Bulahdelah Bushfire Threat Assessment

Bulahdelah Residential Rezoning

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Disclaimers

It is believed that the implementation of the measures and recommendations forwarded within this report would contribute to the amelioration of the potential impact of any bushfire upon the subject lands assessed herein, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

Executive Summary

RPS Australia East Pty Ltd (RPS) has been commissioned by Great Lakes Council to prepare a Local Environmental Study (LES) for an area of land adjacent to the Bulahdelah Golf Course in the Great Lakes Council Local Government Area (LGA). The study area comprises Part of Lots 1 and 2 and the whole of Lot 3 DP 1120817 (formerly Lot 1 DP 120651 and Pt 5 DP 863307) and is located to the northeast of the town of Bulahdelah on the eastern side of the Pacific Highway (Figure 1-1). The Study Area is currently zoned 1(a) Rural under the Great Lakes Local Environmental Plan 1996 (LEP) and it is proposed to rezone parts of the site to residential.

This Bushfire Threat Assessment Report (BTA) has been prepared as part of the LES for the site and takes into consideration the surrounding bushfire threats. It is suitable for submission with a rezoning application and provides information on measures that will enable the development to comply with 'Planning for Bushfire Protection' (NSW RFS, 2006) (hereafter referred to as 'PBP').

This assessment aims to consider and assess the bushfire hazard and associated potential threats relevant to such a proposal, and to outline the minimum mitigative measures which would be required in accordance with the provisions of the *Environmental Planning and Assessment Amendment (Planning for Bush Fire Protection) Regulation 2007* and the *Rural Fires Amendment Regulation 2007 (RF Amendment Regulation, 2007)*.

This assessment has been undertaken in accordance with clause 46 of the RF Regulation 2007. This BTA also addresses the six key Bush Fire Protection Measures (BFPMs) in a development assessment context being:

- The provision of clear separation of buildings and bush fire hazards, in the from of fuel-reduced APZ (and their subsets inner protection areas and defendable space);
- Construction standards and design;
- Appropriate access standards for residents, fire-fighters, emergency workers and those involved in evacuation;
- Adequate water supply and pressure;
- Emergency management arrangements for fire protection and / or evacuation; and
- Suitable landscaping, to limit fire spreading to a building.

In summary, the following is recommended to enable the proposal to meet the relevant legislative requirements:

- APZs from 20 metres will be required for adequate protection from vegetation external to the subject site.
- APZs will need to be established between retained vegetation (unmanaged vegetation) within the site and any future residential dwelling as a result of the proposal.
- Perimeter roads should be established between adjacent vegetation and residential development. This perimeter road will serve as a physical barrier between vegetation and development and therefore, assist in reducing edge effects to retained vegetation.
- Any proposed development be linked to the existing mains pressure water supply and that suitable hydrants be clearly marked and provided for the purposes of bushfire protection. Fire

hydrant spacing, sizing and pressure should comply with AS2419.1, 2005.

- Roads should be constructed in accordance with Section 4.1.3 (1) of PBP 2006 as outlined in Section 7 of this report. Any lessening of these requirements will require a performance-based assessment to be undertaken with the future project applications for the subdivision of land.
- Any future dwelling within the subject land should have due regard to the specific considerations given in the BCA, which makes specific reference to the Australian Standard (AS3959 – 2009) construction of buildings in bushfire prone areas. Assessment in accordance with AS3959-2009 has shown that if the required APZs are implemented then any future dwelling will be able to comply with this standard.

Terms & Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419 -2005	Australian Standard – Fire Hydrant Installations
AS3959-2009	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BCA	Building Code of Australia
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPL Map	Bush Fire Prone Land Map
BPMs	Bush Fire Protection Measures
DECC	NSW Department of Environment and Climate Change
DoP	NSW Department of Planning
EPA Act	*NSW Environmental Planning and Assessment Act 1979*
FDI	Fire Danger Index
FMP	Fuel Management Plan
GLC	Great Lakes Council
ha	Hectare
IPA	Inner Protection Area
LGA	Local Government Area
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection 2006
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation
RPS	RPS Group

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1 Introduction

RPS Australia East Pty Ltd (RPS) has been commissioned by Great Lakes Council to prepare a Local Environmental Study (LES) for an area of land adjacent to the Bulahdelah Golf Course in the Great Lakes Council Local Government Area (LGA). The LES will be used to inform the preparation of a draft Local Environmental Plan (dLEP) and will form part of the public exhibition material. This BTA forms part of the strategic and statutory assessment of LES necessary to determine the suitability of the site for residential rezoning and land use.

The study area comprises Part of Lots 1 and 2 and the whole of Lot 3 DP 1120817 (formerly Lot 1 DP 120651 and Pt 5 DP 863307) and is located to the northeast of the town of Bulahdelah on the eastern side of the Pacific Highway (Figure 1-1). The study area is currently zoned 1(a) Rural and residential development is not permissible under the current zone. A Development Application (DA 799/2007) was approved for a brewery and tourist resort on the site under the existing zoning 1(a) Rural. It is proposed that any future residential subdivision of the site be developed in association with a previously approved submission for a brewery and resort development permissible under the existing zoning 1(a) Rural (DA 799/2007).

This assessment aims to consider and assess the bushfire hazard and associated potential threats relevant to future residential development, and to outline the minimum mitigative measures which would be required in accordance with the provisions of the *Environmental Planning And Assessment Amendment (Planning for Bushfire Protection) Regulation 2007* and the *Rural Fires Amendment Regulation 2007 (RF Amendment Regulation 2007)*. This BTA aims to:

- Identify the overall bushfire threats;
- Assess the capability of the site to provide a safe development;
- Review the potential to carry out hazard management over the subject site taking into account environmental / ecological constraints;
- Provide information on measures that will enable development to comply with Planning for Bushfire (PBP) (NSW RFS, 2006); and
- Provide recommendations as to the suitability/compatibility of future zoning of the subject land based on the identified bushfire threat.

1.1 Site Particulars

Locality – The study area is located northeast of the town of Bulahdelah, on the eastern side of the Pacific Highway, adjacent to the Bulahdelah Golf Course.

LGA – Great Lakes Council.

Titles – Part of Lot 1, Part of Lot 2 and all of Lot 3 in DP 1120817.

Area – The site comprises an area of approximately 200ha.

Zoning – Currently zoned 1(a) Rural under the Great Lakes LEP 1996.

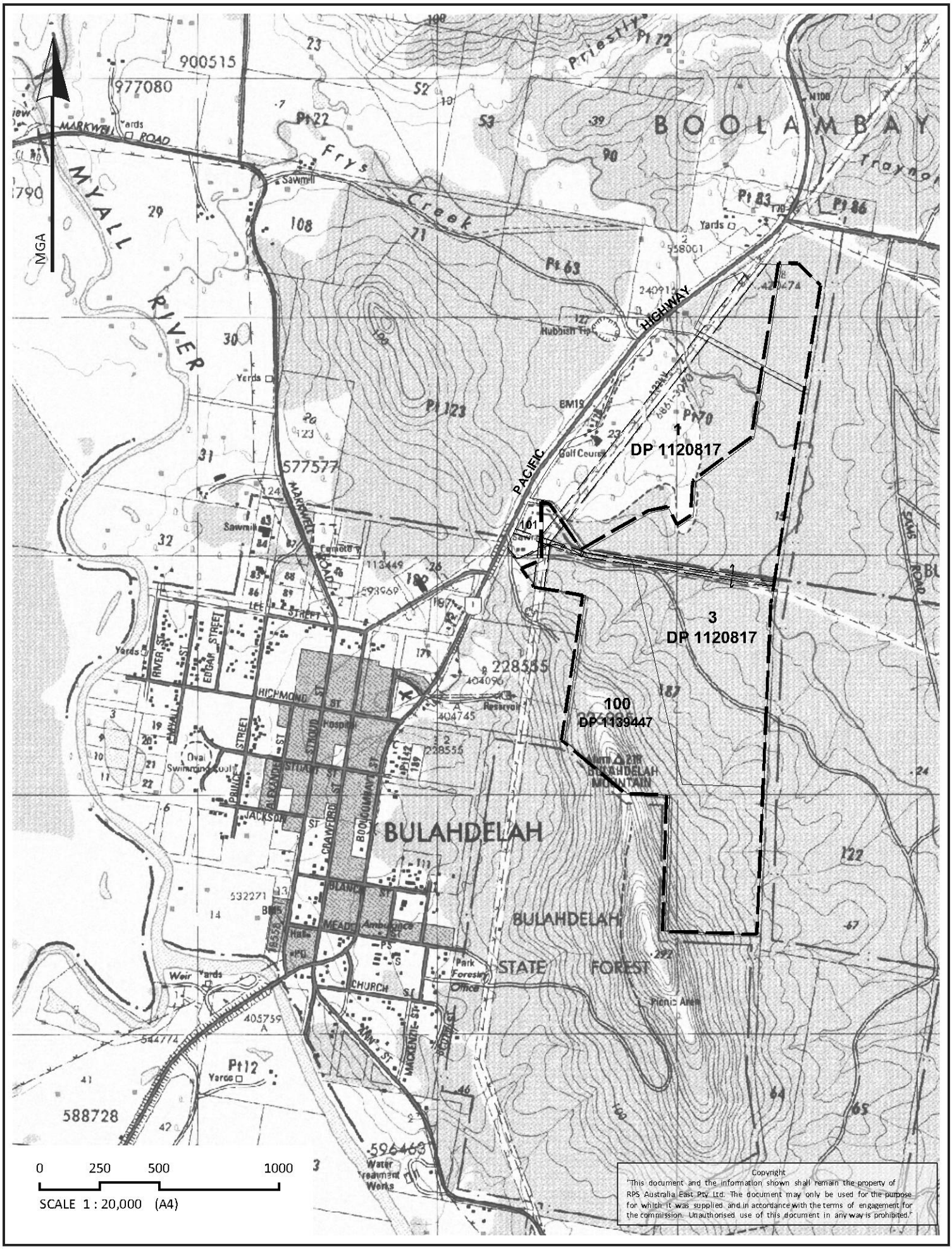
Current Land Use – The study area contains some rural infrastructure, including sheds and disused aquaculture ponds, with the remainder of the land being vacant bushland. GLC has issued an approval for a brewery and resort development on the site. Both of these uses are permissible with consent under the current zone.

Topography – The site is located within a terrain of hillcrests and ridges that run in a northwest to southeast orientation.

Frys Creek, a tributary of the Myall River, flows across the Study Area at the base of the northeast facing slopes of Alum Mountain. The basal slopes of the Bulahdelah (Alum) Mountain Ridge are relatively flat (GLC, 1996). Frys Creek is a 3rd order stream, which flows into the Myall River. The Frys Creek valley floor is relatively flat, with numerous small drainage depressions that drain water to Frys Creek. There are low and ill-defined spurs and slopes in the mid and upper slope areas.

Bushfire Prone Land Map Zoning & FDI – The Site has been mapped as Category 1 Vegetation, Category 2 Vegetation, Cleared Land and a Bushfire Vegetation Buffer (100 and 30m) on the GLC Bush Fire Prone Land Map (BFPLM).

Forest Danger Index – 80



TITLE: ANNEXURE A LOCALITY PLAN	LOCATION: BULAHDELAH	DATUM: N/A	DATE: 19th AUGUST 2011	CAD REF:	J:\JOB\\103163-2B
		PROJECTION: MGA ZONE 56 (GDA 94)	PURPOSE: .	VERSION (PLAN BY):	A A4 (RD-NW)

CLIENT:
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1.2 Description of Proposal

The study area is currently zoned 1(a) Rural and residential development is not permissible under the current zone. The proposal is to prepare a Local Environmental Study (LES) to determine the suitability of rezoning the site, or parts of it, for residential use. The LES would then inform the preparation of a draft Local Environmental Plan (LEP) Amendment to appropriately rezone the site.

1.3 Scope and Purpose

The scope and purpose of this BTA is to review the overall bushfire threat to the subject land and to review the capability of the subject land to provide a safe environment. This assessment will include information on ability of the subject land to comply with the requirements of PBP (RFS, 2006). This will be achieved by providing/undertaking:

- An assessment of all vegetation on and adjacent to the subject land within 140 metres from all elevations from the development estate boundary;
- An assessment of topography (slope) on and adjacent to the subject property to a distance of 140 metres from the development estate boundary;
- Adequacy of public roads in the vicinity to handle increased traffic in a bushfire emergency;
- Recommendations for appropriate setback (APZ) distances from the identified bushfire hazards; and
- Information on water supply for fire fighting purposes.

1.4 Objectives of Assessment

This assessment has been undertaken in accordance with Clause 46 of the RF Regulation 2007. This BTA provides an assessment of the bushfire requirements for future urban development and provides recommendations on the provisions of Bush Fire Protection Measures (BFPMs). There are six key BFPMs in a development assessment context being:

1. The provision of clear separation of buildings and bushfire hazards, in the form of fuel-reduced Asset Protection Zones (and their components being Inner Protection Areas and Outer Protection Areas);

2. Construction standards and design;

3. Appropriate access standards for residents, fire-fighters, emergency workers and those involved in evacuation;

4. Adequate water supply and pressure;

5. Emergency management arrangements for fire protection and / or evacuation; and

6. Suitable landscaping to limit fire spreading to a building.

This assessment will address the six key BFPMs and provide recommendations to the suitability/compatibility of future zoning of the subject land based on the identified bushfire threat.

2 Methodology

2.1 Vegetation Assessment

Vegetation surveys and vegetation mapping carried out on the study area have been undertaken as follows:

- Aerial Photograph Interpretation to map vegetation cover and extent.
- Confirmation of the vegetation assemblage typology present via a site inspection.

2.2 Slope Assessment

Slope assessment has been undertaken as follows:

- Aerial Photograph Interpretation in conjunction with analysis of electronic contour maps with a contour interval of 10m.

3 Vegetation Assessment

The vegetation in and around the subject land, to a distance of 140m, has been assessed in accordance with PBP 2006. This assessment has been made via a combination of aerial photo interpretation.

The vegetation communities have been classified for bushfire purposes into structure and formation using the system adopted by Keith (2004) and using Table A2.1 within PBP (RFS, 2006). These communities found onsite are contained in Table 3-1 Vegetation Assessment. Refer to Figure 3-1 for a Vegetation Map.

Table 3-1 Vegetation Assessment

Direction from Site	Vegetation Type
North	Open Forest
East	Open Forest
South	Open Forest
West	Managed Land (Golf Course) and Open Forest
Within site	Open Forest

Figure 3-1: Vegetation Classification

4 Effective Slope Assessment

In accordance with PBP (RFS 2006), an assessment of the slope affecting the bushfire behaviour was undertaken for a distance of 100m from the edge of the site boundary in the direction of the bushfire hazard.

The slopes leading away from the site have been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site.

The slope of vegetation surrounding the site to 140m is documented in Table 4 -1 below.

Table 4-1: Slope Assessment

Direction from Site	Vegetation Type	Slope Classes
North	Open Forest	Upslope
East	Open Forest	Upslope
South	Open Forest	Upslope
West	Open Forest	Upslope
Within site	Open Forest	Slopes vary throughout the site depending on the location of future development. All possible slopes have been considered in this assessment.

5 Determining Appropriate Setbacks

5.1 Asset Protection Zones

An Asset Protection Zone (APZ) is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property. The required width of the APZ varies with slope and the type of hazard. An APZ can consist of both an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

5.2 Inner Protection Area

The IPA extends from the edge of the OPA to the development. The IPA aims to ensure that the presence of fuels which could contribute to a fire event / intensity, are minimised close to the development. The performance of the IPA must be such that:

- There is minimal fine fuel at ground level which could be set alight by a bushfire; and
- Any vegetation in the IPA does not provide a path for the transfer of fire to the development – that is, the fuels are discontinuous.

The presence of a few shrubs or trees in the IPA is acceptable provided that they:

- Do not touch or overhang any buildings;
- 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; and
- Are located far enough away from any dwelling so that they will not ignite the dwelling by direct flame contact or radiant heat emission.

5.3 Outer Protection Area

The OPA is located adjacent to the hazard. Within the OPA any trees and shrubs should be maintained in a manner such that the vegetation is not continuous. Fine fuel loadings should be kept to a level where the fire intensity expected will not impact on adjacent developments.

5.4 Determining Appropriate Setbacks

The site lies within the GLC LGA and therefore is assessed under a FDI rating of 80. In accordance with Table A2.6 within PBP (RFS, 2006), the appropriate width setbacks for the proposed site based on the topography and the vegetation present in and around the site has been determined and are displayed in Table 5-1 and Table 5-2 below . Refer to Table 5-1 below for APZ widths from External Hazards. Table 5-2 illustrates the position of the required APZ's within the subject site from retained vegetation within the site.

Table 5-1 APZ Widths from External Hazards

Direction from site boundary	Vegetation Type	Slope	APZ *required in accordance with PBP	APZ Components
North	Open Forest	Upslope	20m APZ	10m IPA and 10m OPA
East	Open Forest	Upslope	20m APZ	10m IPA and 10m OPA
South	Open Forest	Upslope	20m APZ	10m IPA and 10m OPA
West	Open Forest	Upslope	20m APZ	10m IPA and 10m OPA

*Any lessening of the above APZs would need a Performance Based Assessment to be undertaken.

It is difficult to determine APZs from retained vegetation within the site without a concept plan due to varied slopes and vegetation throughout the site, however Table 5-2 provides the deemed to satisfy APZs based on retained vegetation within the site being Open Forest and Open Forest occurring on all possible slopes throughout the site.

Table 5-2 APZ widths from Retained Vegetation within the Site

Vegetation Type	Slope	APZ *required in accordance with PBP	APZ Components
Open Forest	Upslope	20m APZ	10m IPA and 10m OPA
Open Forest	Downslope 0 -5 degrees	20m APZ	15m IPA and 5m OPA
Open Forest	Downslope 5-10 degrees	30m APZ	15m IPA and 15m OPA
Open Forest	Downslope 10 – 15 degrees	40m APZ	20m IPA and 20m OPA
Open Forest	Downslope 15 – 18 degrees	45m APZ	25m IPA and 20m OPA

*Any lessening of the above APZs would need a Performance Based Assessment to be undertaken.

Figure 5-1: Asset Protection Zones based on External Hazards

6 Construction Standards and Design

The design of any future residential building within the site should have due regard to the specific considerations given within the Building Code of Australia (BCA), which makes specific reference to Australian Standard 3959 (AS 3959-2009) 'Construction of Buildings in Bushfire-prone Areas'. This standard aims to provide ways to improve the design and construction of a building by minimising the likelihood of the consequences of bushfire attack.

Any future dwelling within the site will need to comply with AS3959-2009. This will be assessed for any development application for a dwelling within the site under Section 79BA of the EP&A Act. If the required APZs as detailed in section 5.4 are implemented for any future residential development, all future dwellings will comply with AS3959-2009.

7 ACCESS

The site is assessed from the Pacific Highway, which provides two way access to and from the site. The proposed upgrades to the Highway as a result of the Bulahdelah Bypass will also provide two way access to and from the site. There is an alternative access options via the existing crown road reserve that continues into the State Forest to the east of the site. The crown road reserve follows the existing overhead power lines and is used for the maintenance of those lines. In addition there are informal tracks that connect with the Buladelah Golf Course and provide for emergency egress if necessary.

PBP (RFS, 2006) recommends a perimeter road be designed for any future residential development. A perimeter road forms part of the APZ and will provide a separation between the building and the boundary of the bush fire hazard.

Any **perimeter road** should be fully sealed and have a minimum road reserve width of 8m minimum kerb to kerb with the following design specifications:

- roads should be two wheel drive, all weather roads;
- roads should be two-way: i.e. at least two traffic lane widths with shoulders on each side, allowing traffic to pass in opposite directions;
- roads should be through roads where possible, any dead end roads should not be more than 200m in length with a 12m radius turning circle and clearly sign posted as such;
- the capacity of road surfaces and bridges should be sufficient to carry fully loaded fire fighting vehicles (approximately 28 tonnes or 8 tonnes per axle); and
- roads should be clearly sign posted and buildings clearly numbered.

According to PBP (2006), the design specifications for **internal public road** require that roads:

- be two-wheel drive all weather roads;
- non perimeter roads comply with Table 6-1 (below) – Road widths for Category 1 Tanker;

Table 7-1: Minimum widths for fire fighting access of non-perimeter public roads

Curve radius (inside edge metres)	Swept Path (metres width)	Single land (metres width)	Two way (metres width)
<40	3.5	4.5	8.0
40 – 69	3.0	3.9	7.5
70 – 100	2.7	3.6	6.9
>100	2.5	3.5	6.5

- the perimeter road is linked to the internal road system at an interval of no greater than 500m in urban areas;
- not be hindered by an overuse of traffic calming devices such as speed humps and chicanes;
- public roads do not have a cross fall not exceeding 3 degrees;
- all roads are through roads, but if unavoidable then dead ends should be not more than 200m in length, incorporate a minimum 12m turning circle and should be clearly sign posted as dead ends;
- curves of roads (other than perimeter roads) are a minimum inner radius of 6 metres and minimal in number, to allow for rapid access and egress;
- the minimum distance between inner and outer curves is 6m;
- maximum grade for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees of other gradient specified by road design standards, whichever is the lesser gradient;
- there is a minimum vertical clearance to a height of 4m above the road at all times;
- the capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating;
- public roads between 6.5m and 8m wide are no parking on one side with the services (hydrants) located on the side to ensure accessibility to reticulated water for suppression;
- one way public access roads are no less than 3.5m wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression;
- parking bays are a minimum of 2.6m wide from kerb edge to road pavement. No services or hydrants are located within the parking bays; and
- public roads directly interfacing the bush fire hazard vegetation should provide roll top kerbing to the hazard side of the road.

According to PBP (2006), the design specifications for **property access roads** require that roads:

- where possible at least one alternative property access is provided for individual dwellings (or group of dwellings) that are located more than 200m from a public through road;
- a minimum carriageway width of four metres for rural-residential areas, rural landholdings or urban area with a distance greater than 70 metres from the nearest hydrant point to the most external part of the proposed building;

Note: No specific access requirements apply in a urban area where a 70m unobstructed path can be demonstrated between the most distant 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 fighting vehicles (i.e. a hydrant or water supply).

- a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches;
- on forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20 metres long by two metres wide;
- internal roads for rural properties have 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 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; and
- access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way. In the case of a right of way, unconstrained access to the NSW Rural Fire Service must be provided for at all times.

The above road specifications are the acceptable solutions as detailed within PBP (RFS, 2006). Deviations from the above acceptable solutions for access may be considered (depending on the situation) through a performance-based assessment.

8 Water Supply

Associated with any kind of development upon the land, it is expected that water mains will be extended into the subject land. Provision of access to this supply should be provided for fire-crews in the form of readily accessible and easily located fire hydrants. Fire hydrant spacing, sizing and pressure should 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 to be 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

9 FIRE FIGHTING CAPABILITY

Any future urban development of the land will need to provide firefighters easy access to structures, adequate turning circles, a safe retreat for firefighters and a clear control line from which to conduct hazard reduction

10 Conclusion and Recommendations

It is clear from this investigation and assessment that the study area, in part, constitutes BFPL. Therefore the proposed development will have to be carried out in accordance with the specifications contained within PBP (RFS 2006) as assessed and presented within this report.

If the recommendations contained within this report are duly considered and incorporated, it is considered that the fire hazard present is containable to a level necessary to provide an adequate level of protection to life and property on the site.

In summary, the following is recommended to enable the proposal to meet the relevant legislative requirements:

- APZs from 20 metres will be required for adequate protection from vegetation external to the subject site.
- APZs will need to be established between any future residential dwelling and any retained vegetation (unmanaged) within the site.
- Perimeter roads should be established between adjacent vegetation and residential development. This perimeter road will serve as a physical barrier between vegetation and development and therefore, assist in reducing edge effects to retained vegetation.
- Any proposed development be linked to the existing mains pressure water supply and that suitable hydrants be clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure should comply with AS2419.1, 2005.
- Roads should be constructed in accordance with Section 4.1.3 (1), PBP 2006 as outlined in Section 7 of this report. Any lessening of these requirements will require a performance-based assessment to be undertaken with the future project applications for the subdivision of land.
- Any future dwelling within the subject land should have due regard to the specific considerations given in the BCA, which makes specific reference to the Australian Standard (AS3959 – 2009) construction of buildings in bushfire prone areas. Assessment in accordance with AS3959-1999 has shown that if the required APZs are implemented then any future dwelling will be able to comply with this standard.

11 Bibliography

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Appendix 1

Site Plans