



CLARKE DOWDLE & ASSOCIATES
DEVELOPMENT CONSULTANTS
SURVEYORS • PLANNERS • ECOLOGISTS • BUSHFIRE CONSULTANTS

BUSHFIRE THREAT & PROTECTION ASSESSMENT



For the Proposed Residential Development at
293 Matcham Road,
Matcham, NSW
(LOT 1 IN DP 561056)
March 2018

PO Box 3122, Umina Beach NSW 2257
Ph: (02) 4344 3553 Fax: (02) 4344 6636
EMAIL: admin@cdasurveys.com.au
WEBSITE: www.cdasurveys.com.au



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DOCUMENT TRACKING

Project Location	293 Matcham Road, Matcham
Date	16/03/18
Prepared by	Ashley Dowdle
Reviewed by	Kristan Dowdle
Approved by	Kristan Dowdle
Status	FINAL
Version	4

1.0 INTRODUCTION

This Bushfire Threat & Protection Assessment is required as the site falls within a Bushfire Prone Area as deemed by Central Coast Council. The proposal development relates to the construction of a new single residential dwelling within a vacant allotment. The development falls under Section 79BA of the *Environmental Planning and Assessment Act* which states that the consent authority cannot grant consent to any development which is in a bushfire prone area unless the consent authority:

- (a) *is satisfied that the development conforms to the specifications and requirements of the document entitled Planning for Bush Fire Protection, 2006, prepared by the NSW Rural Fire Service in co-operation with the Department of Planning (or, if another document is prescribed by the regulations for the purposes of this paragraph, that document) that are relevant to the development (the relevant specifications and requirements), or*
- (b) *has been provided with a certificate by a person who is recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements.*

This report will form the basis for providing an assessment of the bushfire protection requirements for the development and will provide recommendations on the provision of Asset Protection Zones, accessibility, water supplies and construction standards of future developments within the site.

1.1 Proposed Development

The subject property is a large irregular shaped allotment which is currently vacant and contains unmanaged vegetation throughout. The proposal will involve the construction of a dwelling on the southern portions of the allotment. The dwelling will be provided access via an existing access road of which will be upgraded to comply with PBP. Figure 1 provides a site plan of the proposal.

The development adjacent to the house to the east includes retaining walls to create turf areas and a pool. Not buildings are proposed within this area.

The final development plans will accompany the relevant development application for the proposed development.

2.0 OBJECTIVES AND SCOPE OF THE ASSESSMENT

The primary objectives of this report are to:

- Outline the degree of bushfire hazard currently affecting the site;
- Outline the degree to which any identified bushfire hazard can be managed;
- Indicate the potential of the site to provide a safe development;
- Provide recommendations for the provision of Asset Protection Zones and Construction standards;
- Review the accessibility of the site; and
- Identify any pre-existing bushfire protective measures such as roads and creeks.

In order to achieve the above objectives the following work was conducted:

- Compilation and review of site information including a site detail plan, topographic map, aerial photograph and site photographs;
- Review of appropriate guidelines including Australian Standard AS3959-2009 '*Construction of buildings in Bushfire Prone Areas*' and *Planning for Bushfire Protection, 2006* (PBP);
- Inspection of the proposed development site and surrounding areas to assess the topography, slopes, aspect, drainage vegetation and adjoining land usage;
- Identification of any existing bushfire protection advantages such as roads, creeks and sporting ovals; and
- Visual appraisal of bushfire hazard and risk to the site.

3.0 LEGISLATION

This report has been prepared in accordance with the following legislation and planning requirements:

- *Environmental Planning and Assessment Act, 1979*, Section 79C (1) (c), Section 79BA
- *Rural Fires Act, 1997 (Amended)*, Sections 63 (1) and 63 (2)
- *Planning for Bushfire Protection* (NSW Rural Fire Service, 2006).

4.0 SITE IDENTIFICATION AND DESCRIPTION

4.1 Site Identification and Location

The subject site is known as 293 Matcham Road, Matcham (Lot 1 in DP 561056). The site is in the Local Government Area (LGA) of Central Coast Council (Fire Danger Index-100).

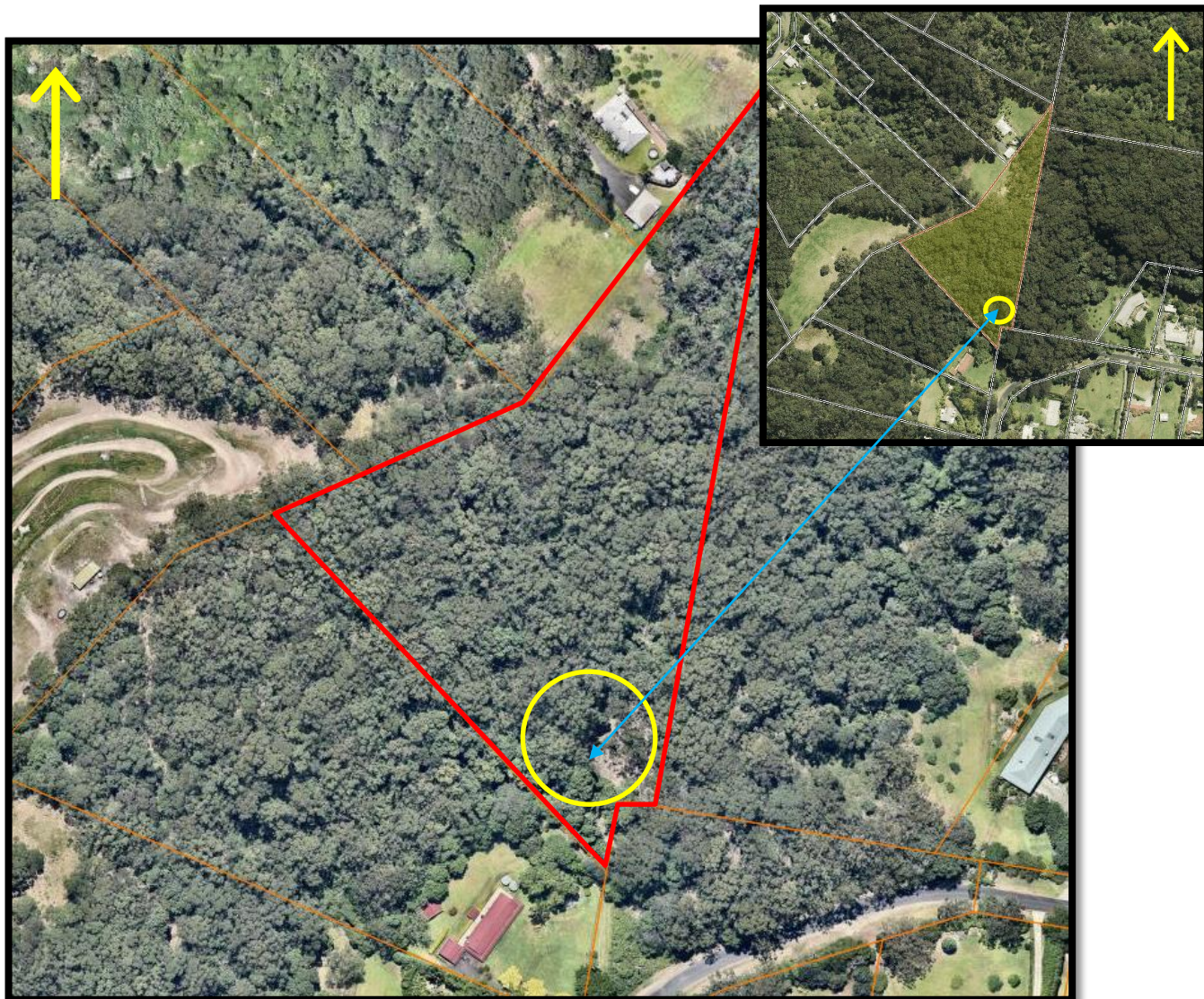


Figure 2: Aerial Photograph of site (approx. location of dwelling circled in yellow)
Source: Nearmap & Six Maps, 2018

The allotment is a large irregular shaped rural/residential parcel of land. The bushfire assessment has been based on the proposed dwelling area being on the southern portions of which contains a sparse tree layer with cleared lands existing in the understory.

The site contains a listed Endangered Ecological Community (EEC) and recommendations for minimising clearing have been provided.

The proposal will be provided access via a driveway that will extend from Matcham Road to the south.

The site will not be connected to the town reticulated supply of water but will be connected to the main electrical grid.

4.2 Bushfire Prone Mapping

The site has been identified by Central Coast Council as being bushfire prone. The mapping identifies the proposed dwelling area as partially containing Category 1 (orange) and predominantly containing Category 2 (yellow) vegetation. Figure 3 highlights this.

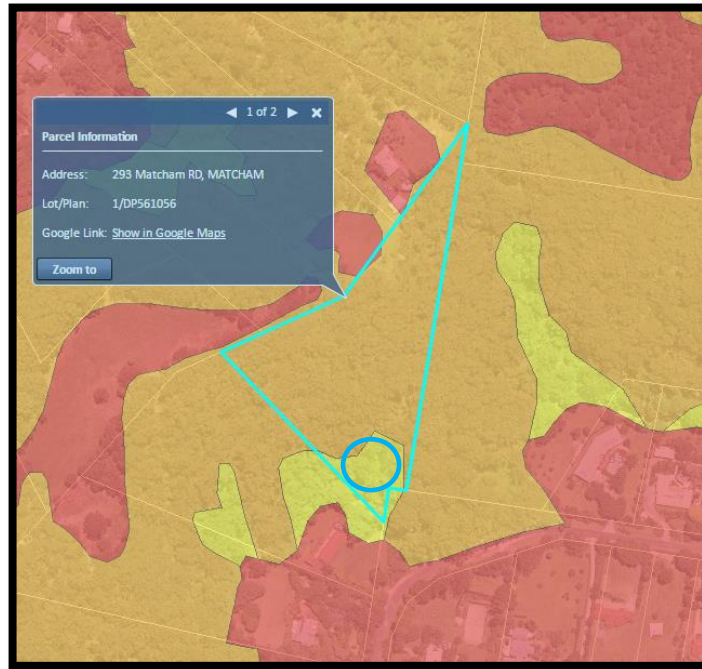


Figure 3: Bushfire Prone Mapping (approx. location of dwelling circled in blue)
Source: Central Coast Council, 2018

4.3 Surrounding Vegetation

4.3.1 Hazard Aspects

North

To the north of the proposed dwelling area is steep south facing land containing vegetation that has been mapped as containing *Coastal Narrabeen Moist Forest* and *Tumbi Spotted Gum Ironbark Forest* of which meets with Keith (2004) description of a 'wet and dry sclerophyll forest'. In accordance with conversion Table 3.7 in Addendum: Appendix 3 of PBP, this vegetation which poses a bushfire risk, will be assessed a **Forest** as per AUSLIG 1999 Pictorial Analysis (AS 3959-2009).

South & West

To the south and west of the proposed dwelling area is vegetated land that has been mapped as containing *Coastal Warm Temperate Rainforest*. This vegetation forms part of listed Endangered Ecological Community (EEC) known as *Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (LR)*.

In accordance with conversion Table 3.7 in Addendum: Appendix 3 of PBP, this vegetation which poses a bushfire risk, will be assessed a **Rainforest** as per AUSLIG 1999 Pictorial Analysis (AS 3959-2009).

East

To the east of the proposed dwelling area is land containing vegetation that has been mapped as containing *Coastal Narrabeen Moist Forest* of which meets with Keith (2004) description of a 'wet sclerophyll forest'. In accordance with conversion Table 3.7 in Addendum: Appendix 3 of PBP, this vegetation which poses a bushfire risk, will be assessed a **Forest** as per AUSLIG 1999 Pictorial Analysis (AS 3959-2009).

South-East

To the south-east existing within the road reserve is partially cleared lands of which contains vegetation that has been mapped as containing *Coastal Narrabeen Moist Forest* of which meets with Keith (2004) description of a 'wet sclerophyll forest'. It is noted with the inclusion of the clearing and vegetation removal associated with the driveway construction, this aspect provides a short fire run towards the site (~50m) and therefore is deemed to meet with the Section A2.3 definition of 'remnant' vegetation and will therefore be assessed equivalent to a Rainforest.



1.



2.



3.



4.

Note: See figure 5 for photograph location and direction.

4.4 Effective Slope

Figure 3 provides the topographic mapping surrounding the proposal as sourced by the Central Coast Council.

It is noted that PBP states in A2.3(b) that effective slope is;

'the gradient within the hazard (vegetation) which will most significantly influence the fire behaviour of the site having regard to vegetation class found.'

In regards to the site, the effective slopes for each hazard facing were inspected and calculated through a combination of topographic mapping from Central Coast Council (1m contours) and ground truthing. The effective slope measured 100m from the proposed development for the hazard facing aspects are;

- North: >10° Up Slope
- South: 5-10° Down Slope
- East: Flat/Cross Slope
- West: Flat/Cross Slope

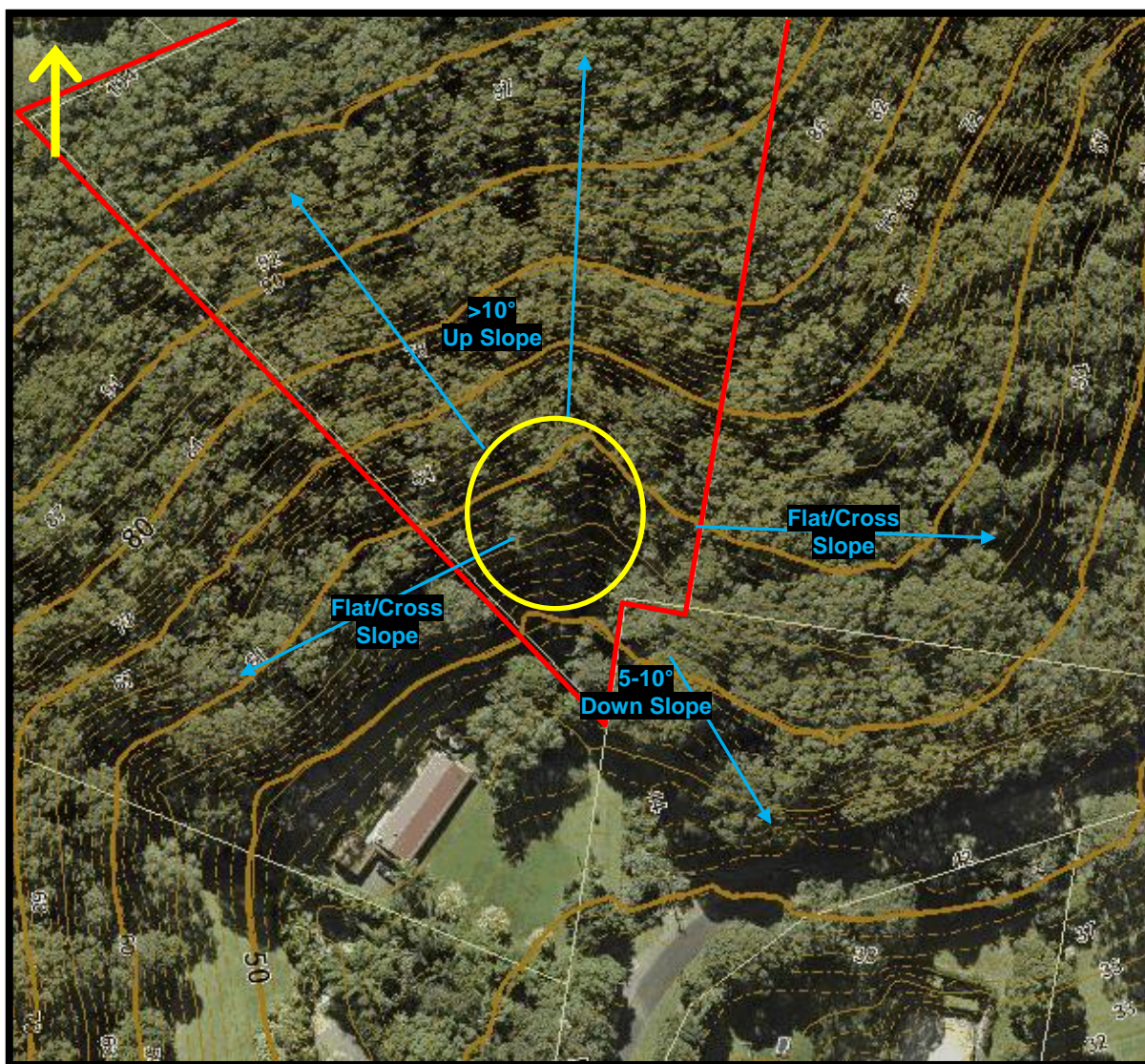


Figure 4: Topographic Mappings surrounding the proposed development
Source: Central Coast Council, 2018

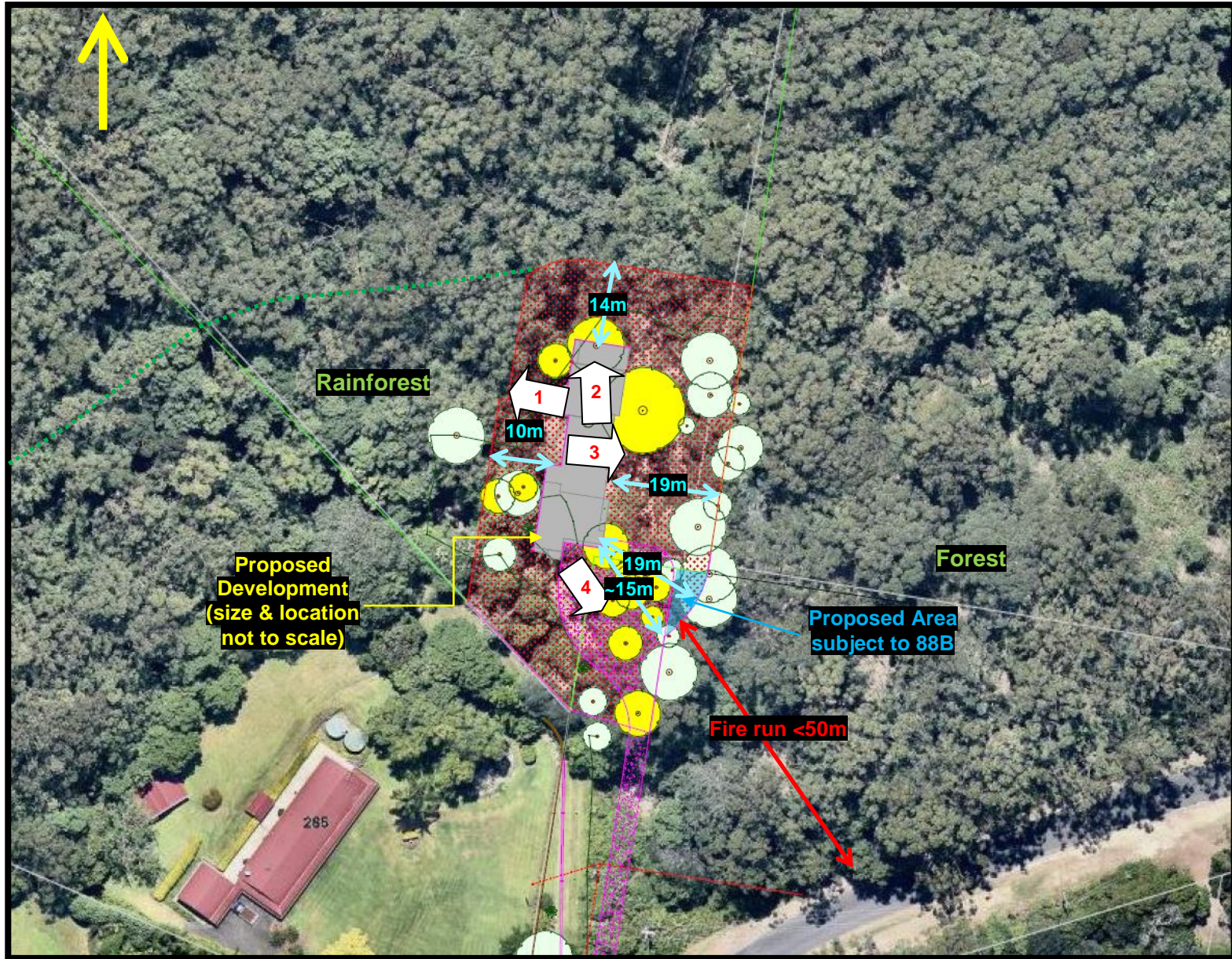


Figure 5: Bushfire Site Plan
Source: Nearmap, 2018

5.0 BUSHFIRE RISK ASSESSMENT

5.1 Background Information

This bushfire assessment follows the methods and procedures recommended in PBP. This document provides concepts for (via a NSW State variation to the BCA) Class 1, 2, 3 buildings, Class 4 parts of buildings, some Class 10 structures and Class 9 buildings that are Special Fire Protection Purposes (SFPP) (AS3959-2009) in bushfire prone areas and gives guidance on planning and development control processes in relation to bushfire protection measures. The document also provides a methodology for determining setback distance and Bushfire Attack Levels (BAL) required in development for residential purposes that are found to fall in areas designated as bushfire-prone.

5.2 Asset Protection Zones

Appendix 2 of PBP provides a methodology for determining the Asset Protection Zone (APZ) required for any given proposed development. APZ's describes the distance between the proposed development (the asset) and the hazard (the bushland) and vary according to topography and vegetation type. PBP states that the primary purpose of an APZ is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures within the development.

5.3 Bushfire Attack Level (BAL)

The bushfire risk to a property depends on the vegetation type, slope and proximity of vegetation to the proposed development, and can be classified as BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL FZ as outlined in AS3959-2009 and PBP. The categories of bushfire attack were determined for the vegetation conditions currently existing on the site and adjacent areas. Following the identification of the bushfire attack category for each aspect, the site will be assessed according to vegetation that presents the highest level of bushfire attack risk. AS3959-2009 provides two methods to determine complying Bushfire Attack Levels, these are the **Simplified Procedure-Method 1** (deemed-to-satisfy) and **Detailed Method for Determining the Bushfire Attack Level-Method 2**.

Table 1 provides an assessment through Detailed Assessment Method 2 in AS3959-2009 for the northern aspects and Method 1 for the remaining setbacks. The following land and vegetation conditions were used in the calculations and assessment;

Northern

- A setback of 14m from the hazard to the north-east
- Forest Vegetation (Fuel loads 35 tonnes/hectare)
- The effective slope of 10° Up Slope (Restricted to 10 degrees)
- A site/APZ slope of 20° (as per site survey)
- A Flame Width of 100m

The level of bushfire attack then determines the construction standards necessary for the proposed development. These protective construction measures are outlined in Australian Standard AS3959-2009. The BAL required for each of the aspects/facades for the proposed development are summarised in Table 1.

Table 1: Bushfire Attack Assessment (Method 1-AS3959-2009)

	ASPECT			
	Northern	South-Eastern	Eastern	Western
Vegetation ¹ within 100m of development	Forest	Rainforest (remnant)	Forest	Rainforest
Effective Slope of Land	>10° Up Slope	5-10° Down Slope	Flat/Cross Slope	Flat/Cross Slope
APZ and setback Provided/Recommended ²	14m ⁴	~15m (driveway)	19m (to BDY and Easement)	10m
Bushfire Attack Level (BAL) ³	BAL 40	BAL 40	BAL 40	BAL 40

Notes for Table 1:

- (1) Refer to Keith (2004), AS 3959-2009 and Table A2.1 in PBP
- (2) APZ Recommended/Provided
- (3) Bushfire Attack Levels are in accordance with AS3959-2009
- (4) See Attached Radiant Heat Calculation

Proposed Development

With reference to Table 1 above and Table 2.4.2 in AS3959-2009, the proposed development will be subject to BAL FZ. Furthermore, due to the occurrence of EEC, APZ's have been recommended in order to reduce the amount of clearing and provide a defensible space around the proposed dwelling. As listed in Table 1, these APZ's are;

- A minimum APZ of 14m to the north of the proposal
- A minimum APZ of 10m to the west of the proposal
- An APZ from the proposed dwelling to the eastern boundary (19m)
- An APZ from the proposed dwelling to the southern boundary

It is noted that the APZ to the south-east occurs almost entirely within the adjoining road reserve. This included area includes the location of the proposed driveway. Due to the construction and therefore it is deemed to meet with requirements of *Section 3.3 Exceptional circumstances for APZs in PBP*, as although occurring offsite, the continual maintenance of this area can be guaranteed due to the hardstand areas and landscaping works required to provide access to the property.

It is also noted that the owner will approach council for the creation of an easement for APZ for the areas located outside driveway area to the east (See Figure 5).

Recommendations deemed suitable for the type and location of the proposed additions will be made which meet with the National Construction Code (NCC) deemed-to-satisfy provisions of AS3959-2009 and Appendix 3 in PBP.

6.0 RECOMMENDATIONS

The subject site falls within a bushfire prone area as deemed by Central Coast Council; therefore the requirements of PBP apply. This bushfire assessment has followed the methodology and procedures recommended in the PBP document.

This Bushfire Threat and Protection Assessment concluded that the proposed development may comply with the performance criteria for PBP if the proposed acceptable solutions and recommendations are implemented. These items are outlined below.

6.1 Asset Protection Zones

- **The following minimum APZ's are recommended;**
 - **A minimum APZ of 14m to the North of the proposed dwelling**
 - **A minimum APZ of 10m to the West of the proposed dwelling**
 - **An APZ from the proposed dwelling to the southern boundary**
 - **An APZ from the proposed dwelling to the eastern boundary (19m)**
 - **An APZ to the south-eastern boundary, driveway and within council's road reserve (Figure 5).** In accordance with **Section 88B** of the 'Conveyancing Act 1919' a restriction/covenant to the land use shall be placed within the road reserve (beyond the driveway construction) requiring the provisions of an Inner Protection Area which shall be maintained as outlined within Appendix 5 of PBP and the NSW Rural Fire Service's document '*Standards for asset protection zones*'..
- The APZ/site shall be maintained to meet with the requirements of a Inner Protection Area (IPA) and RFS guidelines: *Standards for Asset Protection Zones* (NSW RFS, 2005) of which include the following;

Inner Protection Area (IPA)

Trees:

- *canopy cover should be less than 15% (at maturity)*
- *trees (at maturity) should not touch or overhang the building*
- *lower limbs should be removed up to a height of 2m above ground*
- *preference should be given to smooth barked and evergreen trees.*

Shrubs:

- *create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings*
- *shrubs should not be located under trees*
- *shrubs should not form more than 10% ground cover*
- *clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.*

Grass:

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

6.2 Construction Standards

Proposed Development

- All structures including retaining walls and pools areas and other associated works to the east of the dwelling shall be The northern, southern and eastern aspects of the proposed development shall be built to comply with AS3959-2009 Construction of Buildings in Bush Fire Prone Areas' **Section 3 and 9 (BAL FZ)**; however, any material, element of construction or system when tested to the method described in AS1530.8.2 shall comply with Clause 13.8 of that standard, except that flaming of the specimen is not permitted.
- The **proposed dwelling** shall be constructed to comply with AS3959-2009 **Sections 3 and 8 (BAL 40)** and **Addendum: Appendix 3.7 in PBP**

Roof

- Roof gutters and valleys should be leaf-proofed by the installation of an external gutter protection system that stops leaves from entering the gutter and building up in the gutter. The material used in such a system should have a flammability index of no greater than 5 (AS AS1530.2);

Service Pipes

- All exposed piping should be of metal. Pipes of other materials should be buried to a depth of at least 300mm below finished ground level.

Fencing

- All new fencing and gates shall be constructed in accordance with the NSW Rural Fire Service guideline: *Fast Fact-Fences or Gates in Bushfire Prone Areas*

6.3 Property Access and Evacuation Safety

- Safe access is provided to the subject property and surrounding properties private access road running from Matcham Road. This road will serve both as an access point for fire fighters and an egress point for residents during a bushfire event.

Direct access to the site will occur via an access driveway that runs from Matcham Road. In accordance with Section 4.1.3 of PBP, the following construction and design features are required for the access road;

- The access road should suitable for all weather access
- The access road should be provided with a minimum vertical clearance of 4 metres to any overhanging obstructions, including branches
- A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches
- Have a maximum grade of no more than 10 degrees for the unsealed road
- The crossfall is not more than 10 degrees
- The minimum distance between inner and outer curves is six metres
- It is recommended that the building occupants prepare a bushfire survival plan which addresses the option to leave early prior to bushfire impacting the site. Details on how prepare this plan is provided by the NSW RFS website (http://www.rfs.nsw.gov.au/file_system/attachments/Attachment_BushFireSurvivalPlan.pdf)

6.5 Water and Utility Services Supply

6.5.1 Water

The site is not connected to the town reticulated supply of water. Therefore the following recommendations are made.

- An onsite water reservoir of at least 20,000 litres should be provided for fire-fighting purposes in accordance with NSW RFS fast fact 3/08;
- The water supply and site should be provided with a Static Water Supply (SWS) sign which can be purchased from the RFS;
- Tanks/water supply must be fitted with a minimum 65mm Storz outlet with a gate or ball valve. The gate or ball valve must be adequate for water flow and must be metal. Tanks must be located within the inner protection zone and away from the dwelling;
- Above ground tanks must be manufactured of concrete or metal and any raised stand must be metal. Tanks on the hazard side of the building must be provided with adequate shielding to protect fire fighters;
- Underground water tanks must have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access must be supplied within 4 metres of the access hole.
- All above ground water pipes external to the building are to be metal including and up to any taps;
- A petrol or diesel pump enclosed in a non combustible housing to provided water pressure for the hoses;
- Taps and fittings should be constructed of metal; and
- The number of taps and/or length of hose should be adequate in number and/or length to supply water to the dwelling;

6.4.2 Gas (if applicable)

- Any gas cylinders or gas connections should be installed and maintained in accordance with Australian Standard AS1596 - *The Storage and Handling of LP Gas* and the requirements of relevant authorities.
- If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion.

6.4.3 Electricity

- Where overhead electrical connection lines are proposed-lines area installed with short pole spacing and no part of a tree closer to a power line that the distance set out on accordance with the specifications in 'Vegetation Safety Clearance' issued by Energy Australia

7.0 SPECIFIC OBJECTIVES FOR INFILL DEVELOPMENT

With a combination of bushfire protection measures, the proposal is seen to comply with the aim and objectives of PBP for infill development. The Specific Objectives for infill development and a comment as to how they are achieved by the proposed development is provided below:

Specific Objective 1: “ensure that the bushfire risk to adjoining lands is not increased”.

The proposal will not increase the bushfire risk to adjoining lands. The bushfire risk will be decreased as the dwelling will be constructed to comply with the relevant BAL creating a safer environment for occupants and reducing the chances of building to building fire propagation. Furthermore increased property management will reduce fuels loads surrounding the proposal. The proposal provides compliance with the objective.

Specific Objective 2: “provide a minimum defensible space”.

All sides of the building can be accessed before and after the passage of fire. The recommended APZs will provide pedestrian access around the dwelling and is adequate defensible space. The proposal provides compliance with the objective.

Specific Objective 3: “provide a better bushfire protection, on a re-development site, than the existing situation. This should not result in new works being exposed to greater risk than the existing building”.

The proposed dwelling will be constructed to the highest level of construction under AS3959; therefore the proposal provides compliance with the objective.

Specific Objective 4: “ensure that the footprint of the proposed building does not extend towards the hazard beyond existing building lines on neighbouring land”.

The proposed development will be closer to the bushfire hazard than the neighbouring developments. To compensate for this the proposed dwelling will be constructed to the highest level of construction under AS3959. The proposal provides compliance with the objective.

Specific Objective 5 “not result in an increased bushfire management and maintenance responsibility on adjoining land owners unless they have agreed to the development”.

The maintenance of the APZ's within the site will not result in an increased bushfire management and maintenance responsibility on adjoining land owners. The proposal provides compliance with the objective.

Specific Objective 6 “ensure building design and construction enhance the chances of occupant and building survival”.

The proposed dwelling will be constructed to the highest level of construction under AS3959. This level of construction will involve the usage of non-combustible external materials. The proposal provides compliance with the objective.

8.0 CONCLUSION

Clarke Dowdle & Associates have been engaged to conduct a Bushfire Threat & Protection Assessment upon the property located at 293 Matcham Road, Matcham, NSW. This assessment was performed in March 2018 and was conducted in accordance with the procedures and methods recommended in the NSW Rural Fire Service published document '*Planning for Bushfire Protection*' (PBP)

This report has outlined and provided recommendations demonstrating how the proposed development may comply with the performance criteria set out in PBP.

The determining authorities and Rural Fire Service may suggest additional measures to be implemented with any planning and construction upon the subject site.

We would be pleased to provide further information on any aspects of this report.

For and on behalf of

Clarke Dowdle and Associates



Kristan Dowdle

B. Env. Sc.
Grad Dip. Design in Bushfire Prone Areas
Environmental & Bushfire Consultant

Disclaimer

PBP States;

Notwithstanding the precautions adopted, it should always be remembered that bushfire burn under a wide range of conditions and an element of risk, no matter how small always remains.

AS 3959-2009 states;

It should be borne in mind that the measures contained in this standard cannot guarantee that the building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions.

This Report is a Bush Threat & Protection Assessment that provides the required information to assist Local Council and the Rural Fire Service in determining compliance in accordance with PBP and AS 3959-2009 and as stated above, this report does not guarantee that the proposal will withstand bushfire attack on every occasion.

REFERENCES

- Keith, D. (2004), *Ocean Shores to Desert Dunes*. Department of Environment and Conservation, Sydney
- National Construction Code (2016), Building Codes Australia, *Class 1 and Class 10 Building Housing Provisions Volume 2*
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- NSW Rural Fire Service and Department of Planning (2006), *Planning for Bushfire Protection, A guide for Councils, Planners, Fire Authorities and Developers*. NSW Rural Fire Service.
- Schauble, J. (2004). *The Australian Bushfire Safety Guide*. Harper Collins Publishers, Sydney, Australia.
- Standards Australia, (2009), *AS3959 Construction of Buildings in Bushfire-prone Areas*. Standards Australia International



Calculated March 14, 2018, 1:49 pm (BALc v.4.7)

293 Matcham Rd, Matcham (north)

Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	1.5 km/h
Vegetation classification	Forest	Flame length	13.98 m
Surface fuel load	25 t/ha	Flame angle	42 °
Overall fuel load	35 t/ha	Panel height	9.35 m
Vegetation height	n/a	Elevation of receiver	9.77 m
Effective slope	-10 °	Fire intensity	27,210 kW/m
Site slope	-20 °	Transmissivity	0.868
Distance to vegetation	14 m	Viewfactor	0.5962
Flame width	100 m	Radiant heat flux	39.37 kW/m ²
Windspeed	n/a	Bushfire Attack Level	BAL-40
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005