Bushfire Protection Assessment (of new lot layout)

Proposed subdivision – 41 Warriewood Road, Warriewood

Prepared for
Woolwich Pty Ltd

28 April 2017

DOCUMENT TRACKING

Item	Detail
Project Name	Bushfire Protection Assessment: Proposed subdivision – 41 Warriewood Road, Warriewood
Project Number	16SYD_4801
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Reviewed by	Rod Rose
Approved by	Rod Rose (FPAA BPAD Certified Practitioner No. BPAD1940-L3)
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1 Property and proposal

Street or property name:	41 Warriewood Road		
Suburb town or locality:	Warriewood	**Postcode:**	2102
Lot and DP:	Lot 32 DP 5464/C		
Local Government Area:	Northern Beaches Council		
Type of area:	Urban		
Type of development:	Residential subdivision		

1.1 Description of proposal

Woolwich Pty Ltd commissioned Eco Logical Australia Pty Ltd (ELA) to prepare a bushfire protection assessment (BPA) for a proposed subdivision at 41 Warriewood Road, Warriewood (hereafter referred to as the subject land).

The proposed development is to subdivide the existing rural residential lot into 29 residential lots with associated private road and infrastructure.

1.2 Location and description of sub ect land

The subject land is located within the northern Sydney suburb of Warriewood approximately 26 km north of the Sydney Central Business District and has been mapped as Bush Fire Prone Land by the Northern Beaches Council as shown in **Figure 2**. The proposed subdivision includes residential subdivision and two roads in the northern portion of the subject land, and the construction of a detention basin to the south-east of the subdivision within a vegetated area as shown in **Figure 2**.

Figure 3 shows the subject land and the location of the proposed development in relation to the nearest bush fire prone vegetation.

1.3 Previous proposal

A previous Development Application and associated Bushfire Protection Assessment were submitted to the Northern Beaches Council in late 2016 that proposed a total of 32 lots. Correspondence from NSW RFS dated 2 December 2016 (ref D16/3779) identified two issues requiring further assessment being:

1. *Further details justifying the down grading of the bush fire hazard to a low hazard, given that the area of vegetation exceeds 1 hectare and provides a potential fire run directly towards the development exceeding 50 metres.*
2. *Further details demonstrating that a suitable building envelope and appropriate asset protection zones as required by 'Planning for Bush Fire Protection 2006' can be achieved within the proposed lots located to the south of the Lorikeet Grove road extension.*

In response to the above items, the BPA has been amended with the vegetation classified as 'Forested wetlands' in accordance with PBP and a performance solution developed to determine the appropriate APZ dimension to achieve a maximum of BAL-29 to all lots north of Lorikeet Drive. The proposed design was also modified to remove all residential lots south of Lorikeet Drive.

Figure 1: Northern Beaches Bush Fire Prone Land Map

Figure 2: Location of Sub ect Land

Figure 3: Asset Protection Zone

2 Bushfire threat assessment

The subject land is identified as bush fire prone land by The Northern Beaches Council as shown in **Figure 1**. The following assessment is prepared in accordance with Section 100B of the *Rural Fires Act 1997* and *Planning for Bush Fire Protection 2006* (RFS 2006), herein referred to as PBP.

2.1 Vegetation types

In accord with PBP, the predominant vegetation class has been assessed within the proposed lots and calculated for a distance of at least 140 m out from the proposed development. The predominant vegetation and effective slope assessments are shown **Table 1**.

The north-east portion of the subject land has cleared land associated with the existing dwelling and adjustment area for animals. The southern portion of the subject land contains remnant vegetation identified as a low quality 'Coastal Flats Swamp Mahogany Forest' (CFSMF) (OEH 2013) associated with Narrabeen Creek and infested with invasive weed and exotic species.

In its natural form 'Coastal Flats Swamp Mahogany Forest' has an open-forest to woodland structure depending on local conditions. In this area the structure is consistent with an open forest with a dense understorey and reflects the Coastal Swamp Forest class of Keith (2004) and is considered as 'forested wetlands' vegetation in accordance with PBP. This remnant vegetation is fragmented and small in size as a result of surrounding land uses. As future residential development occurs in this area (e.g. subdivisions) the bushfire hazard will be reduced further. The low risk posed by this remnant vegetation is reflected on the Northern Beaches Bush Fire Prone Land Map as shown in **Figure 1**. Nevertheless, a conservative approach is adopted and the vegetation is categorised as 'forested wetlands' within PBP.

To the north, east and west are existing residential lots and suburban infrastructure which is managed land.

2.2 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 proposed development where the vegetation was found. This assessment was made with 2 m contours and confirmed during a site inspection.

The slope under the bushfire hazard within the subject land is 1 degree downslope.

3 Asset protection zones and construction

Table A2.4 of PBP has been used to indicate the acceptable solution APZ dimension for the development using the vegetation and slope data identified in **Section 2**. The proposed APZ has been determined using an alternate solution that achieves a maximum of BAL-29 in accordance with AS 3959-2009 and is tabulated below and shown in **Figure 3**.

The NBC Bushfire Attack Assessor was used to determine the APZ and construction requirements in accordance with Appendix B: Detailed Methodology for Determining the Bushfire Attack Level (BAL) – Method 2 of *Australian Standard 3959: Construction of buildings in bushfire-prone areas' 2009.* The results of this assessment are shown in **Appendix A**.

As outlined in CB3 of the Appendix B of AS 3959-2009 the vegetation classification system and associated fuel loads in AS 3959 are based on a national system. Vegetation classification systems specific to the relevant State or accepted as an alternate to the national system may be used. In NSW a system has been established by Keith (2004) and the fuel loads identified in PBP are appropriate for this purpose. This alternate solution therefore utilises the fuel loadings for a forested wetland in accordance with Table A2.1 of PBP.

The identified fuel loads for 'Forested Wetland' being a Surface fuel load of 15 t/ha and the Overall fuel load being 20 t/ha is reinforced as appropriate based upon recent research by the University of Wollongong (Penny Watson).

A Vegetation Management Plan (VMP) is to be prepared as part of the proposed development for the vegetation that will remain in situ.

Table 1: Threat assessment APZ and category of bushfire attack

Direction from envelope	Slope[1]	Vegetation[2]	PBP Acceptable Solution APZ[3]	Proposed APZ[4]	AS 3959-2009 Construction Standard[4]	Comments
South-west	1 degree downslope	Forested wetlands	20 m	≥17 m	BAL-29	APZ provided within subject land
All other directions	Managed Land					

[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

[4] Assessment according to Method 2 of AS 3959-2009 using the NBC Bushfire Attack Assessor to achieve a maximum of BAL-29

3.1 APZ maintenance plan

Vegetation clearing undertaken during the bulk earthworks phase will provide the proposed APZ identified in **Table 1**. The following fuel management specifications (Inner Protection Area standard) will be applied to the APZ and any landscaping within the subject land:

- 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 Construction standard

The building construction standard is based on the Bushfire Attack Level (BAL) determined in accordance with Method 2 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 managed separation distance between the development and the bushfire hazard.

Lot specific BALs will be determined when development applications for individual dwellings are lodged. The applicable BAL will be dependent on the extent of surrounding development that has occurred at the time that a development application for a dwelling is lodged. A maximum BAL rating of BAL-29 is achievable using Method 2 of AS 3959-2009 within the subject land.

Utilities and access

4.1 Water supply

The furthest point from any dwelling to a hydrant will be less than 90 m in accordance with *Australian Standard AS 2419.1 'Fire hydrant installations – System design installation and commissioning'* (Standards Australia 2005).

The reticulated water supply is to also comply with the following acceptable solutions within Section 4.1.3 of PBP:

- Reticulated water supply uses a ring main system for areas with perimeter roads;
- 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.

4.2 Gas and electrical supplies

The electricity supply to the proposed development is to be located underground. This complies with PBP.

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).

4.3 Access

.3.1 Public roads

The proposed public road network will link in with the existing public roads and future roads to be constructed in adjoining subdivisions. Temporary dead end roads will be provided until adjoining stages of development are completed, and will incorporate temporary turning circles in accordance with the design criteria. The proposed roads are unlikely to become blocked by a bushfire from the low risk bushfire vegetation to the south-west.

The perimeter road (Lorikeet Drive) is continued from adjoining developments that have been previously approved with a kerb to kerb width of 7.65m within a road reserve of 16 m. Although this dimension (7.65 m) is slightly under the 8 m recommended by PBP, the road provides for two way access of at least two traffic lane widths and is considered compliant with the PBP access performance criteria for the adjoining low risk bushfire hazard.

.3.2 Access and egress

Future dwellings within the proposed subdivision will be accessed via standard residential driveways. Given the urban nature of the development these residential driveways will not need to comply with any specific bushfire access design requirements.

Table 2: Performance criteria for proposed public roads (PBP p. 23)

Intent may be achieved where:	Acceptable solutions	Complies
• 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)	Perimeter road provided with width appropriate to low risk
	• the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas	Can comply
	• 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	Temporary dead ends with turning circles proposed
	• 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	Can comply

Intent may be achieved where:	Acceptable solutions	Complies
	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	Can comply
	• 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
• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles	• 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
• roads that are clearly sign posted (with easy distinguishable names) and buildings / properties that are clearly numbered	• 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
	• 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	Can comply
• there is clear access to reticulated water supply	• 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	Can comply
	• 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	Can comply
• parking does not obstruct the minimum paved width	• public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road	Can comply

5 Assessment of environmental issues

A Flora and Fauna Assessment (ELA, 2017) has been prepared to support the development. The FFA determined that there were no threatened species, or populations are known to occur in the subject land. One threatened ecological community, Swamp Sclerophyll Forest on Coastal Floodplains (listed as endangered under the TSC Act) was identified within the study area and an assessment of significance was conducted for this community. As a precautionary measure, assessments of significance were also conducted for several microchiropteran bat species that have potential to occur within the study area. The assessments of significance concluded that a significant impact is not likely to occur as a result of the proposed subdivision, and as such, a Species Impact Statement or referral to the Commonwealth are not required.

At the time of assessment, there were no known Aboriginal relics that will affect or be affected by the bushfire protection proposals in this report.

The Northern Beaches Council is the determining authority for this subdivision; they will assess more thoroughly any potential environmental and heritage issues.

Recommendations and conclusion

The proposal consists of a residential subdivision located within proximity of a relatively small isolated patch of Forested Wetland. A well accepted alternate solution has been used to identify the APZ requirements utilising Method 2 of AS 3959-2009; and that assessment approach confirms that the development satisfies the standards of PBP for a residential development as outlined below:

- Asset protection zones are provided as outlined in **Section 3** of this report;
- Water supply is to be installed in accordance with the requirements outlined in **Section**
- Electrical services are to be underground (**Section**);
- Any gas services are to be installed and maintained in accordance with AS/NZS 1596:2014 (**Section**); and
- Public roads are to comply with the requirements outlined in **Section** of this report.

In the author's professional opinion, the bushfire protection requirements listed in this assessment provide an adequate standard of bushfire protection for the proposed development, a standard that is consistent with *Planning for Bush Fire Protection 2006* and appropriate for the issue of a Bush Fire Safety Authority.

If further information is required, please contact Bruce Horkings on 02 4443 5555.

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BPAD Bushfire Planning & Design Accredited Practitioner Level 3

References

Eco Logical Australia. 2017. *41 Warriewood Road, Warriewood – Flora and Fauna Assessment*. Prepared for Woolwich Pty Ltd.

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Photographs

Photo 1: Bushfire ha ard as seen from cleared area looking west

Photo 2: Bushfire ha ard as seen from cleared area looking south

Appendix A – NBC Bushfire Attack Assessment Report

NBC Bushfire Attack Assessment Report V2.1

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 3/03/2017 **Assessment Date:** 2/03/2017

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Site Street Address: 41 Warriewood Road, Warriewood

Assessor: Bruce Horkings; Ecological Australia

Local Government Area: Pittwater **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: South

Vegetation Information

Vegetation Type:	Forest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	1 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	15	**Overall Fuel Load(t/ha):**	20

Site Information

Site Slope	1 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	17

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K)**	1090

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	6.42
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	19929
Radiant Heat(kW/m2):	27.97	**Flame Angle (degrees):**	64
Flame Length(m):	14.94	**Maximum View Factor:**	0.432
Rate Of Spread (km/h):	1.93	**Inner Protection Area(m):**	17
Transmissivity:	0.851	**Outer Protection Area(m):**	0

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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