Travers

bushfire & ecology

bushfire protection assessment

Rezoning Application
Lot 21 DP862841
1590 Burragorang Road, Oakdale

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

FPA AUSTRALIA
Certified Business
Bushfire Planning
& Design

April 2013
(REF: A13003B)

Bushfire Protection Assessment

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Date:	17 April 2013
File:	A13003B

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 guidelines *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.

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Executive Summary

A bushfire protection assessment has been has been prepared to identify the potential bushfire constraints for the purposes of a future rezoning application at 1590 Burragorang Road, Oakdale, NSW.

The proposal is located on land mapped by *Wollondilly Shire 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* and to take into account any comments by the Commissioner. *Direction 4.4, Planning for Bush Fire Protection 2006 (PBP)* identifies matters for consideration for planning proposals that will affect, or are in proximity to, land mapped as bushfire prone.

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 perimeter roads, 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.

Our assessment found that bushfire can potentially affect the site from the forest vegetation located to the north of the proposed residential zoning and unmanaged grassland vegetation to the 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 *Planning for Bush Fire Protection 2006* and *Community Resilience Practice Note 2/12 – Planning Instruments and Policies*.

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Glossary of Terms

APZ	asset protection zone
AHIMS	Aboriginal Heritage Information System
BCA	*Building Code of Australia*
BSA	bushfire safety authority
EEC	Endangered Ecological Community
FDI	fire danger index
IPA	inner protection area
LEP	*Local Environmental Plan*
OPA	outer protection area
PBP	*Planning for Bush Fire Protection 2006*
NSW RFS	*NSW Rural Fire Service*
SFPP	special fire protection purpose
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2009*

Table of Contents

Introduction 1

Travers bushfire & ecology has been requested by *SMEC Urban to* undertake a bushfire protection assessment for the proposed rezoning of Lot 21 DP 862841, 1590 Burragorang Road, Oakdale.

The proposal is located on land mapped by *Wollondilly Shire Council* as being bushfire prone. *Direction 4.4, Planning for Bush Fire Protection 2006 (PBP)* identifies matters for consideration for planning proposals that will affect, or are in proximity to, land mapped as 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* and to take into account any comments by the Commissioner.

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, asset protection zones (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 current zoning of the site, in accordance with Wollondilly LEP 2011, is RU1 - Primary Production.

The proposed zones have been determined by the ecological constraints prepared by *Travers bushfire & ecology* in March 2013 - see Figure 1.1.

These include;

- **E3 Environmental Management** – in this case for lands that provide protection and buffers for watercourses and contain existing and potential threatened species habitat
- **E4 Environmental Living** – in this case for existing forested slopes that may be sensitively developed such as the existing degraded portions of the EEC, Shale / Sandstone Transition Forest, subject to offsetting provisions.
- **Residential Zones** such as R2 Low Density Residential, R3 Medium Density Residential or R5 Large Lot Residential for all cleared or low condition vegetation areas.

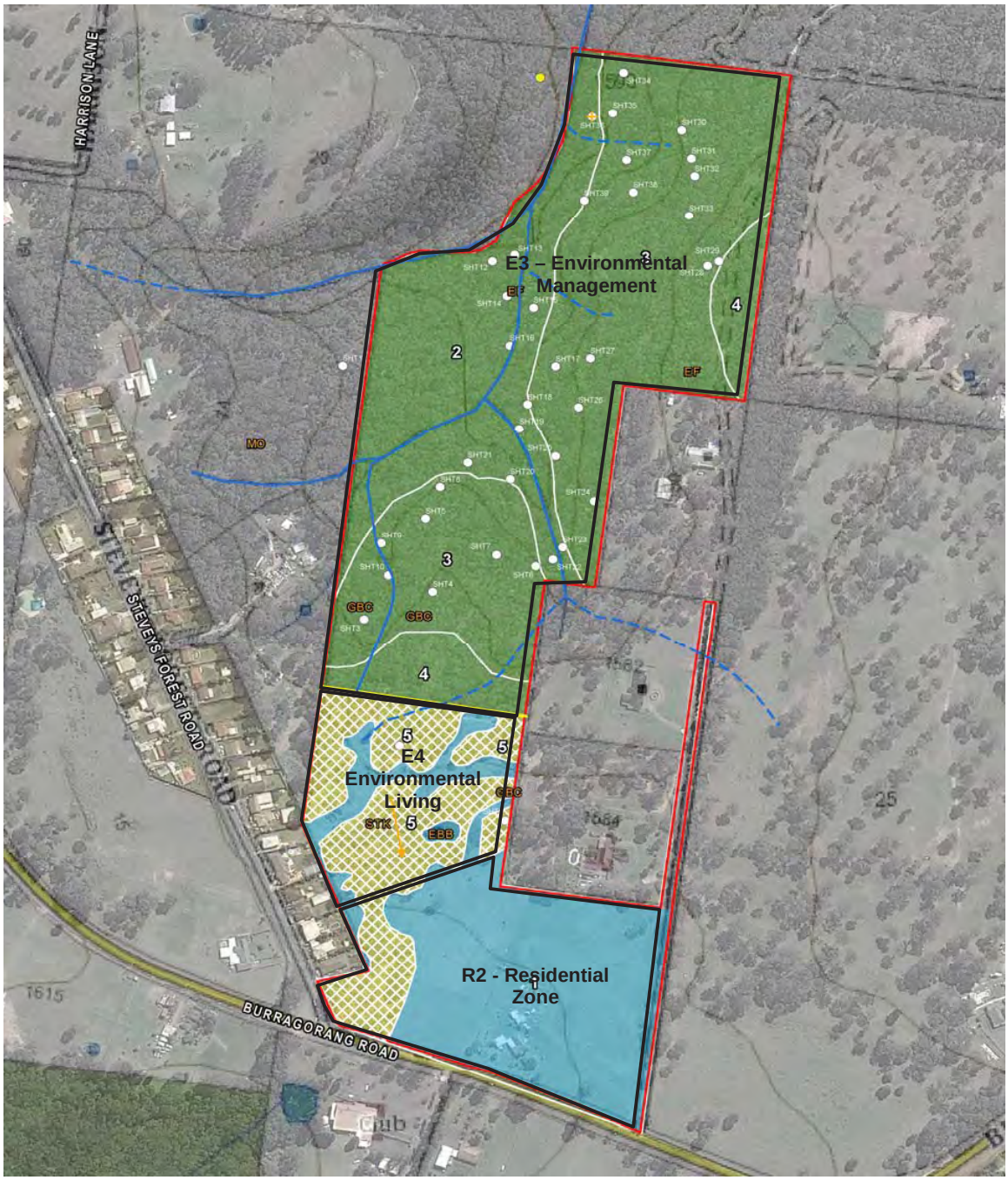


Figure 1.1 – Recommended Zones

The proposal at this stage does not involve a concept plan and, as such, the bushfire constraints have been highlighted and minimum APZs have been recommended based on the recommended zoning. Recommendations have also been made for future road design, building construction, water supplies and utilities.

1.3 Information Collation

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

- Wollondilly Local Environmental Plan 2011
- Wollondilly Development Control Plan 2011
- Ecological Constraints Analysis – Rezoning Study Lot 21 DP 86284, 1590 Burragorang Road, Oakdale, 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 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 21 DP862841, 1590 Burragorang Road, Oakdale (refer Figure 1.2). It is situated to the north east of the intersection of Burragorang Road and Steveys Forest Road within the local government area of Wollondilly.

The site is adjoined in part by residential properties (small lot) and rural residential properties fronting Steveys Forest Road to the west as well as large lot rural residential properties to the east and south. Extensive bushland vegetation is located within the northern portion of the site and continues further to the north. A 10m wide easement is located on the eastern boundary.

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

Table 1.1 – Site features

Location	Lot 21 DP 862841, 1590 Burragorang Road, Oakdale
Local government area	Wollondilly
Elevation	430-440m AMSL
Topography	There are gentle slopes on the southern side of the study area with slightly steeper slopes running north east. The beginning of Horse Creek watercourse is running north east from the northern boundary of the site area.
Geology	Oakdale sits on the edge of where Ashfield shale meets Hawkesbury sandstone.
Catchment and drainage	The study area drains north east towards Horse Creek which comes off Lake Burragorang and travels through the study site.
Vegetation	Forest / woodland structure in residual vegetation. Gully forest along creek lines. Cleared or managed remnants of vegetation within the southern portion.
Existing land use	Rural residential with some grazing animals.
Clearing	The majority of the southern portion of the study area has been cleared or managed, with areas of regrowth and some remnant canopy.

Figure 1.2 – Aerial Appraisal
(Source: *Spatial Information Exchange*)

1.5 Legislation and Planning Instruments

1.5.1 Environmental Planning and Assessment Act 1979 (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 *Wollondilly Shire Council* as being bushfire prone (refer Figure 1.3). The entire site and surrounding land within 100m of the site is identified as being Category 1 vegetation.

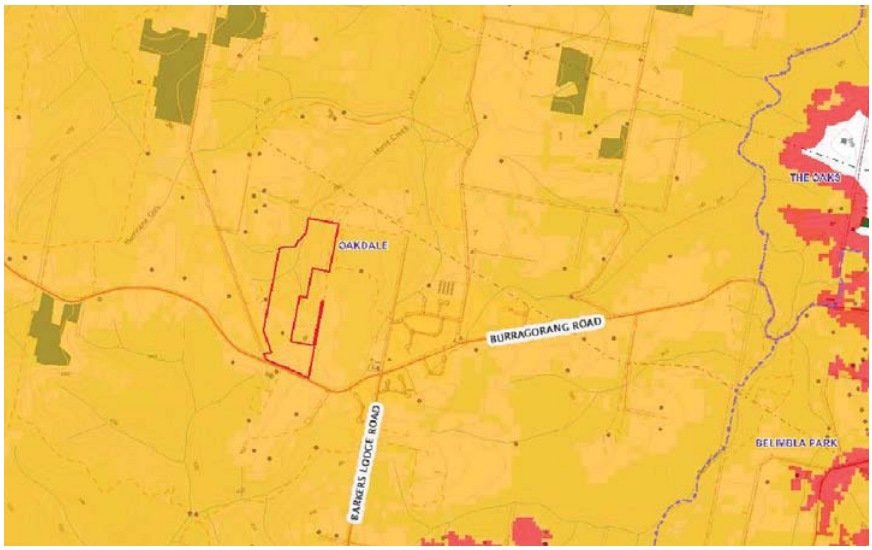


Figure 1.3 – Bushfire Prone Land Map
(Source: Wollondilly Shire Council)

PBP (pg 4) stipulates that if a proposed amendment to land use zoning or land use affects a designated bushfire prone area then the Section 117(2) Direction No 4.4 of the *EP&A Act* must be considered. This requires Council to consult with the Commissioner of the NSW RFS and to take into account any comments by the Commissioner and to have regard to the planning principles of *PBP* (detailed within Section 1.5.3).

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 *Wollondilly LEP 2011* as outlined below.

Wollondilly Local Environmental Plan 2011

The site is zoned under the current *Wollondilly LEP 2011* as RU1 – Primary Production - refer Figure 1.4).

The land surrounding the property to the north, east and west is also RU1 Zone, with a small portion of land to the south zoned as RE2 – Primary Production.

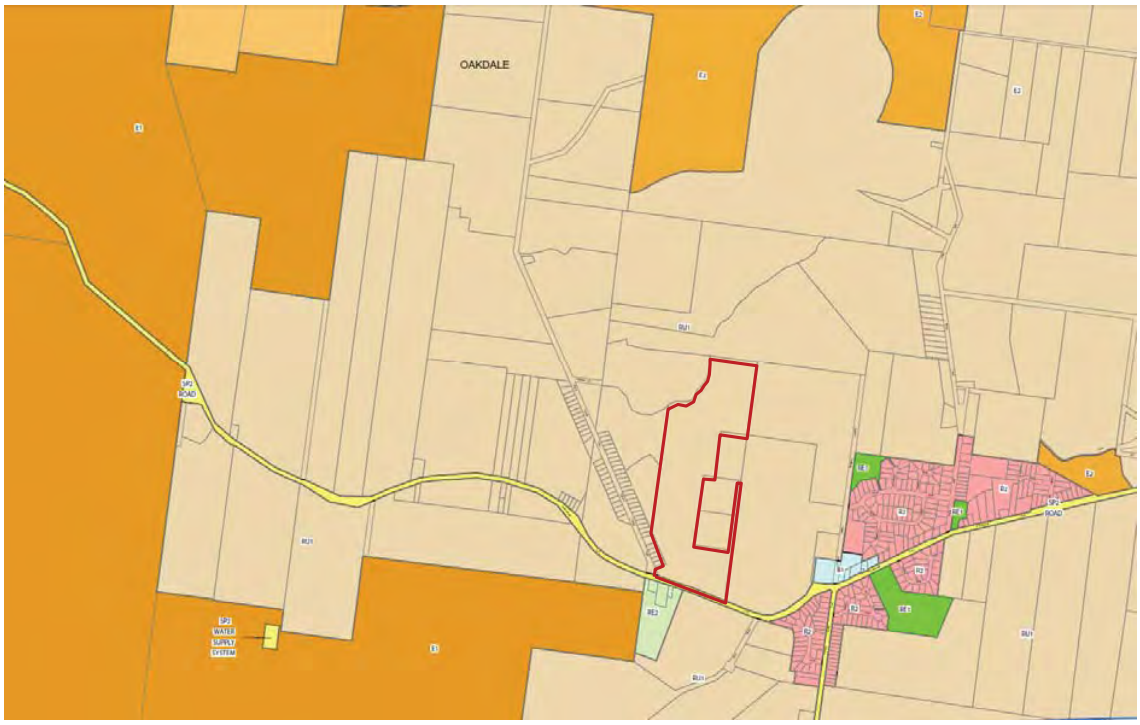


Figure 1.4 – Current Zoning
(Source: *Wollondilly Council LEP 2011*)

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

1.5.3 Planning for Bush Fire Protection 2006 (PBP)

Bushfire protection planning requires the consideration of the *NSW 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 Class 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 setbacks for each dwelling construction level and can be used in future planning for master plans and / or subdivision proposals.

1.6 Environmental and Cultural Constraints

1.6.1 Environmental Constraints

A review of the ecological constraints analysis prepared by *Travers bushfire & ecology* has been undertaken to identify constraints and to ensure the APZs provided do not negatively impact upon the environment. The report identified the following constraints:

- Five (5) threatened fauna species have been recorded within, or immediately adjacent to, the site including:

    - Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
    - Square-tailed Kite (*Lophoictinia isura*)
    - Masked Owl *Tyto novaehollandiae*)
    - Eastern Bentwing-bat (*Miniopterus orianae oceansis*)
    - Eastern Falsistrelle (*Falsistrellus tasmaniensis*)

- One (1) Endangered Ecological Community (EEC), Shale / Sandstone Transition Forest was recorded (refer Schedule 1 for location)

- Numerous Riparian Corridors. The extent of the riparian zones and the mapping of these zones would need to be based on detailed land contour survey.

The Ecological Constraints analysis concluded that the main ecological constraint within the subject lands is the Endangered Ecological Community (EEC) Shale / Sandstone Transition Forest located on the plateau areas which are most likely to be subject to rezoning for development. The report recommends that the loss of EECs may be managed through protection of the main stands, selective clearing of vegetation rather than clear-felling, revegetation works in disturbed patches and / or closing existing tracks which would become redundant.

In terms of the implementation of APZs, it is recommended that the retention of vegetation is considered in relation to the requirement for APZ management adjacent to built residential assets. Consideration will also be required to ensure the APZs recommended within this report are excluded from the identified riparian buffers.

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:

- The retained forest vegetation within the proposed E3 zoned land to the north.
- The proposed retention of any vegetation within the proposed E4 zoned land will also need to be considered. Generally, the retention of vegetation with a size of less than 1ha or a fire run (vegetated width) not exceeding 50m can be considered as remnant forest. The threat posed by remnant vegetation is considered low and APZ setbacks are determined based on a reduced 'rainforest' category.

The site inspection has revealed that the grassland surrounding the site to the east, west and south is currently managed / grazed (refer Photo 3). Please note that *AS3959* states that managed grassland in a minimal fuel condition is regarded as low threat vegetation. Managed grass does not require APZ or BAL construction standards. Minimal fuel condition is recognised as short-cropped grass (i.e. nominal height of 100mm). It is recommended that the future use and management of the surrounding land is reassessed at development application stage to determine if these grassland areas remain managed and if APZs are required.

The following photographs depict the hazardous vegetation surrounding the site:

Photo 1 – Shale / Sandstone Transition Forest looking southward towards the dam

Photo 2 – Upper Georges River Sandstone Woodland within the northern portion of the site

Photo 3 – Cleared paddock looking south west from the lane way on the western boundary

2.2 Effective Slope

The effective slope is assessed for a distance of 100m. 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 degrees downslope within the retained vegetation to the north
- Level within any proposed retained vegetation within the E4 zoned portion of the site.

2.3 Bushfire Attack Assessment

A Fire Danger Index (FDI) of 100 has been used to calculate bushfire behaviour based on the sites location within the Greater Sydney region.

Table 2.1 below 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
North	Forest	$0–5^{0D}$	32m
East	Managed Grassland (refer Note 1)	$0–5^{0D}$	10m (existing easement)
South	Managed Grassland (refer Note 1)	Level	9m (Burrangorang Road)
West	Managed grassland and residential development (refer Note 1)	Level	N/A
Retained vegetation within the E4 zoned land	Forest (refer Note 2)	Level	25m
	Remnant Forest (refer Note 3)	Level	11m

*Notes: * Slope is either 'U' meaning upslope or 'C' meaning cross slope or 'D' meaning downslope*

Note 1: Adequate APZs for a grassland threat has been provided. It is recommended that the future use and management of the land to the east, west and south is reassessed at development application stage to determine if BAL construction levels will be required.

Note 2: The retention of any vegetation within the E4 zoned land exceeding a size of 1ha will be assessed as 'Forest'.

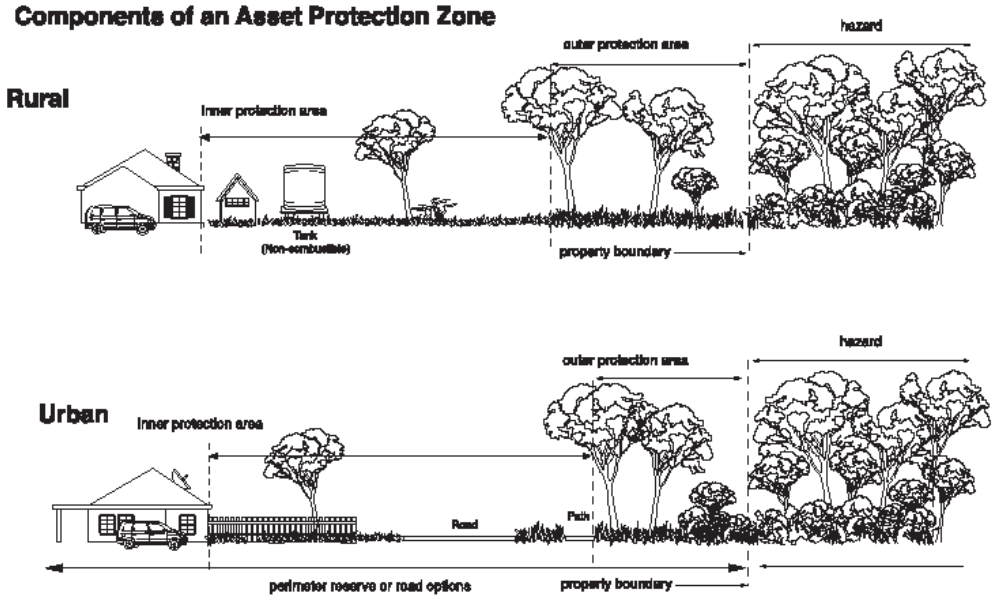
Note 3: The retention of remnant vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 50m will be assessed as Rainforest. In that case the threat posed by remnant vegetation is considered low and APZ setbacks are the same as for the Rainforest category.

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 APZs are wholly within the boundary of the development site	Yes - refer Table 2.1
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 degrees.	Yes - Slopes are less than 18 degrees

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 and subdivision design.

The NSW RFS has released an interim amendment to *PBP* in the form of Appendix 3. This amendment follows the adoption on 1 May 2010 of *AS3959* through the BCA. This appendix, in conjunction with Table 2.4.2 of *AS3959*, is used to determine construction considerations when building on bushfire prone land.

The construction classification system is based on five (5) bushfire attack levels (BALs). 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.

Table 3.2 provides an indication of the BALs that are likely to apply for future building construction. These BAL levels are for planning purposes only and will be assessed / confirmed prior to building construction stage.

Table 3.2 – Determination of Bushfire Attack Level (BAL)

Aspect	Vegetation formation within 140m of development	Effective slope of land	Minimum APZ required equivalent to BAL 29	Construction standards
North	Forest	0–5^{0D}	32m	BAL 29 (32 -<43m) BAL 19 (43 - <57m) BAL 12.5 (57 - <100m)
East	Managed Grassland	0–5^{0D}	N/A	Refer Note 1
South	Managed Grassland (refer Note 1)	Level	N/A	Refer Note 1
West	Managed grassland and residential development	Level	N/A	Refer Note 1
Retained vegetation within the E4 zoned land	Forest	Level	25m	BAL 29 (25 -<35m) BAL 19 (35 - <48m) BAL 12.5 (48 - <100m)
	Remnant Forest	Level	11m	BAL 29 (11 -<16m) BAL 19 (16 - <23m) BAL 12.5 (23 - <100m)

*Notes: * Slope is either 'U' meaning upslope or 'C' meaning cross slope or 'D' meaning downslope*

Note 1: It is recommended that the future use and management of the neighbouring land to the east, south and west is reassessed at development application stage to determine the final APZ distances and BAL construction levels required. If it can be determined that this grassland exhibits minimal fuel condition (i.e. short-cropped grass with nominal height approximate to 100mm) then APZ's and BAL levels will not be required.

3.3 Hazard Management

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

The APZs are to be managed in accordance with the NSW RFS guidelines *Standards for Asset Protection Zones (RFS, 2005)* with landscaping to comply with Appendix 5 of *PBP.*

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

3.4 Access for Fire Fighting Operations

Future residential development within the site will access Burragorang Road to the south.

Table 3.3 outlines the performance criteria and acceptable solutions for future public roads within future subdivision design.

Table 3.3 – Performance criteria for public roads (*PBP* guidelines pg. 20)

Performance Criteria	Acceptable Solutions
Fire fighters are provided with safe all weather access to structures (thus allowing more efficient use of fire fighting resources).	Public roads are two-wheel drive, all weather roads.
Public road widths and design that allow safe access for fire fighters while residents are evacuating an area.	Urban perimeter roads are two way, that is, at least two traffic lane widths (carriageway 8m minimum kerb to kerb) allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 3.4 below. Perimeter road is linked with the internal road system at an interval of no greater than 500m in urban areas. Traffic management devices are constructed to facilitate access by emergency services. Public roads have a cross fall not exceeding 3 degrees. All roads are through roads. If unavoidable dead end roads are not more than 200m in length, incorporate a minimum 12m outer radius turning circle, sign posted dead end and direct traffic away from the hazard. Curves of roads (other than perimeter) have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress. The minimum distance between inner and outer curves is 6m. Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees. Minimum vertical clearance of 4m above the road at all times.
The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles.	The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles (15 tonnes for reticulated water and 28 tonnes for all other areas). Bridges clearly indicate load rating.
Roads that are clearly sign posted (with easily distinguishable names) and buildings / properties that are clearly numbered.	Public roads >6.5m wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water. Public roads 6.5 - 8m wide are No Parking on one side with the hydrant located on this side to ensure accessibility to reticulated water. Public roads <6.5m wide provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water. One way only public access are no less than 3.5m wide and provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water.

Performance Criteria	Acceptable Solutions
There is clear access to reticulated water supply. Parking does not obstruct the minimum paved width.	Parking bays are a minimum of 2.6m wide from kerb edge to road pavement. No services or hydrants are located within parking bays. Public roads directly interfacing the bushfire hazard are to provide roll top kerbing to the hazard side of the road.

Table 3.4 – Minimum widths for public roads that are not perimeter roads

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

3.5 Water Supplies

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

Table 3.5 outlines the performance criteria and acceptable solutions for reticulated water supply.

Table 3.5 – 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. 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. Hydrants are not placed within any road carriageway All above ground water and gas pipes external to the building are metal, including and up to taps. The provisions of parking on public roads are met.

3.6 Gas

Table 3.6 outlines the required performance criteria for the gas supply.

Table 3.6 – Performance Criteria for Reticulated Water 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. 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. 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. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used.

3.7 Electricity

Table 3.7 outlines the required performance criteria for electricity supply.

Table 3.7 – 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. Regular inspection of lines in undertaken to ensure they are not fouled by branches.	Where practicable, electrical transmission lines are underground Where overhead electrical transmission lines are proposed: • Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas: and • 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 has been prepared to identify the potential bushfire constraints for the purposes of a future rezoning application of 1590 Burragorang Road, Oakdale, NSW.

Our assessment found that bushfire can potentially affect the site from the forest vegetation located to the north of the proposed residential zoning and unmanaged grassland vegetation to the 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.	It is advised that future road design should include a perimeter 'public road' (for small lot residential) or alternatively a 'fire trail' (for large lot residential) between the proposed dwellings and the bushfire prone vegetation.
Provision, at the urban interface, for the establishment of adequate asset protection zones for future housing.	APZs have been recommended in compliance with BAL 29 (AS3959, 2009).
Specifying minimum residential lot depths to accommodate asset protection zones for lots on perimeter roads.	Future subdivision design is to allow for the BAL 29 APZs 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 asset protection zones.	Compliant – can be made a condition of consent.

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

4.2 Recommendations

Recommendation 1 - APZs are to be provided to the future residential development. APZs are to be measured from the exposed wall of the any dwelling toward the hazardous vegetation. The minimum APZ must be achievable within all lots fronting the bushfire hazard as nominated in Table 2.1 and also as generally depicted in Schedule 1.

Recommendation 2 - Fuel management within the APZs 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 *NSW RFS* in their publications.

Recommendation 3 – Careful consideration is to be given to the retention of vegetation within the E4 – Environmental Living Zone. Development of the concept / subdivision plan should take into account the APZ recommended within Table 2.1.

Recommendation 4 - 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 5 – Public access roads are to comply with the acceptable solutions provided within Section 4.1.3 of *PBP* (refer Section 3.4 of this report). The apparent easement on the eastern boundary should be clarified for its future use. Should it be a road then it provide an insitu APZ use which is beneficial for future development sited near that boundary.

Recommendation 6 – 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 & 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.

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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.

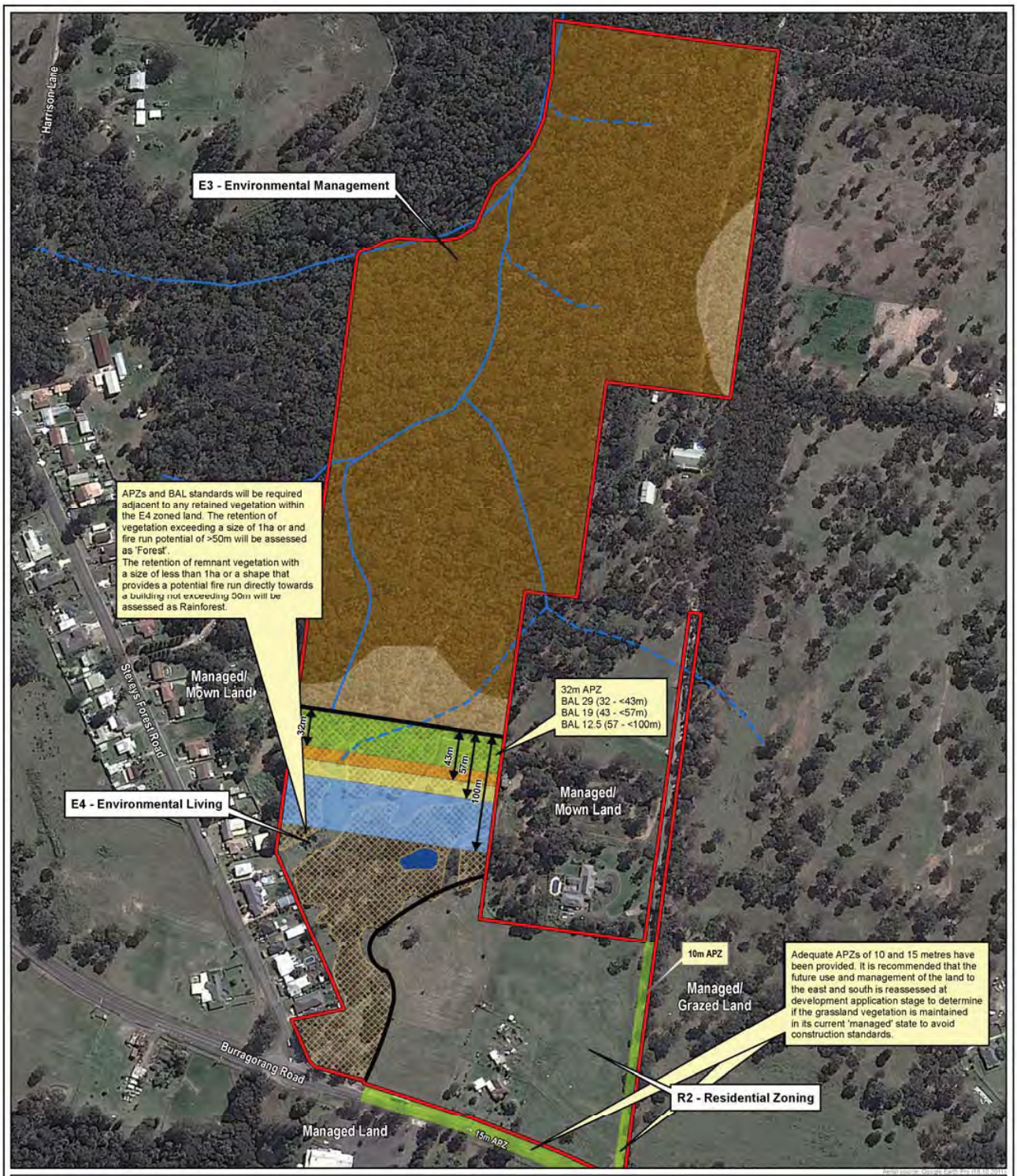
Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack.* RFS Development Control Service.

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


Harrison Lane
E3 - Environmental Management
APZs and BAL standards will be required adjacent to any retained vegetation within the E4 zoned land. The retention of vegetation exceeding a size of 1ha or and fire run potential of >50m will be assessed as 'Forest'.
The retention of remnant vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 30m will be assessed as Rainforest.
Managed/ Mown Land
Stevens Forest Road
32m
43m
57m
100m
32m APZ
BAL 29 (32 - <43m)
BAL 19 (43 - <57m)
BAL 12.5 (57 - <100m)
E4 - Environmental Living
Managed/ Mown Land
10m APZ
Managed/ Grazed Land
Adequate APZs of 10 and 15 metres have been provided. It is recommended that the future use and management of the land to the east and south is reassessed at development application stage to determine if the grassland vegetation is maintained in its current 'managed' state to avoid construction standards.
Burragorang Road
R2 - Residential Zoning
Managed Land
15m APZ
Legend
Study site
Proposed zoning boundary
Mapped creeklines (from topographic map)
Drainage line (from contour & site observation)
Asset Protection Zone
Bushfire Construction Standards
AS3959 (2009)*
BAL 12.5
BAL 19
BAL 29
Vegetation Formations
Dam with occasional sedges
Forest
Endangered Ecological Communities
Shale-Sandstone Transition Forest
Shale-Sandstone Transition Forest (diminished quality)
*Please refer to additional construction requirements for BAL levels that are contained in Addendum Appendix 3 of Planning for Bushfire Protection (2006)
Travers bushfire & ecology
PROJECT & MAP REFERENCE
Burragorang Road, Oakdale
A13003_BF01
DATE & ISSUE NUMBER
17/04/2013
Issue 1
SCALE & COORDINATE SYSTEM
1:3,000 @ A3
GDA 1994 MGA Zone 56
0 70 140 m
TITLE
Schedule 1: Bushfire Protection Measures
Disclaimer: 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.

Management of Asset Protection Zones

A1

The *NSW Rural Fire Service (RFS)* advises that when living in a bushfire prone environment APZs are required to be provided between hazardous fuels and a dwelling.

The *NSW 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.

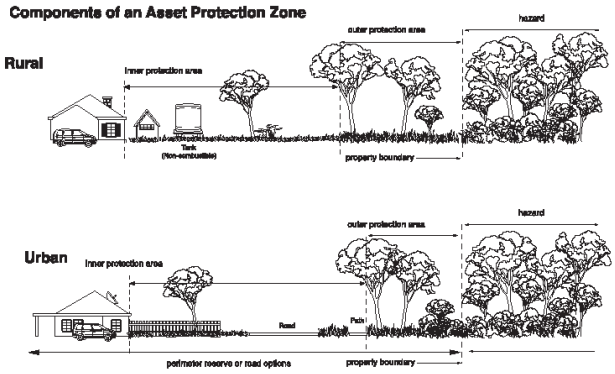
When considering bushfire fuel it is important to understand that it occurs in our native bushland in three vertical layers – see Table 1.

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	200-3000mm	Shrubs and grasses
Canopy Fuels	>3000mm	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 – 4 t/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 4-6 t/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.

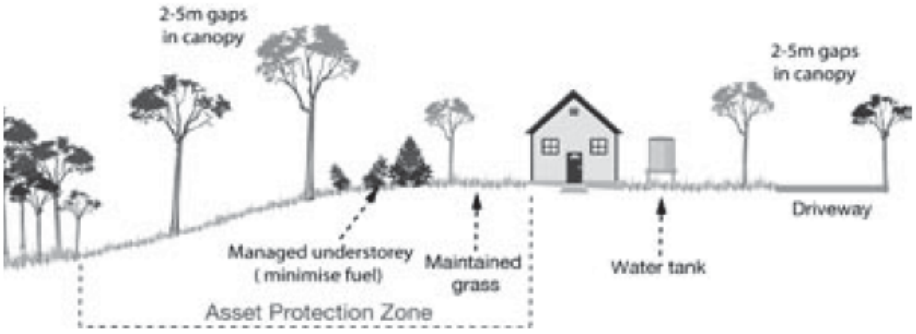
- Raking or manual removal of fine fuels - Ground fuels such as fallen leaves, twigs (less than 6mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire. Fine fuels can be removed by hand or with tools such as rakes, hoes and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

- Tree 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 crush tile; and
- The following *NSW 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.