Travers

bushfire & ecology

# bushfire protection assessment

Rezoning Application
Lot 1021 DP 1054632
Wycombe Road,
TERRIGAL

Under Section 117(2) Direction No 4.4
of the *EP&A Act*

FPA AUSTRALIA
Certified Business
Bushfire Planning
& Design

November 2013
(REF: A13105B)

# Bushfire Protection Assessment

**Rezoning Application**
**Lot 1021 DP 1054632**
**Wycombe Road,**
**TERRIGAL**

| | |
|---|---|
| Report Authors: | Nicole van Dorst |
| Plans prepared: | Trent Matheson & Peter Tolley |
| Checked by: | John Travers BPAD A 15195 |
| Date: | 8 November 2013 |
| File: | A13105B |



**Disclaimer:**

This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person including the client then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be relied upon as meaning it reflects any advice by this firm. The report does not suggest or guarantee that a bush or grass fire will not occur and or impact the development. The advice does advise on matters published by the *NSW Rural Fire Service* in their guideline *Planning for Bush Fire Protection 2006* and other advice available from that organisation.

The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

ABN 64 083 086 677
PO Box 7138
Kariong NSW 2250

38A The Avenue
Mt Penang Parklands
Central Coast Highway
Kariong NSW 2250

t: 02 4340 5331
e: info@traversecology.com.au
www.traversecology.com.au

# EXECUTIVE SUMMARY

A bushfire protection assessment has been undertaken for the proposed rezoning of Lot 1021 DP 1054632 Wycombe Road, Terrigal. The proposal is to rezone the land from 7(c2) Scenic Protection - Rural Small Holdings (proposed future E3 Environmental Management under Draft LEP) to R2 – Low Density Residential to accommodate a residential subdivision.

This report identifies matters for consideration for the planning proposal and highlights the required bushfire protection measures, including asset protection zones (APZs), for future development in accordance *Planning for Bush Fire Protection 2006* (*PBP*) and *Community Resilience Practice Note 2/12 Planning Instruments and Policies*.

The key principle for the proposal is to ensure that future development is capable of complying with *PBP*. Planning principles for the proposal include the provision of adequate access including the establishment of adequate asset protection zones (APZs) for future housing, specifying minimum lot depths to accommodate APZs and the introduction of controls which avoid placing inappropriate developments in hazardous areas and placement of combustible material in APZs.

Our assessment found that bushfire can potentially affect the site from the adjoining forest vegetation located beyond Wycombe Road to the west and the remnant forest / freshwater wetland within the rural residential land and road reserve to the south-east and south, resulting in possible ember attack, radiant heat and potentially flame attack.

The bushfire risk posed to the rezoning proposal can however be mitigated if appropriate bushfire protection measures (including APZs) are put in place and managed in perpetuity.

The assessment has concluded that future development on site will provide compliance with the planning principles of *PBP*.

John Travers *B.App.Sc. / Ass. Dip. / Grad. Dip / BPAD A*
Nicole van Dorst *B.App.Sc / Grad. Dip* BPAD D

**GLOSSARY OF TERMS**

| | |
|---|---|
| AHIMS | Aboriginal Heritage Information System |
| APZ | asset protection zone |
| *AS1596* | *Australian Standard – The storage and handling of LP Gas* |
| *AS2419* | *Australian Standard – Fire hydrant installations* |
| *AS3745* | *Australian Standard – Planning for emergencies in facilities* |
| *AS3959* | *Australian Standard – Construction of buildings in bushfire-prone areas 2009* |
| *BCA* | *Building Code of Australia* |
| BSA | bushfire safety authority |
| EEC | endangered ecological community |
| *EP&A Act* | *Environmental Planning and Assessment Act 1979* |
| FDI | fire danger index |
| IPA | inner protection area |
| LEP | local environmental plan |
| *LHCCREMS* | *Lower Hunter Central Coast Regional Environmental Management Strategy* |
| OPA | outer protection area |
| *PBP* | *Planning for Bush Fire Protection 2006* |
| RFS | NSW Rural Fire Service |
| SFPP | special fire protection purpose |

## TABLE OF CONTENTS

**SECTION 1.0 – INTRODUCTION ..... 1**

1.1 Aims of the assessment ..... 1
1.2 Project synopsis ..... 1
1.3 Information collation ..... 2
1.4 Site description ..... 2
1.5 Legislation and planning instruments ..... 3
1.6 Environmental and cultural constraints ..... 7

**SECTION 2.0 – BUSHFIRE THREAT ASSESSMENT ..... 8**

2.1 Hazardous fuels ..... 8
2.2 Effective slope ..... 10
2.3 Bushfire attack assessment ..... 10

**SECTION 3.0 – SPECIFIC PROTECTION ISSUES ..... 12**

3.1 Asset protection zones (APZs) ..... 12
3.2 Building protection ..... 13
3.3 Hazard management ..... 13
3.4 Access for fire fighting operations ..... 14
3.5 Water supplies ..... 16
3.6 Gas ..... 16
3.7 Electricity ..... 17

**SECTION 4.0 – CONCLUSION AND RECOMMENDATIONS ..... 18**

4.1 Conclusion ..... 18
4.2 Recommendations ..... 19

REFERENCES

SCHEDULE 1 – Bushfire Protection Measures

APPENDIX 1 – Management of asset protection zones

# Introduction 1

*Travers bushfire & ecology* has been requested to undertake a bushfire protection assessment for the proposed rezoning located at Lot 1021 DP 1054632 Wycombe Road, Terrigal.

## 1.1 Aims of the assessment

The aims of the bushfire protection assessment are to:

- Review the bushfire threat to the landscape
- Undertake a bushfire attack assessment in accordance with *PBP*
- Provide advice on planning principles, including the provision of perimeter roads, APZs and other specific fire management issues
- Review the potential to carry out hazard management over the landscape, taking into consideration the proposed retention of trees within the final development plans.

## 1.2 Project synopsis

The site is currently zoned 7(c2) Scenic Protection - Rural Small Holdings and is proposed to be zoned E3 Environmental Management under the Draft Gosford LEP 2009.

The proposal seeks to amend the site's zoning to 2(a) Residential (current zoning) or R2 (draft zoning) to accommodate a future residential subdivision (refer Figure 1.1).

A concept plan has not been prepared, however, it is envisioned the site will support a ten (10) lot subdivision with a lot size of approximately 550sqm.

Schedule 1 attached, identifies the surrounding managed land and distances provided between the site and unmanaged vegetation.

Recommendations have also been made for building construction, water supply and utilities.

## 1.3 Information collation

To achieve the aims of this report, a review of the information relevant to the property was undertaken prior to the initiation of field surveys. Information sources reviewed include the following:

- Gosford Planning Scheme Ordinance 1968
- Draft Gosford Local Environmental Plan 2009
- Flora and Fauna Assessment, 2013 prepared by *Travers bushfire & ecology*
- *Google* aerial photography
- Topographical maps *DLPI of NSW* 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas*
- *Planning for Bush Fire Protection 2006 (PBP)*
- *Community Resilience Practice Notes 2/12 Planning Instruments and Policies.*

An inspection of the proposed development site and surrounds was undertaken by Nicole van Dorst in October 2013 to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bushfire measures and a visual appraisal of bushfire hazard and risk were also undertaken.

## 1.4 Site description

The site is located at Lot 1021 DP 1054632, on Wycombe Road, approximately 60m to the north of Beaufort Road, Terrigal (refer Figure 1.1).

The site is bounded to the east and south by managed residential / rural residential land, to the north by a children's playground and to the west by remnant forest within a managed rural residential landscape.

Table 1.1 provides a summary of the planning, cadastral, topographical and disturbance details of the subject site.

**Table 1.1 – Site features**

| | |
|---|---|
| **Location** | Wycombe Road, Terrigal |
| **Size** | Approximate 53m x 158m area |
| **Local government area** | Gosford City Council |
| **Elevation** | 25-40m (AHD) |
| **Grid reference** | 353906E 6299903N |
| **Topography** | Situated on a slightly steep north-easterly facing aspect. |
| **Geology and soils** | Geology; Narrabeen Group – Inter-bedded laminate, shale and quartz to lithic-quartz sandstone<br>Soils; Minor red claystone north of the Hawkesbury River |
| **Catchment and drainage** | The stormwater flows through the subject site and onto Beaufort Road where it drains south east into Terrigal Lagoon. This then makes its way out the mouth of the lagoon into the Pacific Ocean. This has a high flow opening during high rain periods. |
| **Vegetation** | Remnant open forest, under-scrubbed and mostly cleared. |
| **Existing land use** | Open space |
| **Clearing** | There has been previous vegetation reduction and management within the site |


**Figure 1.1 –** Aerial appraisal

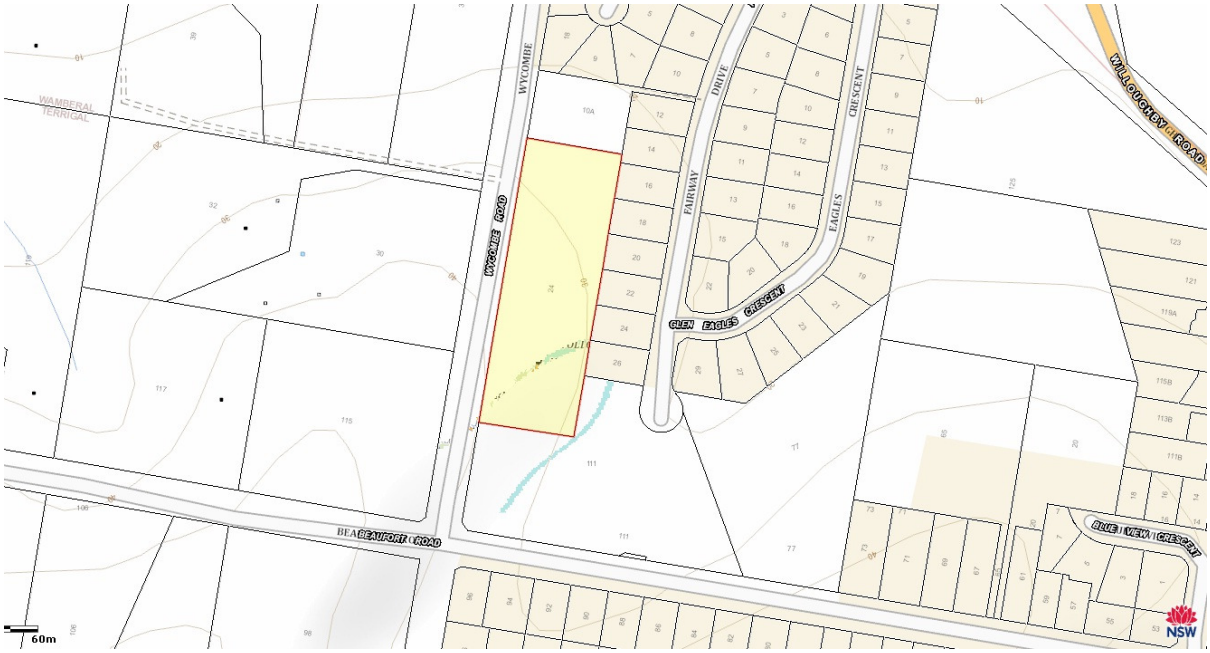



**Figure 1.2 –** Topography

## 1.5 Legislation and planning instruments

### *1.5.1 Environmental Planning and Assessment Act (EP&A Act) and bushfire prone land*

The *EP&A Act* governs environmental and land use planning and assessment within New South Wales. It provides for the establishment of environmental planning instruments, development controls and the operation of construction controls through the *Building Code of Australia (BCA)*. The identification of bushfire prone land is required under Section 146 of the *EP&A Act*.

Bushfire prone land maps provide a trigger for the development assessment provisions. The proposed rezoning is located on land that is mapped by *Gosford City Council* as being bushfire prone (refer Figure 1.3).

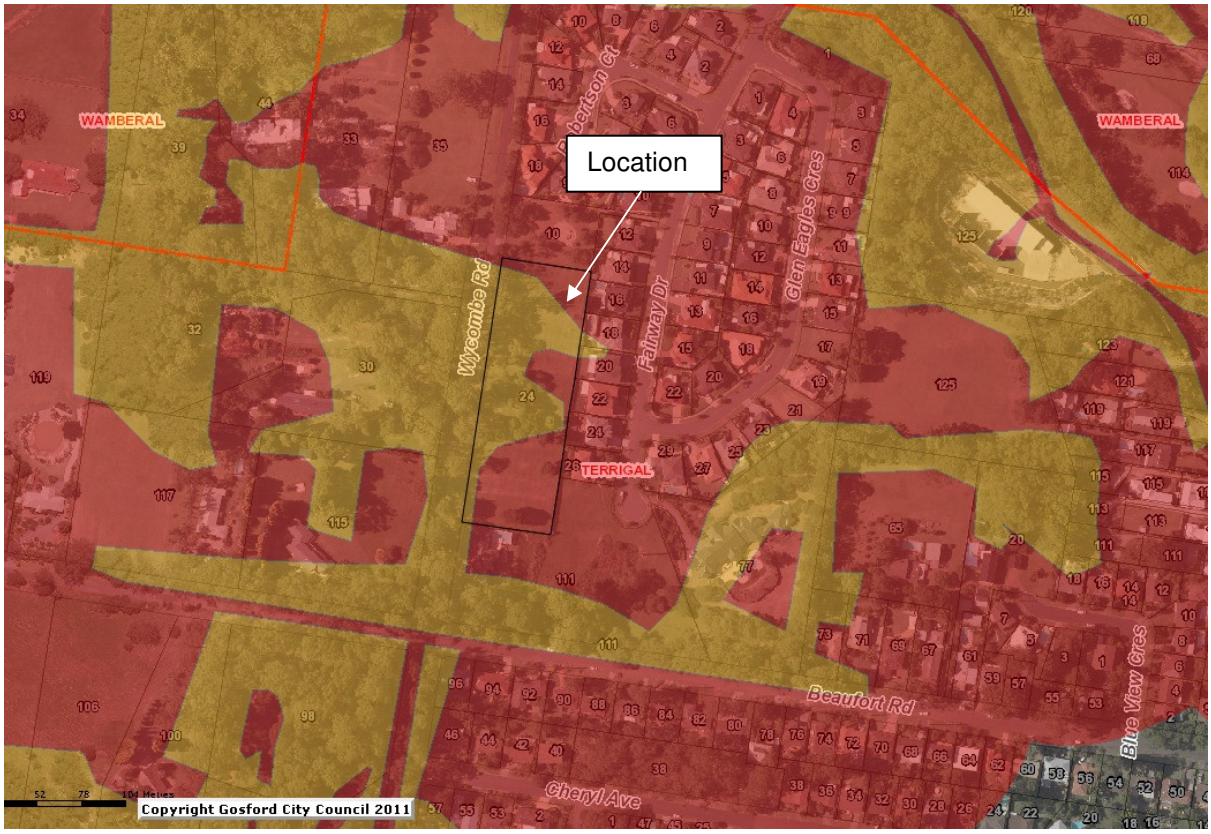



**Figure 1.3** – Bushfire prone land map

*PBP* (pg 4) stipulates that if a proposed amendment to land use zoning or land use affects a designated bushfire prone area, Section 117(2) Direction No 4.4 of the *EP&A Act* must be applied.

The proposal is located on land mapped by *Gosford City Council* as being bushfire prone.

As such, the proposal is subject to the requirements of Section 117(2) of *the Environmental Planning and Assessment Act 1979 (EP&A Act)* which requires Council to consult with the Commissioner of the NSW Rural Fire Service (RFS) and to take into account any comments by the Commissioner; and to have regard to the planning principles of *PBP.*

### *1.5.2 Local environmental plan (LEP)*

A LEP provides for a range of zonings which list development that is permissible or not permissible, as well as the objectives for development within a zone.

The proposal is to proceed as an amendment to the current *Gosford Scheme Ordinance* and *Draft LEP* as outlined below.

*Gosford Planning Scheme Ordinance 1968*

The site is zoned under the current *Gosford Scheme Ordinance* as 7(c2) – Scenic Protection - Rural Small Holdings with the adjoining land to the east zoned as 2(a) – Residential (refer Figure 1.4).

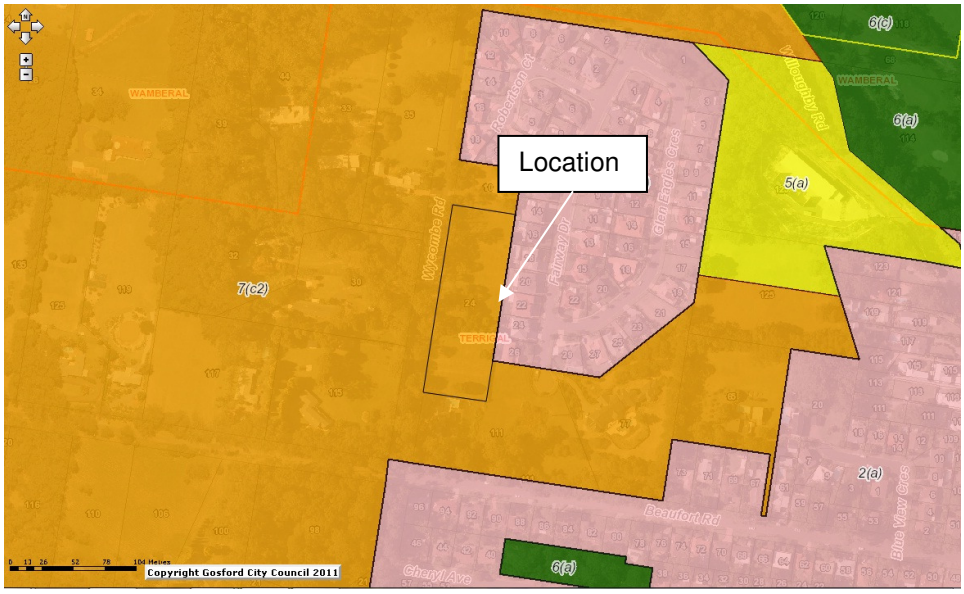



**Figure 1.4** – Gosford Planning Scheme Ordinance
(Source: Gosford City Council website)

*Draft Local Environmental Plan 2009*

The site is zoned under the draft *Gosford LEP 2009* as E3 – Environmental Management with the adjoining land to the east zoned as R2 (refer Figure 1.5).

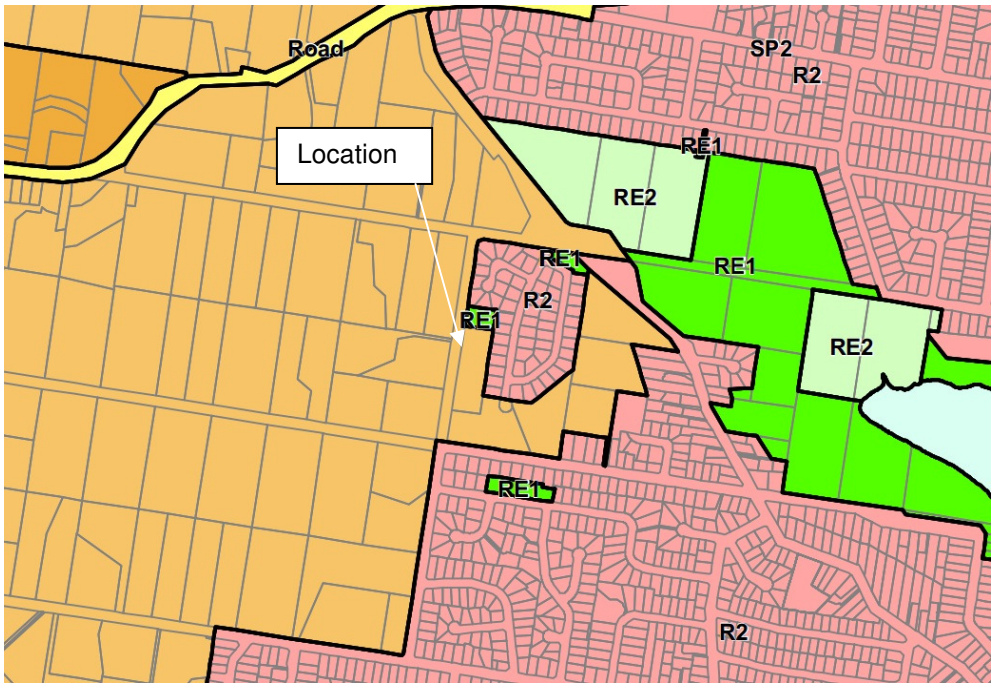



**Figure 1.5** – Draft Gosford LEP 2009
(Source: Gosford City Council website)

The proposal seeks to amend the site's zoning to 2(a) Residential (current zoning) or R2 (draft zoning).

The proposal, including the provision of APZs, would seek to comply with the objectives of the proposed rezoning.

### *1.5.3 Planning for Bush Fire Protection 2006 (PBP)*

Bushfire protection planning requires the consideration of the RFS planning document entitled *PBP. PBP* provides planning principles for rezoning to residential land as well as guidance on effective bushfire protection measures.

The policy aims to provide for the protection of human life (including fire fighters) and to minimise impacts on property and the environment from the threat of bushfire, while having due regard to development potential, on site amenity and protection of the environment.

*PBP* outlines the following planning principles that must be achieved for all rezoning proposals:

1. Provision of a perimeter road with two way access which delineates the extent of the intended development.

2. Provision, at the urban interface, for the establishment of adequate APZs for future housing.

3. Specifying minimum residential lot depths to accommodate APZs for lots on perimeter roads.

4. Minimising the perimeter of the area of land interfacing the hazard, which may be developed.

5. Introduction of controls which avoid placing inappropriate developments in hazardous areas, and

6. Introduction of controls on the placement of combustible materials in APZs.

In addition to the above, *PBP* outlines the bushfire protection measures required to be assessed for new development in bushfire prone areas.

The proposed rezoning has been assessed in compliance with the following measures to ensure that future development is capable of complying with *PBP*:

- asset protection zones
- building construction and design
- access arrangements
- water supply and utilities
- landscaping
- emergency arrangements

### *1.5.4 Building Code of Australia (BCA) and the Australian Standard AS3959 Construction in bushfire-prone areas 2009 (AS3959)*

The *BCA* is given effect through the *EP&A Act* and forms part of the regulatory environment of construction standards and building controls. The *BCA* outlines objectives, functional

statements, performance requirements and deemed to satisfy provisions. For residential dwellings these include Classes 1, 2 and 3 buildings. The construction manual for the deemed to satisfy requirements is *AS3959.*

Although consideration of *AS3959* is not specifically required in a rezoning proposal, this report (Section 3.2) provides the indicative dwelling construction levels.

## 1.6 Environmental and cultural constraints

### *1.6.1 Environmental constraints*

The results of the flora and fauna assessment undertaken by *Travers bushfire & ecology* (2013) indicate that the site has limited potential for threatened flora and fauna species.

The report included the following mitigation measure;

- Planting of native vegetation as part of landscape works is recommended to maintain habitat for local fauna.

The above mitigation measure can be incorporated whilst adhering to the requirements of an APZ.

### *1.6.2 Cultural constraints*

A basic search was conducted on the Aboriginal Heritage Information System (AHIMS). The results show that there are no identified Aboriginal sites of significance within Lot 1021 DP 1054632 or within 50m of the site.

# Bushfire Threat Assessment 2

To assess the bushfire threat and to determine the required width of an APZ for a development, a review of the elements that comprise the overall threat needs to be completed.

*PBP* provides a methodology to determine the size of any APZ that may be required to offset possible bushfire attack. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation.

## 2.1 Hazardous fuels

*PBP* guidelines require the identification of the predominant vegetation formation in accordance with David Keith (2004) to determine APZ distances for subdivision developments. However, when determining construction standards in accordance with *AS3959,* AUSLIG Pictorial Analysis is used to determine the vegetation and hence APZ setbacks and building construction standards (refer Section 3.2 of this report).

The hazardous vegetation is calculated for a distance of at least 140m from a proposed site boundary and can be summarised as:

- Forest vegetation associated within the adjoining rural residential allotments to the west. The majority of this vegetation consists of canopy only, with the unmanaged portion of this vegetation (posing a bushfire risk) forming a narrow fragmented width of 25-35m between residential dwellings (refer Schedule 1 attached).

- Remnant forest and freshwater wetland within the rural residential allotment and road reserve to the south east and south (refer Schedule 1 attached).

The remaining land within 140m of the property consists of managed / mown lands with canopy trees only (refer photos below).

**Photo 1** – Managed grass to the south east

**Photo 2** – Managed / mown grass with canopy trees to the south west (beyond Beaufort Road)

**Photo 3** – Managed rural residential land to the west

## 2.2 Effective slope

The effective slope is assessed for a distance 100m from the location of any habitable dwellings. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined.

The effective slope within the hazardous vegetation is:

- 0–5$^{o}$ down slope to west
- Level within the remnant freshwater wetland and forest to the south and south east

## 2.3 Bushfire attack assessment

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site using forest vegetation located within the Greater Sydney region.

Table 2.1 provides a summary of the bushfire attack assessment and the minimum required APZs in compliance with BAL 29 building construction standards (*AS3959*).

**Table 2.1 – Bushfire attack assessment**

| Aspect | Vegetation formation within 140m of development | Effective slope of land | Minimum APZ required equivalent to BAL 29 (metres) | APZ provided (metres) |
|---|---|---|---|---|
| North & east | Managed / residential lands | Level | N/A | >100 |
| West | Forest | 0-5 $^{0D}$ | 25 | >60 (includes Wycombe Road and existing managed lands within the adjoining rural residential properties) |
| South & south east | Remnant forest / freshwater wetland **Refer Note 1** | Level | 11 | 25 (freshwater wetland)<br><br>80 (remnant forest) |

*Notes: * Slope is either 'U' meaning up slope or 'C' meaning cross slope or 'D' meaning down slope*

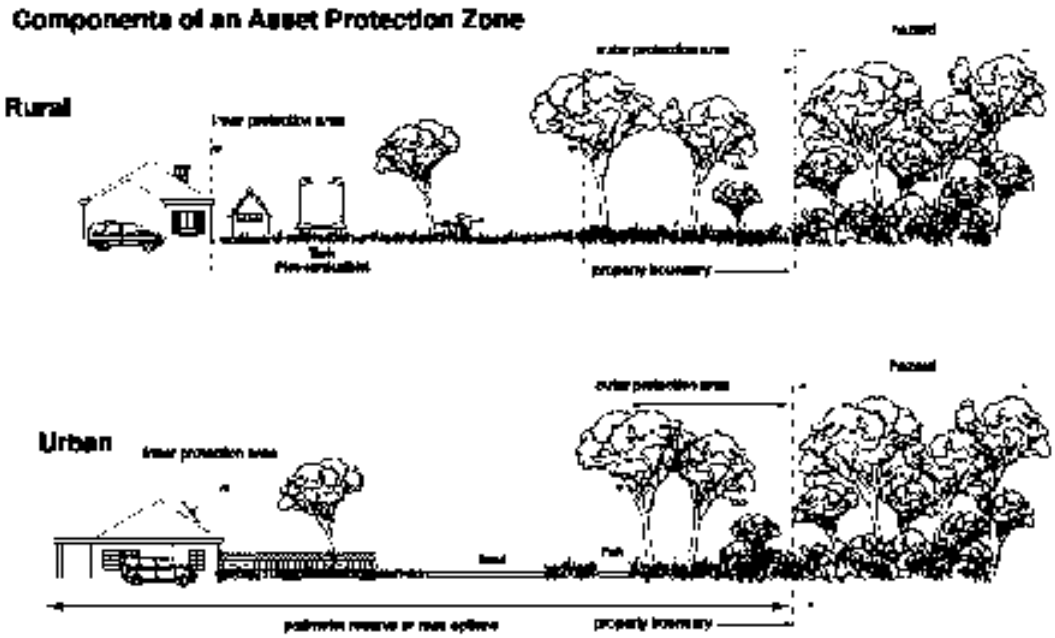
**Note 1**: *PBP* describes remnant vegetation as a parcel of vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 50m. The vegetation to these aspects exhibits these qualities and therefore the threat posed is considered low and APZ setbacks for this aspect are the same as for the rainforest category outlined in *PBP*.

# Specific Protection Issues

# 3

## 3.1 Asset protection zones (APZs)

APZs are areas of defendable space separating hazardous vegetation from buildings. The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. The IPA cannot be used for habitable dwellings but can be used for all external non-habitable structures such as pools, sheds, non-attached garages, cabanas, etc. A typical APZ and therefore defendable space is graphically represented below:




Source: RFS, 2006

**Note:** Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the *RFS* performance criteria.

*PBP* dictates that the subsequent extent of bushfire attack that can potentially emanate from a bushfire must not exceed a radiant heat flux of 29$kW/m^2$ for residential subdivision developments. This rating assists in determining the size of the APZ in compliance with *PBP* to provide the necessary defendable space between hazardous vegetation and a building. Table 3.1 outlines the proposal's compliance with the performance criteria for APZs.

**Table 3.1 – Performance criteria for asset protection zones (*PBP* guidelines pg. 19)**

| Performance criteria | Acceptable solutions | Complies |
|---|---|---|
| Radiant heat levels at any point on a proposed building will not exceed 29kW/$m^2$. | APZs are provided in accordance with Appendix 2.<br><br>APZs are wholly within the boundary of the development site. | Yes - Refer Table 2.1. The entire property should be managed as an APZ.<br><br>The APZ includes the adjoining roads and existing managed rural residential landscape |
| APZs are managed and maintained to prevent the spread of fire towards the building. | In accordance with the requirements of *Standards for Asset Protection Zones* (*NSW RFS* 2005). | Yes - to be made a condition of consent. |
| APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated. | The APZ is located on lands with a slope of less than 18°. | Yes - Slopes are less than 18°. |

## 3.2 Building protection

The construction of buildings in bushfire prone areas is subject to stringent rules pertinent to the building envelope being located on the non-hazardous side of the APZ. The role of the APZ is to provide a safe space to separate the hazard from the building.

In terms of future subdivision approval, the minimum APZ must be provided in accordance with Appendix 2 of *PBP.* The APZs provided in Table 2.1 (Section 2.3) of this report comply with these requirements, whilst also considering the final building setbacks as per *AS3959*.

Although not required in terms of rezoning, the following advice in relation to building construction levels can be used for future planning.

The construction classification system is based on five (5) bushfire attack levels (BAL). These are BAL – Flame Zone (FZ), BAL 40, BAL 29, BAL 19 and BAL 12.5 AS3959 – *Construction of buildings in bushfire-prone areas*. The lowest level, BAL 12.5, has the longest APZ distance while BAL – FZ has the shortest APZ distance. These allow for varying levels of building design and use of appropriate materials.

Based on the existing setbacks provided between the property and the nearest hazardous vegetation, it is recommended that future dwelling construction complies with BAL 12.5 as per *Australian Standards AS3959 Construction of buildings in bushfire-prone areas*.

## 3.3 Hazard management

Should the development be approved, the owner or occupier of each lot will be required to manage their entire property as an APZ in accordance with the RFS guidelines *Standards for Asset Protection Zones (RFS, 2005),* with landscaping to comply with Appendix 5 of *PBP.*

In terms of implementing and / or maintaining APZs, there is no physical reason that would constrain hazard management from being successfully carried out by normal means (e.g. mowing / slashing).

A summary of the guidelines for managing APZs is attached as Appendix 1 to this report.

### 3.4 Access for fire fighting operations

Public road access is provided via the existing Wycombe Road to the west of the site.

Table 3.2 outlines the performance criteria and acceptable solutions for future property access roads within the subdivision.

**Table 3.2 – Performance criteria for property access (*PBP* guidelines pg. 22)**

| Performance criteria | Acceptable solutions | Complies |
|---|---|---|
| Access to properties is provided in recognition of the risk to fire fighters and / or evacuating occupants. | At least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200m from a public through road. | Yes |
| The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles.<br><br>All weather access is provided. | Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes.<br><br>Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge). | N/A. There are no proposed bridges and roads do not traverse wetlands or land subject to inundation. |
| Road widths and design enable safe access for vehicles. | A minimum carriageway width of 4m for dwellings with a distance of greater than 70m from the nearest hydrant point to the most external part of a proposed building.<br><br>*Note: No specific access requirements apply in a urban area where a 70m unobstructed path can be demonstrated between the most distant external part of a dwelling and the nearest part of the public access road that supports the operational use of fire fighting vehicles (road speed limit <70kph).*<br><br>In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long x 2m wide (min. width 6m).<br><br>A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches.<br><br>Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum outer radius of 12m.<br><br>Curves have a minimum inner radius of 6m and are minimal in number to allow rapid access / egress.<br><br>The minimum distance between inner and outer curves is 6m.<br><br>The cross fall is not more than $10^{o}$.<br><br>Maximum grades for sealed roads do not exceed $15^{o}$ and not more than $10^{o}$ for unsealed roads. | Yes – No specific access requirements apply as the road limit is <70kph and all dwellings will be within 50 metres of Wycombe Road. |

## 3.5 Water supplies

Town reticulated water supply is available to the property in the form of an underground reticulated water system.

Table 3.3 outlines the performance criteria and acceptable solutions for reticulated water supply.

**Table 3.3 – Performance criteria for reticulated water supplies (*PBP* guidelines pg. 27)**

| Performance criteria | Acceptable solutions |
|---|---|
| Water supplies are easily accessible and located at regular intervals. | Reticulated water supply to urban subdivision uses a ring main system for areas with perimeter roads.<br><br>Fire hydrant spacing, sizing and pressures comply with AS2419.1 - 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.<br><br>Hydrants are not placed within any road carriageway.<br><br>All above ground water and gas pipes external to the building are metal, including and up to taps.<br><br>The provisions of parking on public roads are met. |

## 3.6 Gas

Table 3.4 outlines the required performance criteria for the gas supply.

**Table 3.4 – Performance criteria for gas supplies (*PBP* guidelines pg. 27)**

| Performance criteria | Acceptable solutions |
|---|---|
| Location of gas services will not lead to the ignition of surrounding bushland land or the fabric of buildings | Reticulated or bottled gas bottles are to be installed and maintained in accordance with AS1596 (2002) and the requirements of relevant authorities. Metal piping is to be used.<br><br>All fixed gas cylinders are to be kept clear of flammable materials to a distance of 10m and shielded on the hazard side of the installation.<br><br>If gas cylinders are to be kept close to the building the release valves must be directed away from the building and at least 2m away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal.<br><br>Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used. |

## 3.7 Electricity

Table 3.5 outlines the required performance criteria for electricity supply.

**Table 3.5 – Performance criteria for electricity services (*PBP* guidelines pg. 27)**

| Performance criteria | Acceptable solutions |
|---|---|
| Location of electricity services limit the possibility of ignition of surrounding bushland or the fabric of buildings<br><br>Regular inspection of lines in undertaken to ensure they are not fouled by branches. | Where practicable, electrical transmission lines are underground<br><br>Where overhead electrical transmission lines are proposed:<br><br>• Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas: and<br>• No part of a tree is closer to a power line than the distance set out in accordance with the specification in *Vegetation Safety Clearances* issued by *Energy Australia* (NS179, April 2002). |

# Conclusion & Recommendations

# 4

## 4.1 Conclusion

A bushfire protection assessment has been undertaken for the proposed rezoning located at Lot 1021 DP 1054632, on Wycombe Road, Terrigal.

Our assessment found that bushfire can potentially affect the site from the adjoining forest vegetation located beyond Wycombe Road to the west and the remnant forest / freshwater wetland within the rural residential land and road reserve to the south east and south, resulting in possible ember attack, radiant heat and potentially flame attack.

The bushfire risk posed to the rezoning proposal can however be mitigated if appropriate bushfire protection measures (including APZs) are put in place and managed in perpetuity.

Future development on site is to comply with the following planning principles.

**Table 4.1 – Planning principles**

| Planning principles | Recommendations |
|---|---|
| Provision of a perimeter road with two way access which delineates the extent of the intended development. | The proposal is provided within existing perimeter roads, Wycombe and Beaufort Roads. |
| Provision, at the urban interface, for the establishment of adequate APZs for future housing. | APZs have been recommended and exceed the minimum requirements as outline in *PBP*. |
| Specifying minimum residential lot depths to accommodate APZs for lots on perimeter roads. | It is recommended that the entire property is managed as an APZ. The surrounding existing cleared and managed land allows for adequate separation as recommended within Table 2.1 and as depicted within Schedule 1 attached. |
| Minimising the perimeter of the area of land interfacing the hazard, which may be developed. | Compliant. |
| Introduction of controls which avoid placing inappropriate developments in hazardous areas. | Future development consists of residential dwellings and is appropriate for the level of bushfire risk. |
| Introduction of controls on the placement of combustible materials in APZs. | Compliant – can be made a condition of consent. |

The following recommendations are provided to ensure that future residential development is in accordance with, or greater than, the requirements of *PBP.*

## 4.2 Recommendations

**Recommendation 1** – The entire property is to be managed as an APZ. Fuel management within the APZ is to be maintained by regular maintenance of the landscaped areas, mowing of lawns in accordance with the guidelines provided in Appendix 1, and as advised by the RFS in their publications.

**Recommendation 2** – Building construction standards are to be applied for future residential dwellings in accordance with *Australian Standard AS3959 Construction of buildings in bushfire-prone areas (2009)* with additional construction requirements as listed within Section A3.7 of Addendum Appendix 3 of *PBP.*

**Recommendation 3** – Private access roads are to comply with the acceptable solutions provided within Section 4.1.3 of *PBP* (refer Section 3.4 of this report).

**Recommendation 4** – Water, electricity and gas supply is to comply with the acceptable solutions as provided within Section 4.1.3 of *PBP* (refer Sections 3.5, 3.6 and 3.7 of this report).

**REFERENCES**


Australian Building Codes Board (2010) – *Building Code of Australia*, Class 1 and Class 10 Buildings Housing Provisions Volume 2.

Chan, K.W. (2001) – *The suitability of the use of various treated timbers for building constructions in bushfire prone areas*. Warrington Fire Research.

Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bush fire-prone areas.*

Hon Brad Hazzard (7 June 2012) – *Planning proposal to rezone land at Boundary Road, Medowie from 1 (c1) Rural Small Holdings Zone to 1(c5) Rural Small Holdings, 1(c4) Rural Small Holdings and 7(a) Environmental Protection.*

Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change.

Rural Fire Service (2006) - *Planning for bushfire protection– a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service.

Rural Fire Service (2006) - Bushfire Attack Software on RFS Web site.

Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack.* RFS Development Control Service.

Travers, J. (2003) *The Ecological Management of Asset Protection Zones at Wallarah Peninsula – A Case Study*.

Umwelt, 2012. *Ecological Assessment for Rezoning Application Lots 93 – 96 Boundary Road, Medowie.*

# Plan of Bushfire Protection Measures

S1


**Legend**

- Study site (Lot 1021 DP1054632)
- Cadastre
- Edge of vegetation
- Managed land

Aerial source: NearMap (29.04.2013)

| PROJECT & MXD REFERENCE | DATE & ISSUE | SCALE & COORDINATE SYSTEM |
|---|---|---|
| Wycombe Rd, Terrigal<br>A13105_BF001 | 31/10/2013<br>Issue 1 | 1:2,000 @ A4<br>GDA 1994 MGA Zone 56 |

0 25 50 m

TITLE

# Schedule 1 - Bushfire Protection Measures

Document Path: B:\Pete_Travers\Projects\A13105_WycombeRd_BeauforiRd_Terrigal\MXDs\A13105_BF001.mxd

# Management of Asset Protection Zones

# A1

The RFS advises that when living in a bushfire prone environment APZs are required to be provided between hazardous fuels and a dwelling.

The RFS provides basic advice in respect of managing APZs in several documents namely *Planning for Bush Fire Protection 2006 (PBP)* and *Standards for Asset Protection Zones* (undated but circa 2006).

APZs provide a level of defendable space between the hazard and a habitable dwelling or similar structure. These zones are usually shown on plans adjacent to either cultural or natural assets (e.g. dwelling). They act to significantly lessen the impact of intense fire. The major mitigating factor that limits the effects of wildfire is the amount of fuel available to burn. By reducing the amount of fuel there will be a reduction in the intensity of the fire.

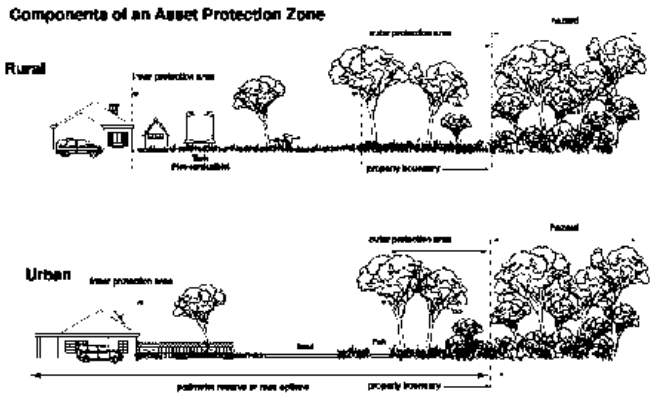
When considering bushfire fuel it is important to understand that it occurs in our native bushland in three vertical layers – see Table 1.

**Table 1 – Fuel layers**

| Fuel layer name | Location of layer in vertical column | Type of fuel |
|---|---|---|
| Ground fuels | Below ground level | Peatmoss (always below the surface) |
| Surface fuels | 0-200mm | Litter layer (leaves & twigs) |
| Aerial fuels | 200-3,000mm | Shrubs and grasses |
| Canopy fuels | >3,000mm | Tree canopy |

The APZ can be further classified into two sub-zones with each having a specific role. These sub-zone areas are called the inner protection area (IPA) and the outer protection area (OPA) – see figure below.

The IPA is managed as a fuel free zone while the OPA is managed as a fuel reduced zone. This means that the fuel free zone has little fuel available to be consumed in the event of a fire whilst the fuel reduced zones has less than normal fuel levels that could be consumed in the event of a fire.




***Inner protection area (IPA)***

This area is almost free of all fuels and usually takes the form of grassy areas, car parks, roads, concrete areas, tracks or trails. It does not imply or require the wholesale removal of every tree and or shrub.

This zone is intended to stop the transmission of flame and reduce the transmission of radiant heat by the elimination of available fuel. This area also allows airborne embers to fall safely without igniting further outbreaks.

This zone also provides a safe fire fighting position and is operationally important for implementation of clear fire control lines.

Grasses may occur within an IPA if they are generally no higher than 50-75mm. Above this height, fuel weights tend to increase exponentially and consequentially cause greater flame heights and therefore fire intensity

Shrubs may occur within an IPA in the form of clumping amidst open grassy areas. The design of the clumping will be dependent on species selection and spatial density. For example, the larger the shrubs the less clumping may occur in a given area.

As a general rule, trees are allowed within an IPA but only where those trees are at least 5m away from a dwelling.

A recommended performance standard for the fuel load of an IPA is between 0-4t/ha. Shrubs may occur within an IPA commensurate with a spatial distribution of 15-20%. For example an area of 100m$^2$ (10mx10m) can have up to 20% of this area composed of shrubs.

If a shrub layer is present the following table shows the additional fuel weights that should be added to the calculated surface fuels.

| Shrub cover | Fuel weight |
|---|---|
| 10-30% | 2.5 tonnes / ha |
| 35-50% | 5.0 tonnes / ha |
| 55-75% | 7.5 tonnes / ha |

***Presence of trees within an inner protection area***

A tree may occur within an IPA if the canopy does not form a link with shrubs. The reason is to lessen any chance for vegetation linking and the capability for fire to extend into the canopy.

It is a basic premise in fire behaviour understanding that fire cannot occur in the canopy unless surface fuels such as grasses or shrubs are burning. This merging creates opportunity for fire to link with the canopy and therefore increase fire intensity by some significant amount.

Trees that have a canopy beginning near the ground (such as Forest Oaks *Allocasuarina*) form a continuous link with the tree canopy and shrubs. A forest canopy cannot therefore burn without fuel to feed that fire. In a tall open forest, where the trees are generally above 20m in height the canopy is separated from the land surface by some distance. In an open woodland the low canopy height (usually <5m) merges with the shrubland layer.

Knowing the relationship between the shrub layer and the tree canopy allows fire managers to design safer areas in the APZs. It is for this reason that vegetation such as Forest Oaks are usually excluded from an IPA.

Similarly, in open forests the height of the forest is sufficiently removed from the shrub layer. As a general rule, trees are allowed within an IPA where the density of those trees is commensurate with Table 2 below and located on slopes up to 20% with a westerly aspect.

In respect of trees that can be located in an IPA Table 2 provides guidelines.

**Table 2 – Tree density in inner protection area**

| Distance from dwelling wall | Trees permitted on the exposed side of a dwelling | Trees permitted on the non exposed side of a dwelling |
|---|---|---|
| Within 5m | No trees | No trees |
| Between 5-10m | One tree per 100m$^2$ | 2 trees per 100m$^2$ |
| Between 10-20m | <10 tree per 400m$^2$ | <10 trees per 400m$^2$ |

***Outer protection area (OPA)***

This zone is designed to stop the development of intense fires and the transmission of severe radiated heat.

The OPA assumes all trees will remain but with either a modified shrub / grass layer or regular removal of the litter layer. In some sparse vegetation communities the shrub layer may not require modification.

The fire fighting advantage will manifest in reduced fire intensity. It achieves this by denying fire a significant proportion of the fuel to feed upon. Fuels containing small (or fine) leaves such as Forest Oaks (or similar) are targeted for removal due to the capacity to burn quickly and therefore feed fire up into adjacent trees.

In most cases, the removal of 85% of the litter layer will achieve a satisfactory OPA. A recommended performance standard for the fuel load of an OPA is between 4-6t/ha.

**Managing the APZ**

Fuel management within the APZs should be maintained by regular maintenance such as:

- Mowing grasses regularly - grass needs to be kept short and, where possible, green.

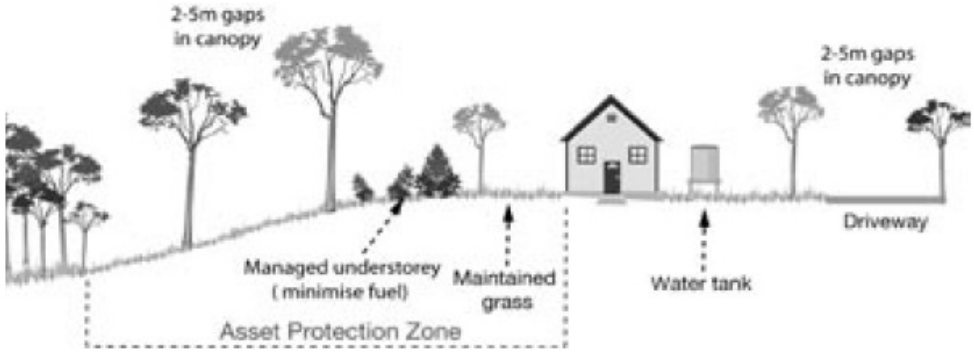
- Raking or manual removal of fine fuels - ground fuels such as fallen leaves, twigs (less than 6mm diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire. Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

- Removal or pruning of trees, shrubs and understorey - the control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation. Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by 2-5m. A canopy should not overhang within 2-5m of a dwelling. Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

- Trees or tall shrubs may require pruning upon dwelling completion in line with *PBP.* Notwithstanding this, the presence of shrubs and trees close to a dwelling in a bushfire prone landscape requires specific attention to day to day management and owners and or occupier should be made aware that whilst landscaping can contribute to a way of life and environmental amenity the accumulated.

In addition, the following general APZ planning advice should be followed:

- Ensure that vegetation does not provide a continuous path to the house.
- Plant or clear vegetation into clumps rather than continuous rows.
- Prune low branches 2m from the ground to prevent a ground fire from spreading into trees.
- Locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission.
- Ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low flammability plants and non flammable ground cover such as pebbles and crushed tile; and
- The following RFS illustrative diagram depicts one version of an ideal situation. Specific advice is to be sought from qualified experts to ensure that the implemented APZs meet the performance criteria of APZs.




Figures courtesy of NSW RFS 2006.