access which delineates the extent of the intended development;
- Provision, at the urban bushland interface, for the establishment of adequate asset protection zones for future housing;
- Specifying minimum residential lot depths to accommodate asset protection zones for lots on perimeter roads;
- Minimising the perimeter of the area of land, interfacing the hazard, which may be developed;
- Introduction of controls which avoid placing inappropriate developments in hazardous areas; and
- Introduction of controls on the placement of combustible materials in asset protection zones.



Figure 1: Study area

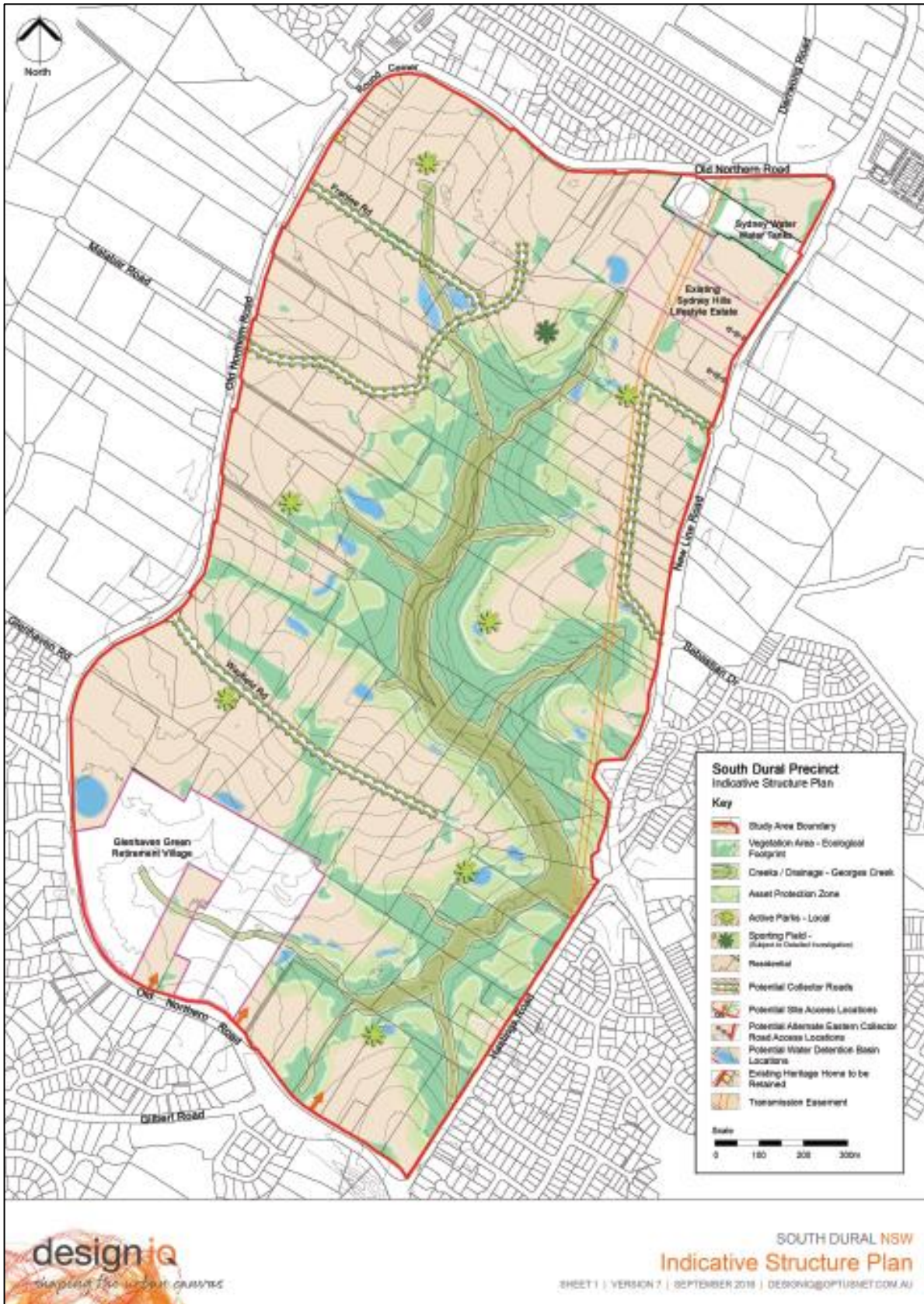


Figure 2: Indicative Structure Plan

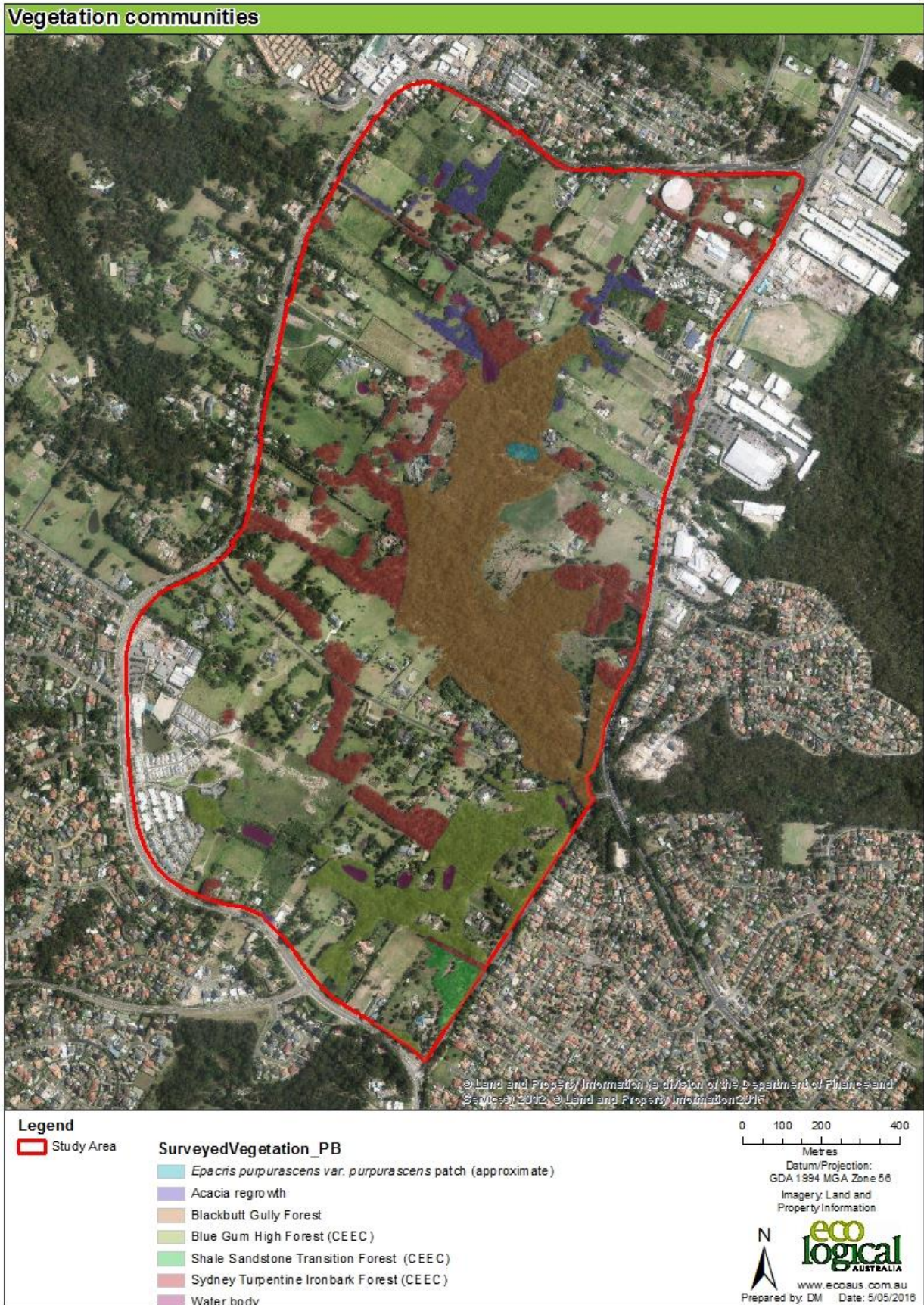


Figure 3: Vegetation Communities

2 Bushfire threat assessment

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as asset protection zone location and dimension. This section provides 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 at the study area.

The concept of bushfire risk as influenced by fire history and current and past bushfire issues has little bearing on the determination of bushfire protection strategies for rezoning and future development within the study area. This is due to the fact that PBP assesses bushfire protection based purely on vegetation and slope (i.e. hazard and not risk), making the assumption that a fire may occur in any patch of bushland at a worst-case scenario (based on a set design fire).

Notwithstanding this, the *Hornsby Ku-ring-gai Committee Bush Fire Risk Management Plan* (BFRMP) was reviewed to gain a greater understanding of the bushfire environment, hazard and risk issues that affect the study area. The smallest established urban area of Dural to the east of the study area (e.g. around Millstream Grove, Ravensbourne Circuit) is identified as having an extreme risk rating whilst the portion of Dural to the south of Georges Creek (e.g. James Henty Drive, Thomas Wilkinson Avenue) and the Dural Industrial Area are rated as High. Within the study area itself those assets adjoining the core vegetated area have a High risk rating.

Treatment actions to respond to these risks include community education, mosaic burning within identified Strategic Fire Advantage Zones (SFAZ) and maintenance of mapped Asset Protection Zones (APZ). Importantly the vegetation through the centre of the study area along Georges Creek is mapped as a SFAZ with the area surrounding this mapped as assets at risk.

The proposed development will provide further asset protection for existing development to the east of the study area by providing increased separation through more formalised management within the existing large allotments (through development of these areas). An increase in density within the study area as part of the rezoning is unlikely to increase the risk rating.

The BFRMP does not affect the bushfire protection measures required for future development within the study area, but should be updated following development of the study area (**Figure 1**).

2.1 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 rezoning are listed in **Table 1** and are discussed in detail in this section. This section demonstrates that the study area can accommodate the required bushfire protection measures and achieve the Direction 4.4 objectives and RFS requirements.

Table 1: PBP bushfire protection measures

| Bushfire Protection Measure | 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 fire fighting. |
| Building construction standards | Provide a guide on the application of construction standards for future buildings. |

2.2 Vegetation types

In accord with PBP, the predominant vegetation class has been assessed within the study area and calculated for a distance of at least 140 m out from the proposed development.

The study area is dominated by a broad bushland/riparian corridor associated with Georges Creek that has its headwaters in the northern section of the study area and drains south-east towards the intersection of Hastings and New Line Road. The spatial distribution of this bushland can be appreciated from the aerial photograph in **Figure 1**.

Vegetation mapping undertaken by Parsons Brinckerhoff shows large areas of relatively intact and undisturbed Blackbutt Gully Forest along the riparian corridor (see **Figure 3**). Patches of Blue Gum High Forest and Sydney Turpentine Ironbark Forest in varying condition occur throughout the site. In accordance with PBP the predominant vegetation is ‘forest’.

Weed infestations and associated edge effects where the bushland abuts existing development and rural land occur influence the vegetation condition.

Where remnant or riparian vegetation occurs that has a size and arrangement that will result in reduced fire intensity, PBP allows for these to be a ‘low hazard and APZ setbacks are the same as for rainforest. This principle has been applied to the study area as follows:

- Vegetation less than 2 hectares in size but greater than 1 hectare and separated from other stands of vegetation
- Vegetation that provides a potential fire run directly toward buildings of no more than 50 m
- Riparian areas no greater than 20 metres in width on either side of a watercourse.

Throughout the study area there are small pockets of scattered trees and islands of trees with maintained understorey. Ecological advice indicates that vegetation enhancement of these areas is not required and the existing maintenance regime will be allowed to continue. As such these areas are not considered a bushfire hazard. Further to this, the northern most point of the riparian corridor will have a narrow strip of vegetation (being 5-10 m either side of the watercourse) that will provide insufficient fuel loads to sustain a bushfire when combined with surrounding management practices. It is proposed that all vegetation will be retained except for the Acacia regrowth.

The remaining vegetation within the study area consists of land used for agriculture purposes or land that is cleared and managed.

2.3 Effective slope

In accord with PBP, the slope that would most significantly influence fire behaviour was determined over a distance of 100 m from the boundary of the subject land where the vegetation was found (considering a worst-case scenario).

This assessment was made with 2 m contours and confirmed during field investigations and uses the slope classes listed in **Table 2**.

Slopes vary across the study area with steeper slopes along the watercourses. The slopes under the bushfire hazard range from >0-15 degrees downslope.

Table 2: PBP slope classes

| Upslope or Downslope | PBP Slope Class |
|----------------------|--|
| Upslope / Flat Land | Flat land and all upslope land leading away from the development |
| Downslope | >0-5 degrees downslope leading away from the development |
| | >5-10 degrees downslope leading away from the development |
| | >10-15 degrees downslope leading away from the development |
| | >15-18 degrees downslope leading away from the development |

3 Asset protection zones

Table A2.4 of PBP has been used to indicate the required APZ dimensions for future residential development within the subject land using the vegetation and slope data identified in **Section 2**. The APZ calculation is tabulated below and shown in **Figure 4**.

It is best practice to provide an APZ dimension that achieves a building construction standard under *AS 3959-2009 Construction of buildings in bushfire-prone areas* (Standards Australia 2009) of Bushfire Attack Level (BAL)-29 for residential development to ensure future home owners are not impacted by the additional costs associated with construction of a dwelling at BAL-40. **Table 3** lists the current minimum APZ and best practice APZ related to BAL-29 (refer to **Section 4** for more information on AS 3959-2009). APZ dimensions shown in **Figure 4** are based on BAL-29 APZ.

Special Fire Protection Purpose (SFPP) developments will require an increase in APZ to provide a higher level of bushfire protection. These developments are identified in Section 100B of the RF Act and include schools, retirement villages, nursing homes, child care centres, tourist accommodation and seniors living. The APZ required for these development types has also been provided in **Table 3**.

It is important to note that the APZ calculations quoted in this assessment are indicative only and have been determined at a landscape scale. This level of detail is suitable for a rezoning assessment where the aim is to demonstrate whether a parcel of land can accommodate the bushfire hazard, the expected APZ and future development. The final APZ dimensions for any future subdivision or development depends on the accuracy of a slope assessment undertaken at a site-specific level. The APZ dimensions quoted in this assessment should not be relied on to approve a future subdivision.

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

| Slope ¹ | Vegetation ² | PBP required APZ ³ | BAL-29 APZ | SFPP required APZ |
|-------------------------------|-------------------------|-------------------------------|------------|-------------------|
| Upslope | Forest | 20 m | 25 m | 60 m |
| >0-5 ⁰ downslope | Forest | 25 m | 32 m | 70 m |
| >5-10 ⁰ downslope | Forest | 35 m | 39 m | 85 m |
| >10-15 ⁰ downslope | Forest | 50 m | 49 m | 100 m |
| >0-5 ⁰ downslope | Remnant (low hazard) | 10 m | 14 m | 40 m |
| >5-10 ⁰ downslope | Remnant (low hazard) | 15 m | 18 m | 50 m |

¹ Slope most significantly influencing the fire behaviour of the site having regard to vegetation found. Slope classes are according to PBP.

² Predominant vegetation is identified, according to PBP and “Where a mix of vegetation types exist the type providing the greater hazard is said to be predominate”.

³ Assessment according to Table A2.4 of PBP

3.1 APZ maintenance plan

The following fuel management specifications will need to be considered in the provision of APZ for future development:

- No tree or tree canopy is to occur within 2 m of the dwelling roofline.
- The presence of a few shrubs or trees in the APZ is acceptable provided that they:
 - are well spread out and do not form a continuous canopy
 - are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period
 - are located far enough away from the building so that they will not ignite the building by direct flame contact or radiant heat emission.
- Any landscaping or plantings should preferably be local endemic mesic species or other low flammability species.

3.2 Staging of development for APZ

Staging of future development should give consideration to the provision of an APZ to manage any potential bushfire hazard within adjoining future development areas to ensure that future dwellings are not impacted by unnecessary construction standards. This could occur through the provision of temporary APZ for earlier stages which will be automatically extinguished once the land where the APZ operates is developed and the hazard is permanently removed.

3.3 Perimeter access within APZ

An APZ may require a perimeter road depending on the significance of the bushfire threat. The assessment of perimeter access is provided in the following **Section 5.3**.

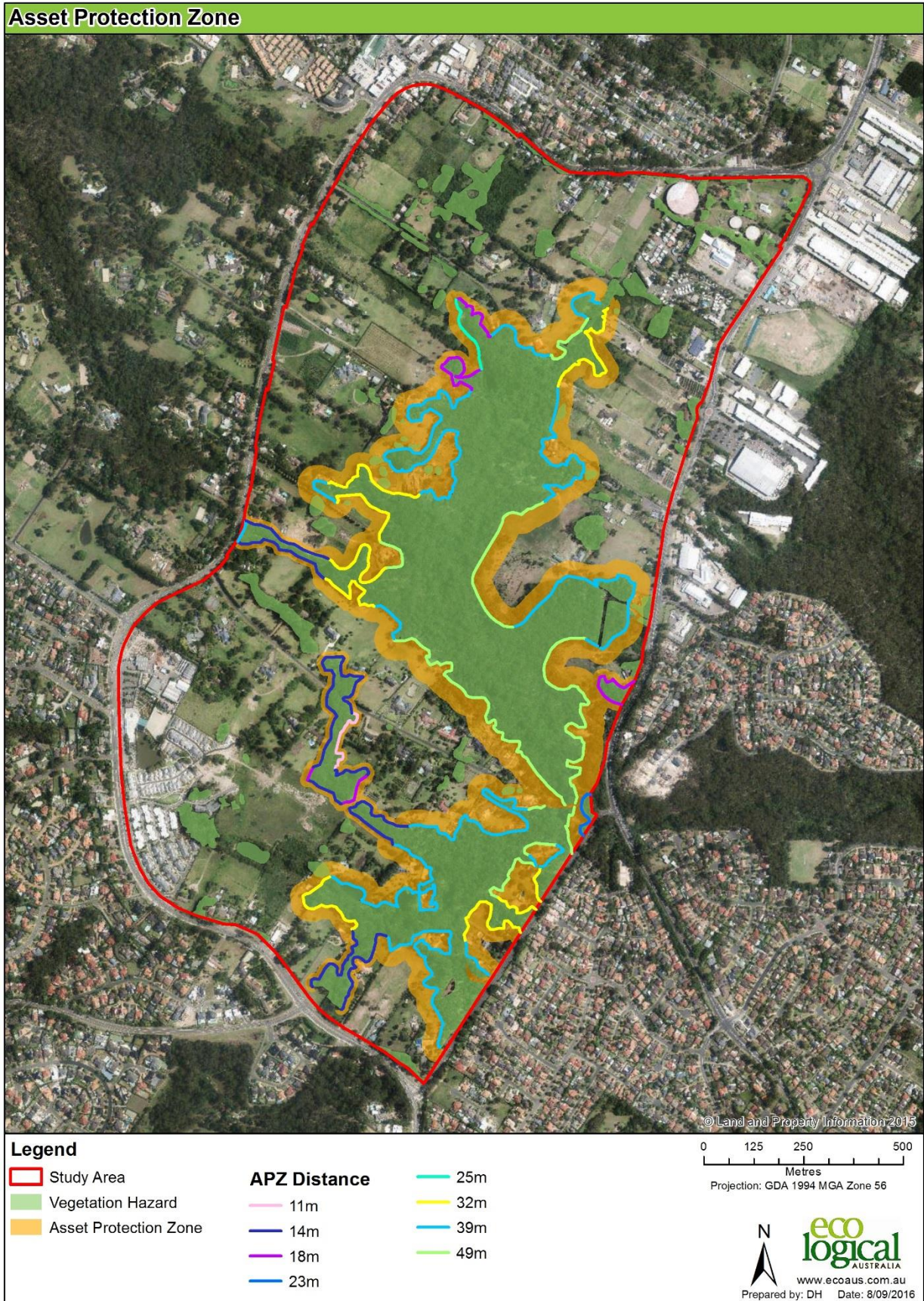


Figure 4: Asset protection zones

4 Construction standard

The application of building construction standards for bushfire protection under *AS 3959-2009 Construction of buildings in bushfire-prone areas* (Standards Australia 2009) is to be considered at the development application stage for individual dwellings and buildings. An assessment under AS 3959-2009 is not required at the rezoning or subdivision stages. The following is a brief introduction on AS 3959-2009.

AS 3959-2009 contains six Bushfire Attack Levels (BAL), each with a prescribed suite of design and construction specifications aimed at preventing ignition during the passing of a bushfire front. The BALs are outlined below:

- BAL-Low: The threat does not warrant application of construction standards. Developments with BAL-Low are generally not within bushfire prone land (greater than 100 m from bushland)
- BAL-12.5: Addresses background radiant heat at lower levels and ember attack
- BAL-19: Addresses mid-range radiant heat and ember attack
- BAL-29: Addresses high range radiant heat and ember attack
- BAL-40: Addresses extreme range of radiant heat and potential flame contact and ember attack
- BAL-FZ: Addresses construction within the flame zone. New subdivided lots are not permitted within the flame zone in NSW.

NSW has a minor variation to AS 3959-2009 which requires consideration in future development applications. The variation is contained within the document '*PBP Appendix 3 Addendum*' (RFS 2010).

5 Utilities and access

5.1 Water supply

Future lots will likely be serviced by reticulated water infrastructure suitable for fire fighting purposes. The furthest point from any future dwellings to a hydrant is to be less than 90 m (with a tanker parked in-line) in accordance with *Australian Standard 2419.1 – 2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (Standards Australia 2005). The reticulated water supply is to comply with the following acceptable solutions within Section 4.1.3 of PBP:

- Reticulated water supply to use a ring main system for areas with perimeter roads;
- Fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005;
- 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.

5.2 Gas and electrical supplies

In accordance with PBP, electricity should be underground wherever practicable. Where overhead electrical transmission lines are installed:

- Lines are to be installed with short pole spacing, unless crossing gullies
- No part of a tree should be closer to a powerline than the distance specified in the *ISSC 3 Guideline for Managing Vegetation Near Power Lines* (Industry Safety Steering Committee, 2005).

Any gas services are to be installed and maintained in accordance with *Australian Standard AS/NZS 1596 'The storage and handling of LP Gas'* (Standards Australia 2014).

5.3 Access

All bushfire prone areas should have an alternate access or egress option. This is usually achieved by providing more than one public road into and out of a precinct. The need for an alternative road and its location depends on the bushfire risk, the density of the development, and the chances of the road being cut by fire. The study area is surrounded by a network of public roads with potential for to link into this existing system at multiple points.

Future access arrangements within the study area are to be in accordance with the intent and principles of PBP regarding the provision of safe access and egress for both residents and fire fighters.

5.3.1 Safe access and egress

All bushfire prone areas should have an alternate access or egress option. An internal road system supporting future development is to comply with Section 4.1.3 (1) of PBP.

5.3.2 Road design and construction

Depending on the bushfire risk, all bushland interface areas containing an APZ for a significant bushfire hazard should feature a perimeter public road within the APZ. It is acceptable for some areas not to have a perimeter road or have a perimeter trail instead. These include areas of lower bushfire risk (such as grassland or low hazard remnants or areas where it may not be feasible to provide a continuous road due to the shape of the interface or the terrain. These areas should have some other access strategy such as regular access points and good access to a hydrant network.

Provision of a simple layout with perimeter roads and frequent direct access to the internal road system will provide sufficient access/egress in the case of an emergency. Public roads should provide safe operational access to structures and water supply. Perimeter roads will be required at APZ bushland interface locations where a significant bushfire hazard exists. However, minor drainage corridors and the setbacks provided within larger 'lifestyle lots' present a lower risk scenario and, therefore, may not require implementation of perimeter roads. Property access roads will also need to provide safe access for emergency services and provide protection to properties and occupants during a bushfire

The design details (PBP acceptable solutions) of public roads are shown in **Table 4**.

Table 4: Performance criteria for proposed public roads

| Intent may be achieved where: | Acceptable solutions |
|---|---|
| <ul style="list-style-type: none"> • firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources) | <ul style="list-style-type: none"> • public roads are two-wheel drive, all weather roads |
| <ul style="list-style-type: none"> • public road widths and design that allows safe access for firefighters while residents are evacuating an area | <ul style="list-style-type: none"> • 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) • the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas • traffic management devices are constructed to facilitate access by emergency services vehicles • public roads have a cross fall not exceeding 3 degrees • 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 • curves of roads (other than perimeter roads) are a minimum inner radius of six metres • 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 • there is a minimum vertical clearance to a height of four metres above the road at all times • 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 |
| <ul style="list-style-type: none"> • the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles | <ul style="list-style-type: none"> • public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression |
| <ul style="list-style-type: none"> • roads that are clearly sign posted (with easy distinguishable names) and buildings / properties that are clearly numbered | <ul style="list-style-type: none"> • 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 • 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 |
| <ul style="list-style-type: none"> • there is clear access to reticulated water supply | <ul style="list-style-type: none"> • 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 • 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 |
| <ul style="list-style-type: none"> • parking does not obstruct the minimum paved width | <ul style="list-style-type: none"> • public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road |

6 Recommendations and conclusion

Bushfire hazard has been assessed across the subject study area and found to be acceptable based on the ability to provide compliant APZ within the subject site. On the basis of this assessment, indicative asset protection zone requirements have been mapped across the proposed rezoning area.

A number of strategies have been provided in the form of planning controls such that the risk from bushfire can be minimised and future rezoning or development approval processes can be streamlined. Further, it has been found that development of the anticipated land uses within the subject study area, from a bushfire planning perspective, are considered suitable.

A number of strategies have been provided in this report to mitigate bushfire risk including:

- Ensuring adequate setback from bushfire prone vegetation (APZs);
- Integrating non-combustible infrastructure within APZs such as roads, easements and parking areas. An emphasis is placed on APZs within perimeter roads and front yard setbacks;
- Ensuring adequate access and egress from the study area through a well-designed road system;
- Considering the adequacy of water supply and the delivery of other services (gas and electricity);
- Providing temporary APZs during any staged development;
- Providing for effective and ongoing management of APZs; and
- Considering construction standards (AS3959) implications for future developments depending on development type.

The rezoning has been prepared based on the advice and constraints contained within this report. In relation to the furthering of the planning processes as they relate to the future uses of the study area, it is considered appropriate that more detailed assessment and consideration of the relevant bushfire protection strategies should be undertaken at the development application stage. This further assessment should include a more comprehensive review of the road and lot layout and subsequent planning controls, to ensure they are well designed in terms of bushfire protection outcomes.

6.1 Statement of capability

This bushfire assessment demonstrates that the subject land is capable of accommodating future development and associated land use with the appropriate bushfire protection measures and bushfire planning requirements prescribed by s.117 (2) Direction 4.4 – ‘*Planning for Bush Fire Protection*’ and PBP.

If further information is required, please contact Danielle Meggos on 8536 8605.

Yours sincerely,



Danielle Meggos
Senior Bushfire Planner
FPAA BPAD Certified Practitioner No. BPD-L2-37742



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eco
logical
AUSTRALIA



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

MUDGEES

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

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