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bushfire & ecology

bushfire protection assessment

The Falls Estate
Lot 1113 DP 752038
Barnes Road, Frenchs Forest

FPA AUSTRALIA
Certified Business Bushfire Planning & Design

September 2014
(REF: A14054B)

Bushfire Protection Assessment

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Lot 1113 DP 752038
Barnes Road, Frenchs Forest

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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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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*
BAL	*bushfire attack level*
BCA	*Building Code of Australia*
BSA	bushfire safety authority
EP&A Act	*Environmental Planning & Assessment Act 1979*
FDI	fire danger index
IPA	inner protection area
LEP	Local Environmental Plan
OPA	outer protection area
PBP	*Planning for Bush Fire Protection 2006*
RF Act	*Rural Fires Act 1997*
RFS	NSW Rural Fire Service
SFPP	special fire protection purpose

EXECUTIVE SUMMARY

This bushfire protection assessment has been undertaken for the proposed expansion of the recently approved low care seniors living facility at Barnes Road, Frenchs Forest. The previous approval involved the conversion and refurbishment of the existing dwelling for use as a low care seniors living facility.

The notice of determination granted for the previous proposal highlighted the following conditions, which have been incorporated into this report for the proposed expansion of the development.

> ***Condition 15*** - The internal access roads within the property are to be upgraded to comply with 4.2.7 of *Planning for Bush Fire Protection 2006.*
>
> ***Condition 32*** – Positive Covenant – Asset Protection Zone. The establishment of an Asset Protection Zone (APZ) within the Barnes Road reserve, subject to s.138 of the Roads Act, 1993 consent as necessary, is to be subject to a Positive Covenant placed on the title of Lot 1113 in DP 752038 Barnes Road that outlines the property owner's responsibilities under the "Planning for Bushfire Protection 2006".
>
> i) A detailed survey plan is to be provided to Council indicating the extent of the position of the APZ by reference to the road reserve and a plan in registrable form showing the APZ…..

The proposed expansion of the low care seniors living facility is categorised by the NSW Rural Fire Service (RFS) as being a special fire protection purpose (SFPP) development. This classification requires the RFS to issue a *bushfire safety authority* (*BSA*) in accordance with *Planning for bush fire protection 2006* (*PBP*).

PBP dictates that the subsequent extent of bushfire attack that can potentially impact a SFPP building must not exceed a radiant heat flux of 10*kW/m*^{2}. This rating assists in determining the size of the asset protection zone (APZ) to provide the necessary defendable space between hazardous vegetation and a building. The proposal also involves the upgrade of the existing residence to provide for a permanent staff management cottage. This building can have a reduced APZ based on a radiant heat flux of 29kW/m^2.

The assessment found that bushfire can potentially affect the proposed development from the existing tall heath / short heath vegetation located to the north west and the forest vegetation associated with the creek line in the north-east and within the adjoining residential land to the south resulting in possible ember and radiant heat attack.

The bushfire risk posed to the development can however be effectively mitigated if appropriate bushfire protection measures are put in place and managed in perpetuity.

The assessment has concluded that the proposed development will provide:

- Compliance with *PBP*

Other bushfire protection measures are planned and identified within the recommendations of this report.

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Introduction 1

Travers bushfire & ecology has been requested by *Dukor 24 Pty Limited to* undertake a bushfire protection assessment for the proposed expansion of the recently approved low care seniors living facility.

The proposed development is located on land mapped by *Warringah Council* as being bushfire prone. This triggers a formal assessment by the NSW Rural Fire Service (RFS) policy against the provisions of *Planning for Bush Fire Protection 2006 (PBP).*

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 mitigation measures, including the provision of asset protection zones (APZs), construction standards and other specific fire management issues
- Review the potential to carry out hazard management over the landscape

1.2 Project synopsis

In 2013 Council approved the development of a low care seniors living facility on the site. The approval involved the refurbishment of the existing dwelling as well as bushfire protection measures, including asset protection zones both within the site and the adjoining land (Barnes Road Reserve and Lot 1336 DP 752038).

The proposal involves expanding the capacity of an approved residential aged care facility on the site from 10 beds within the existing dwelling house, to a 45 bed facility contained within the existing building and proposed additional buildings on site (refer Figures 1.1 – 1.2).

The proposal also involves the refurbishment of the existing residence located within the north-western portion of the site. This building will be used as a manager's residence (see Schedule 1).

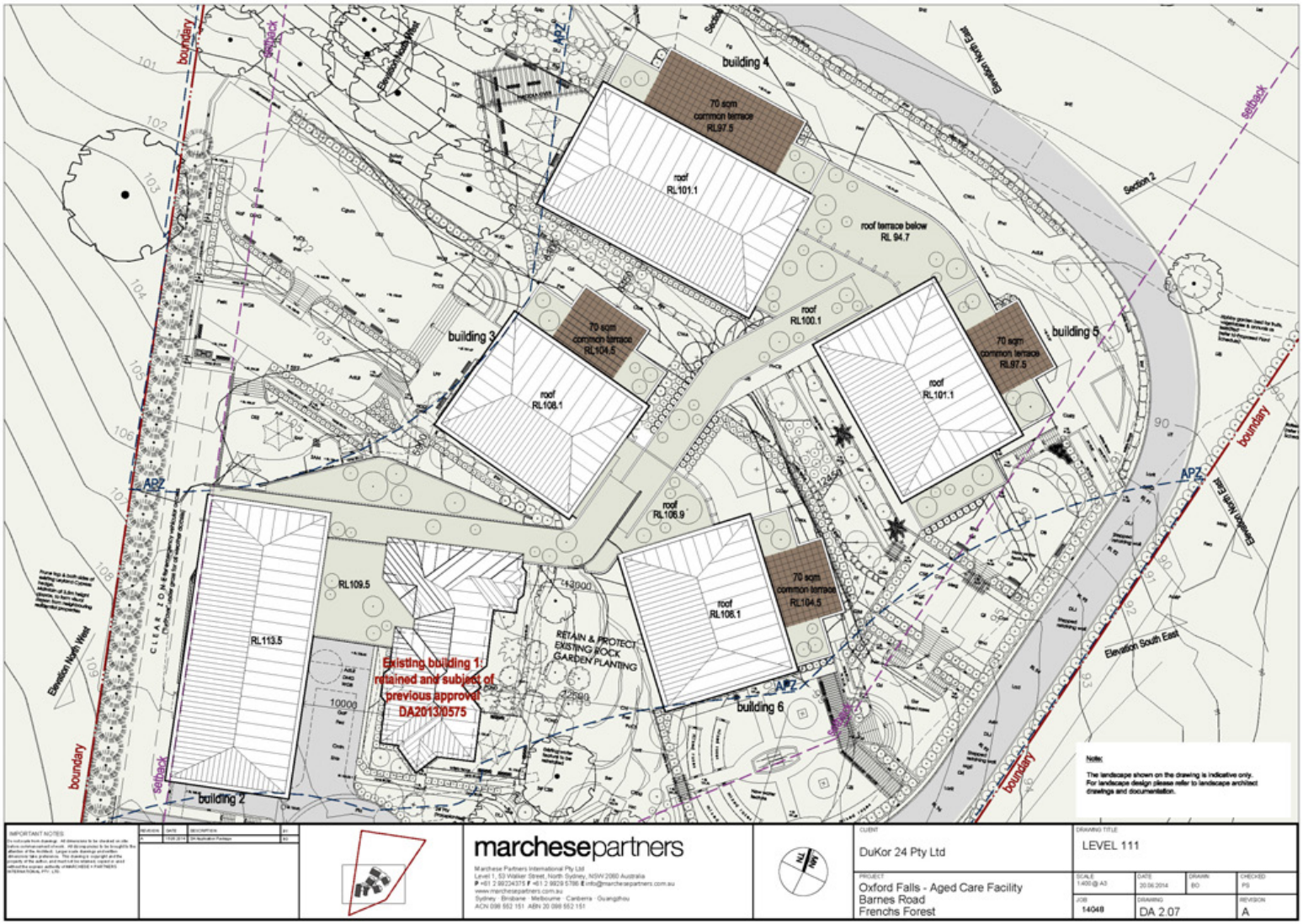


Figure 1.1 – Site plan

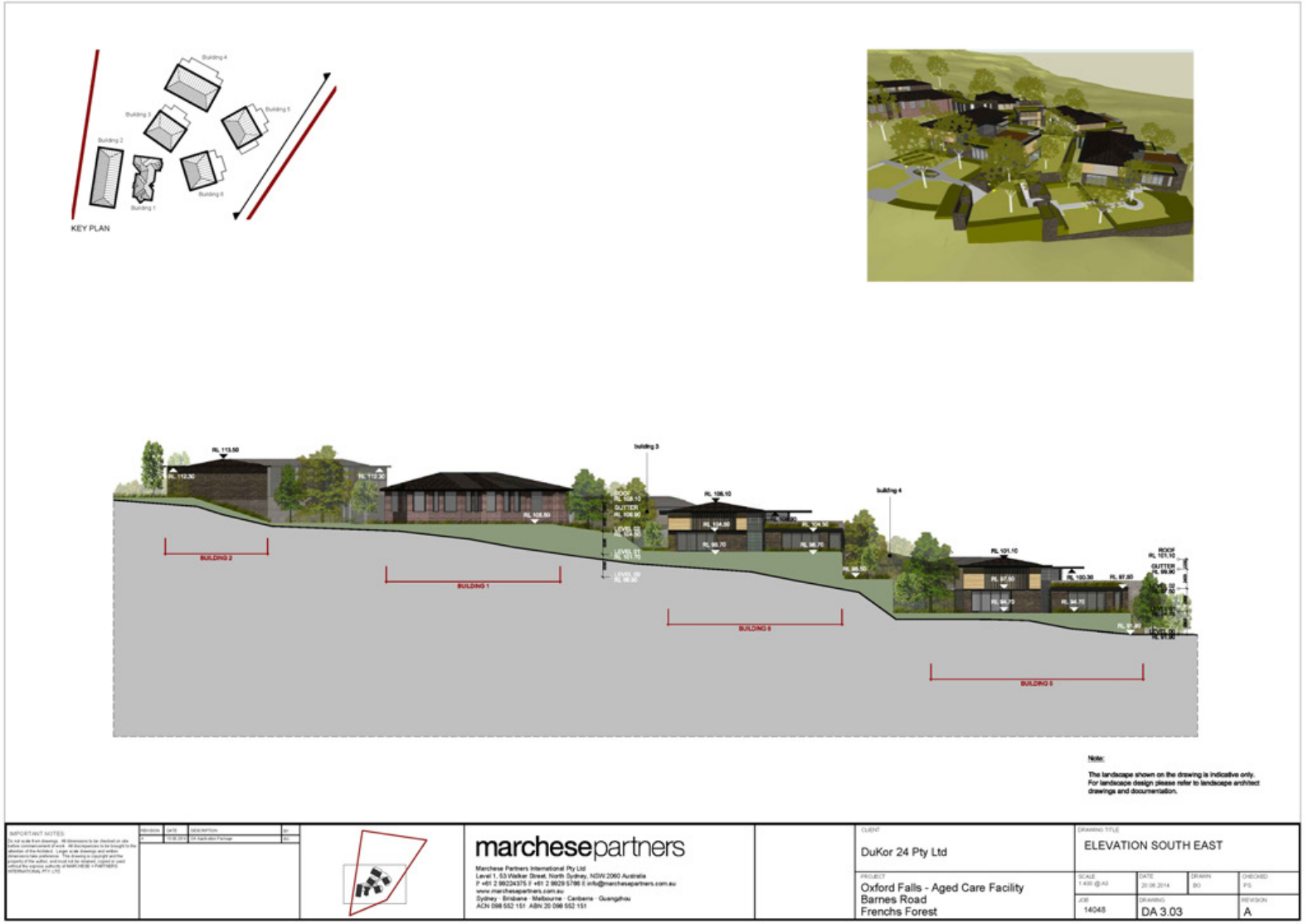


Figure 1.2 – Elevations

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:

- Drawings prepared by *Marchese Partners*, Revision A, dated 15/8/2014
- Landscape plans prepared by *John Chetham & Associates (25/7/2014 & 4/8/12)*
- *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 (NSW RFS).*

An inspection of the proposed development site and surrounds was undertaken by John Travers and Nicole van Dorst on several occasions during February 2013 and May 2014 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 property is situated to the south west of the intersection of Oxford Falls Road and Barnes Road, Frenchs Forest – see location plan Figure 1.3.

Figure 1.3 – Location plan

The majority of the property is currently developed for rural residential use. An existing dwelling is located in the south west with established gardens and out buildings.

The property is bounded to the south west and east by residential and rural residential land and elsewhere by fragmented natural bushland vegetation.

Table 1.1 – Site features

Location	Lots 1113 DP 752038 Oxford Falls Road and Barnes Road, Frenchs Forest
Local government area	Warringah
Grid reference	337700E and 6264700N
Elevation	Approximately 78-114m AHD
Topography	Situated on flat to undulating land. Gradients are generally 0-15%, with steeper grades in the west.
Geology and soils	Soils; Oxford Falls – Moderate to deep soils in valleys with underlying Sandstone. Lambert – Generally shallow soils over Hawkesbury Sandstone. Hawkesbury – Steep inclines, shallow soils. Geology; Hawkesbury Sandstone.
Catchment and drainage	Surface flows within the subject site flow into an unnamed watercourse that cuts within the north eastern portion of the subject site. Middle Creek.
Vegetation	Open Forest, scrub / heath and cleared areas. Refer to Sections 3 and 4
Existing land use	Residential (rural) and grazing by horses
Clearing	The majority of the subject site is cleared vegetation.

1.5 Legislation and Planning Instruments

1.5.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

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, and development controls. The identification of bushfire prone land is required under Section 146 of the *EP&A Act*.

1.5.2 Bushfire prone land

Bushfire prone land maps provide a trigger for the development assessment provisions of Section 100b of the Rural Fires Act and Section 79BA of the *EP&A Act.*

The proposed development is located on land that is partly mapped by *Warringah Council* as being bushfire prone - refer Figure 1.4.

The proposed development is an 'integrated development' under Section 91 of the *EP&A Act*. Consequently, to proceed, the proposed development will require a bushfire safety authority (BSA) from the RFS. The Commissioner must be satisfied that the proposal complies with *PBP* before granting a BSA.

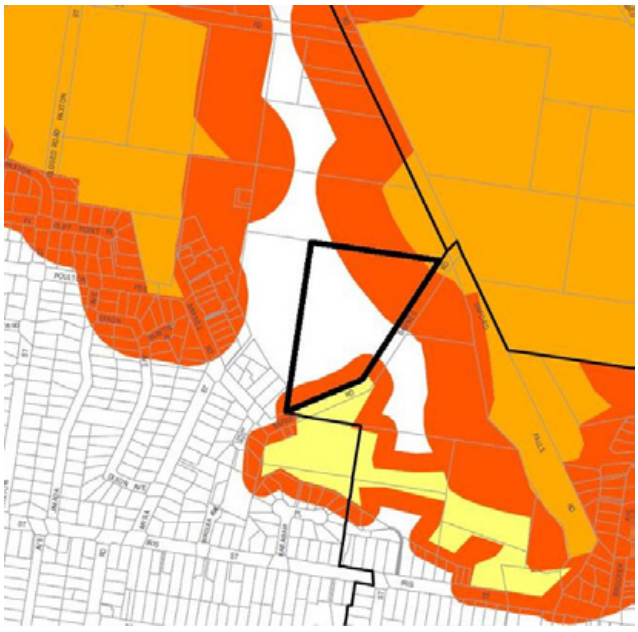


Figure 1.4 – Bushfire Prone Land Map

1.5.3 Rural Fires Act 1997 (RF Act)

This legislation is concerned with the prevention and control of bushfire, hazard reduction and administration.

Section 100B of the *RF Act* states that the Commissioner may issue a *bush fire safety* authority for a *special fire protection purpose* development on bushfire prone land.

1.5.4 Planning for Bushfire Protection 2006 (PBP)

Bushfire protection planning requires the consideration of the RFS planning document entitled *PBP* published in 2006. *PBP* provides planning controls for building in bushfire prone areas 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. More specifically, the aims and objectives for all development located on bushfire prone land should:

1. Afford occupants of any building adequate protection from exposure to a bushfire.

2. Provide for a defendable space to be located around buildings.

3. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevents direct flame contact and material ignition.

4. Ensure that safe operational access and egress for emergency service personnel and residents is available.

5. Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ.

6. Ensure that utility services are adequate to meet the needs of fire fighters (and others who may assist in bushfire fighting).

As the development is a type of development regarded by the RFS as a *special fire protection purpose* development*, PBP* requires additional objectives to be considered. These include the need to:

1. Provide for the special characteristics and needs of occupants. Unlike residential subdivisions, which can be built to a construction standard to withstand the fire event, enabling occupants and fire fighters to provide property protection after the passage of fire, occupants of SFPP developments may not be able to assist in property protection. They are more likely to be adversely affected by smoke or heat while being evacuated.

2. Provide for safe emergency evacuation procedures. SFPP developments are highly dependent on suitable emergency evacuation arrangements, which require greater separation from bushfire threats. During emergencies, the risk to fire fighters and other emergency services personnel can be high through prolonged exposure, where door-to-door warnings are being given and exposure to the bushfire is imminent.

The nature of *special fire protection purpose* means that occupants may be more vulnerable to bushfire attack for one or more of the following reasons:

- They may be less educated in relation to bushfire impacts.
- They may have reduced capacity to evaluate risk and to respond adequately to the bushfire threat.
- They may present organisational difficulties for evacuation and or management.
- They may be more vulnerable through stress, anxiety and smoke impacts arising from bushfire threat.
- There may be significant communication barriers.
- Supervision during a bushfire may be difficult
- Logistical arrangements for the numbers of residents may be complicated in terms of alternate accommodation, transport, healthcare and food supplies.

In addition, *PBP* outlines the bushfire protection measures required to be assessed for new development in bushfire prone areas. The proposal has been assessed in compliance with the following measures:

- Asset protection zones
- Building construction and design
- Access arrangements
- Water supply and utilities
- Landscaping, and
- Emergency management arrangements.

1.5.5 Building Code of Australia and the Australian Standards AS3959 - 2009

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.

In NSW, construction in bushfire prone areas applies to Class 2, 3, 4 & 9 buildings or a Class 10a associated with Class 2, 3, 4 & 9 buildings.

The construction manual for the deemed-to-satisfy requirements is the Australian Standard AS3959 (2009).

1.6 Environmental and Cultural Constraints

A flora and fauna assessment has been undertaken by *Travers bushfire & ecology (2014 / 2013 / 2010)*.

The assessment concluded that in accordance with Section 5A of the *EP&A Act* the proposed development will not have a significant impact on any threatened species, populations or EECs.

The report also deals with riparian issues and advises no impacts will occur upon creeks or waterways.

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 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 building envelope.

The vegetation within 140m of the proposed seniors living facility has been identified as:

- Short heath / Tall heath with emergent eucalypts along the short ridgeline in the north-west

Photo 1 – Short heath to the north-west or the staff management cottage

Photo 2 – Tall heath to the north-west

- Forest vegetation associated with the creek line in the north-east and within the adjoining residential land to the south.

Photo 3 – Forest to the north-east

Photo 4 – Forest to the north-east

The proposed wildlife corridor within and adjoining the northern property boundary, as well as the riparian zone adjoining the north eastern boundary will be revegetated as recommended within the Flora and Fauna Assessment undertaken by *Travers bushfire & ecology*, 2014.

APZs have been provided from the proposed edge of the revegetated lands and will therefore not pose an increased bushfire threat to the development and / or egress / access opportunities.

The remaining land, within 140m of the dwellings, is not considered a bushfire threat as it consists of a managed landscape with mown grass and scattered trees as depicted within the following photographs.

Photo 5 – Managed land to the east

Photo 6 – Managed land to the west

2.2 Effective Slope

The effective slope is assessed for a distance 100m external to a building facade.

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 areas is detailed within Table 2.1 and summarise below:

- 9 degrees down slope within the tall heath vegetation to the north-west of building 1 & 2.
- Level to upslope within the tall heath vegetation to the west of building 4
- Level to upslope within the forest vegetation to the north-east of Buildings 4 & 5
- Level within the proposed wildlife corridor (to be restored & revegetated)
- 0-5 degrees downslope within the forest vegetation to the south of the development
- Level within the short heath vegetation to the north-west of the staff management cottage and 9 degrees upslope within the tall heath to the south-west of the cottage.

2.3 Bushfire Attack Assessment

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site using forest and remnant vegetation located within the Greater Sydney region. Table 2.1 & 2.2 below provides a summary of the bushfire attack assessment and the minimum required APZs in compliance with Appendix 2 *(PBP)* for the aged care facility buildings (SFPP) as well as the staff management cottage

Table 2.1 – Bushfire Attack Assessment – SFPP buildings

Aspect	Vegetation within 140m of development	Effective slope of land	APZ Required (metres)	APZ Provided (metres) (refer Note 1)	APZ on neighbouring lands
North	Proposed wildlife corridor (to be revegetated)	Level	30	82 (IPA)	Nil
North-west (building 1 & 2)	Tall Heath	5-10^{0D}	50	50 (IPA)	Nil
West (building 4)	Tall Heath	Level to upslope	45	45 (IPA)	Nil
North-east (building 5)	Forest	Level to upslope	60	110 (IPA)	Nil
South (building 1,2 & 6)	Forest	0-5^{0D}	70	70 (50m IPA & 20m OPA)	20m within Barnes Road & variable width (<20m) metres on Lot 1336 DP 752038 (refer Note 2)
South-east, east & west	Grassland / managed rural residential	0-5^{0d}	N/A	>100	Not required due to existing lawn management on adjacent urban lands

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

Note 1 – The allowable OPA portion within an APZ is determined by Table A2.7 of *PBP* p58.
Note 2 – The APZ extends within the adjoining lots to the south and south east. The ongoing management of this APZ is to be assured through the provision of an 88b easement agreement as detailed within Section 3.3 of this report and as outlined in Councils condition of consent.

Table 2.2 – Bushfire Attack Assessment – staff management cottage

Aspect	Vegetation within 140m of development	Effective slope of land	APZ Required (based on BAL 29) (metres)	APZ Provided (metres) (refer Note 1)	APZ on neighbouring lands
North & north-east	Proposed wildlife corridor (to be revegetated)	Level	11	>44 (IPA)	Nil
South & East	Managed Land	Level to upslope	N/A	>100 (IPA)	Nil

Aspect	Vegetation within 140m of development	Effective slope of land	APZ Required (based on BAL 29) (metres)	APZ Provided (metres) (refer Note 1)	APZ on neighbouring lands
North-west	Short Heath	Level to upslope	9	16 (IPA)	10m within adjoining land consists of mown grass
South-west	Tall Heath	11^{0U}	10 (refer Note 1)	10 (IPA)	3-10m within adjoining land consists of mown grass

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

Note 1: Performance based assessment

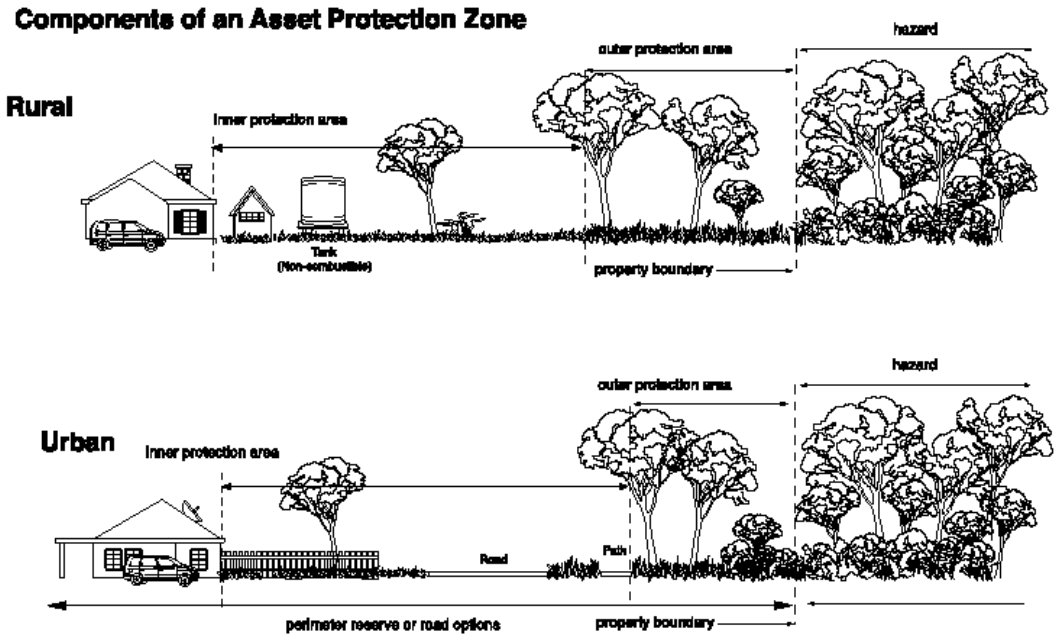
A performance based assessment using Appendix B of *AS3959* was undertaken to determine the required APZ (equivalent to BAL 29 construction) based on tall heath vegetation on an upslope of 11^{o} (determined to be the worst case scenario). The results of the assessment, provided within Appendix 2, were prepared using the bushfire attack assessor (BFAA) developed by *Newcastle Bushfire Consulting.*

Specific Protection Issues

3

3.1 Asset protection zones

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 10*kW/m*^{2} for SFPP developments and 29kW/m^2 for residential developments (staff management cottage).

These ratings assist in determining the size of the APZ in compliance with Appendix 2 of *PBP* to provide the necessary defendable space between hazardous vegetation and a building. Table 3.1 outlines the proposed aged care buildings compliance with the performance criteria for APZs, whilst Table 3.2 outlines the staff management cottage compliance.

Table 3.1 – Performance Criteria for Asset Protection Zones (SFPP) (*PBP* guidelines pg. 19)

Performance Criteria as determined by RFS in PBP	Acceptable Solutions as required by RFS in PBP	Compliance or not
Radiant heat levels of greater than 10kW/m^2 will not be experience by occupants or emergency services workers entering or exiting a building.	An APZ is provided in accordance with the relevant tables and figures in Appendix 2 of *PBP*. Exits are located away from the hazard side of the building. The APZ is wholly within the boundaries of the development.	The APZs provided do comply and exceed the minimum requirements as outlined within Appendix 2 of *PBP* 2006. The APZs do extend within adjoining Lot 1336 DP 752038 and over Barnes Road reserve in the south. The ongoing maintenance of the APZ within these lots will be assured through an 88B easement agreement and a fuel management plan therefore complying with the performance criteria as outlined within Section 3.3 of this report.
Applicant demonstrates that issues relating to slope are addressed: maintenance is practical, soil stability is not compromised and the potential for crown fire is negated.	Mechanisms are in place to provide for the maintenance of the APZ over the life of the development. The APZ is not located on land with a slope exceeding 18 degrees.	Complies – The APZ consists of landscaped areas, roads and turf areas which require minimal maintenance. An 88B easement agreement and *fuel management plan* will ensure ongoing maintenance of APZ within Lot 1336 to the south. As per Councils condition a positive covenant will also be applied over Barnes Road. The APZ does extend within a narrow area exhibiting a slope of 18–20^0. The majority of this area however consists of rocky escarpment interspersed with a low density of native woodland trees. The ongoing management of this area, in its current state, will therefore not pose a risk to soil stability and will comply with the standards of an APZ.
APZs are managed and maintained to prevent the spread of a fire towards the building.	In accordance with the requirements of *Standards for Asset Protection Zones* (RFS 2005).	Complies – Can be made a condition of consent.

Table 3.2 – 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 – A performance based assessment has been undertaken (refer Table 2.2 & Appendix 2) and APZs provided allow for a BAL rating of 29. The 10 – 16 metres separation is provided via the existing grassland vegetation on the adjoining land (refer photo 7).
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* (RFS 2005)	Yes – can 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^o	Yes. APZs are located on slopes less than 18^o

Photo 7 – Existing grassland vegetation providing separation between the dwelling and the tall heath / short heath vegetation.

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.

The NSW RFS have released an interim amendment to *PBP* in the form of Appendix 3. This amendment follows the adoption on 1 May 2010 of AS3959 – *Construction of buildings in bushfire-prone areas* (2009) through the *Building Code of Australia (BCA)* 2010. This appendix, in conjunction with Table 2.4.2 of AS3959 (2009), is used to determine construction considerations when building on bushfire prone land.

The construction classification system is based on six (6) bushfire attack levels (BAL). These are BAL – Flame Zone (FZ), BAL 40, BAL 29, BAL 19, BAL 12.5 and BAL LOW. 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.

The existing and proposed aged care buildings should be upgraded to comply with BAL 12.5 building construction standards.

Note: There is no BAL 10 in AS3959.

3.2.1 Existing building – Aged Care

The existing building 1 (as previously approved) will be constructed in face brick with a tiled roof. The proposed refurbishments are to comply with Australian Standard AS3959 *Construction of buildings in bushfire-prone areas (2009)* (BAL 12.5) with additional construction requirements as listed within Section A3.7 of Addendum Appendix 3.

As recommended within the previous bushfire report improved bushfire protection measures will be provided to the existing building. The following measures are to be implemented into the building design to protect the building from ember attack.

- Where a circular probe of 3mm diameter is capable of being passed through external vents, weepholes or gaps, the vents, weepholes and gaps shall be screened with a mesh with a maximum aperture of 2mm, made of corrosion resistant steel, bronze or aluminium.

- Gaps between doors and the door jams, heads or sills shall be protected by draught excluders.

- All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt jointed to prevent gaps greater than 3mm.

- All doors and the openable portions of all windows are to be screened internally or externally with screens that that have a mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion resistant steel, bronze or aluminium. Gaps between the perimeter of the screen assembly and the building element to which it is fitted shall not exceed 3mm.

- Roof ventilation openings, such as gable and roof vents (where applicable), shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion resistant steel, bronze or aluminium.

- Gutter and valley leaf guards are to be installed are shall be non-combustible.

3.2.2 Existing building – staff management cottage

Any refurbishments to the staff management cottage must comply with BAL 29 as outlined in AS3959 (2009).

The following measures are to be implemented into the building design to protect the building from ember attack.

- Where a circular probe of 3mm diameter is capable of being passed through external vents, weepholes or gaps, the vents, weepholes and gaps shall be screened with a mesh with a maximum aperture of 2mm, made of corrosion resistant steel, bronze or aluminium.

- Gaps between doors and the door jams, heads or sills shall be protected by draught excluders.

- All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt jointed to prevent gaps greater than 3mm.

- All doors and the openable portions of all windows are to be screened internally or externally with screens that that have a mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion resistant steel, bronze or aluminium. Gaps between the perimeter of the screen assembly and the building element to which it is fitted shall not exceed 3mm.

- Roof ventilation openings, such as gable and roof vents (where applicable), shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion resistant steel, bronze or aluminium.

- Gutter and valley leaf guards are to be installed are shall be non-combustible.

3.3 Hazard management

The owner or occupier of the property will be required to manage the APZ in accordance with RFS guidelines *Standards for Asset Protection Zones* (RFS, 2005) with landscaping design to comply with Appendix 5 of *PBP*. 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 / grazing). A summary of the guidelines for managing APZs are attached as Appendix 1 to this report.

The APZs occur within the property as well as

- Barnes Road Reserve – as per council conditions
- Lot 1336 DP 752038 to the immediate south of Barnes Road.

A Section 88b easement agreement is proposed (refer Appendix 3) to be obtained over those adjoining lots for the purpose of maintaining fuel levels to the specifications required for an APZ.

An 88b easement agreement is not required for Lot 80 DP 846099 to the immediate west, due to the well managed grassed lawn on those lands.

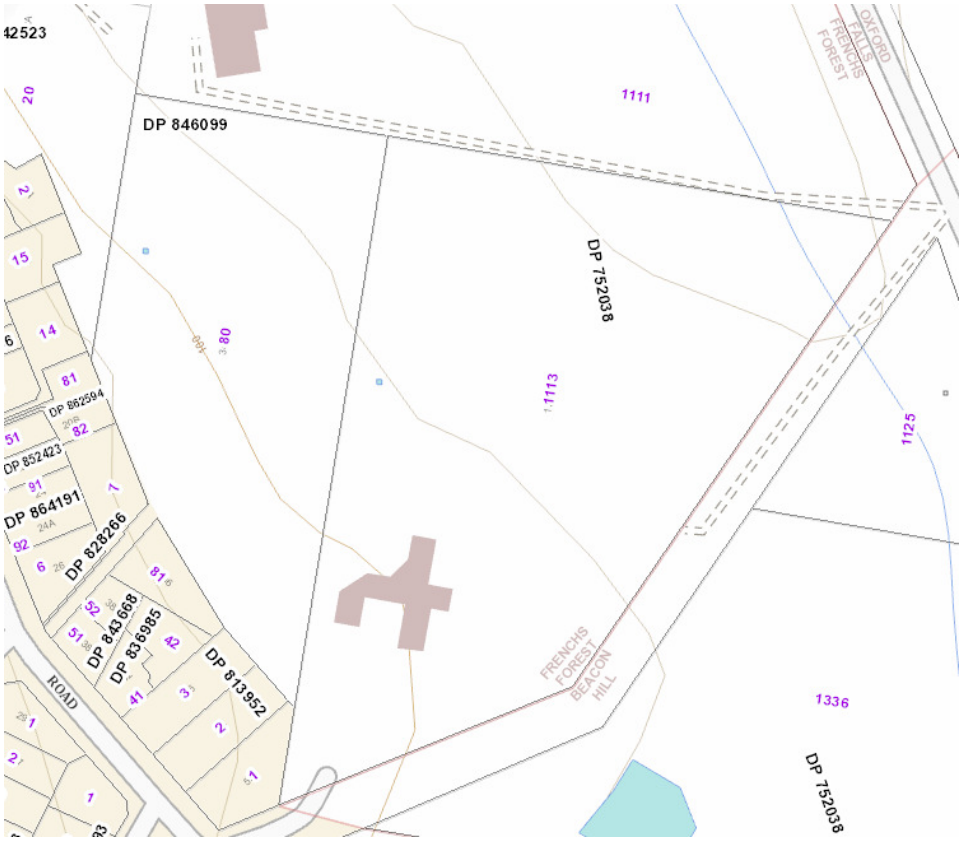


Figure 3.1 – Cadastral plan of adjoining allotments

The 88b easement agreement will require the prior approval of the adjoining land holders and will identify the hazardous areas to be managed, the scope of the works required, the frequency of the works, the objectives of the works and the monitoring of the works.

A landscaping plan has been prepared for the site (refer Figure 3.2). A review of this plan has been undertaken and *TBE* can confirm that it complies with Appendix 5 of *Planning for Bushfire Protection 2006* and the guideline *Standards for Asset Protection Zones.*

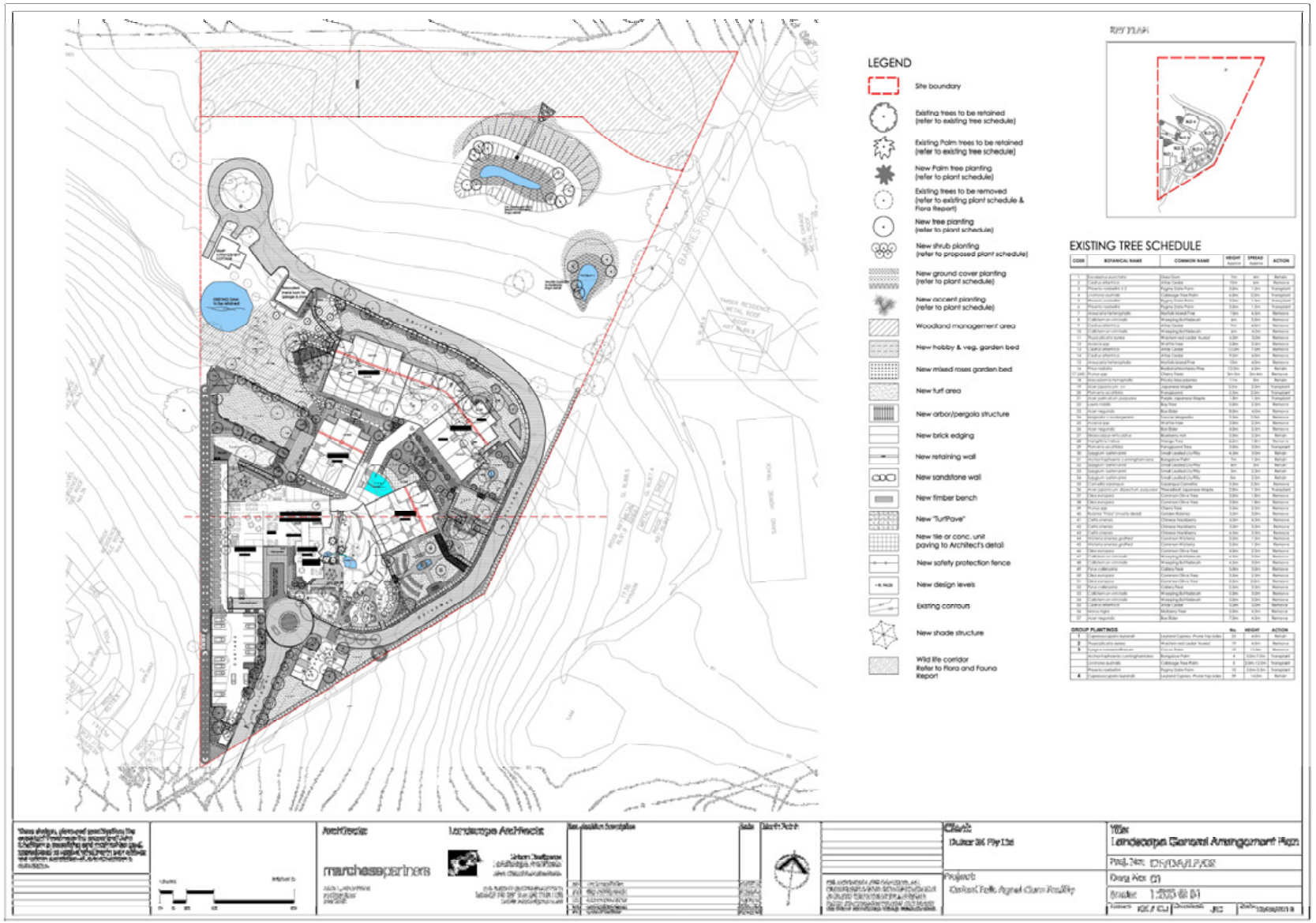


Figure 3.2 – Landscape Plan

3.4 Access for fire fighting operations

The primary access route to the development will utilise the existing driveway access to the south of buildings 1 & 2 via an extension from the public Barnes Road in the south west – refer Schedule 1 attached.

The proposed public portion of the road is 6 metres in width until the road turns west (adjacent Building 5) where the width reduces to 5.5 metres. The northern portion of the road will be used as a service road only to provide access to the staff management cottage. The proposed turning circle at the northern road extent is 4 metres in width and provides a minimum 12m outer radius turning circle.

The *intent of measures* required by the RFS for internal roads is "*to provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area*".

Table 3.2 below outlines the proposals compliance with the performance criteria for public roads.

Table 3.3 – Performance Criteria for Internal Roads (*PBP* guidelines pg. 35)

Performance Criteria as determined by PBP	Acceptable Solutions required by RFS PBP	Compliance or not
Internal road widths and design enable safe access for emergency services and allow crews to work with equipment about the vehicle.	Internal roads are two-wheel drive, sealed, all weather roads.	Complies.
	Internal perimeter roads are provided with at least two traffic lane widths (carriageway 8m minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions.	There are no perimeter roads proposed for the development as previously approved by the NSW RFS. However the existing unformed road 'Barnes Road' provides unsealed secondary access from Oxford Falls Road in the north-east and runs parallel to the sites eastern boundary. Public access (including the existing driveway) will be upgraded to provide a 6 m wide road to enable safe access for emergency services in compliance with the performance criteria.
	Roads are through roads. Dead end roads are not more than 100m in length from a through road, incorporate a minimum 12m outer radius turning circle, and are clearly sign posted as a dead end.	Complies
	Traffic management devices are constructed to facilitate access by emergency services vehicles.	Complies.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Complies.

Performance Criteria as determined by PBP	Acceptable Solutions required by RFS PBP	Compliance or not
	Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress.	Complies.
	The minimum distance between inner and outer curves is 6m.	Complies.
	Maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees.	Complies.
	Cross fall of the pavement is not more than 10 degrees.	Complies.
	Roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than storm surge).	Complies.
	Roads are clearly sign posted and bridges clearly indicate load ratings.	Complies.
	The internal road surfaces and bridges have a capacity to carry fully-loaded firefighting vehicles (15 tonnes).	Complies.

3.5 Water supplies

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

Table 3.4 outlines the proposals compliance with the performance criteria for reticulated water supply.

Table 3.4 – Performance Criteria for Reticulated Water Supplies (*PBP* guidelines pg. 37)

Performance criteria	Acceptable Solutions	Complies
Water supplies are easily accessible and located at regular intervals	Access points for reticulated water supply to SFPP developments incorporate a ring main system for all internal 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, once development has been completed. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. The provisions of public roads in Section 4.1.3 of PBP in relation to parking are met.	Complies - can be made a condition of consent.

3.6 Gas

Table 3.5 outlines the required performance criteria for the proposals gas supply.

Table 3.5 – Performance Criteria for Gas Supplies (*PBP* guidelines pg. 37)

Performance criteria	Acceptable Solutions	Complies
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 AS 1596 – 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 and located on the non hazard side of the development. If gas cylinders are to be kept close to the building the release valves must be directed away from the building and away from any combustible material, so that they do not act as a catalyst to combustion. . Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used	Complies - can be made a condition of consent.

3.7 Emergency and evacuation planning

Table 3.6 outlines the required performance criteria for the proposals emergency procedures

Table 3.6 – Performance Criteria for Emergency and Evacuation Planning (*PBP* guidelines pg.39)

Performance criteria	Acceptable Solutions	Complies
An Emergency and Evacuation Management Plan is approved by the relevant fire authority for the area.	An emergency / evacuation plan is prepared consistent with the RFS Guidelines for the Preparation of Emergency / Evacuation Plan. *Note: The applicant should provide a copy of the above document to the local Bush Fire Management Committee for their information prior to the occupation of any accommodation of a SFPP*.	Complies - can be made a condition of consent.
Suitable management arrangements are established for consultation and implementation of the emergency and evacuation plan.	An Emergency Planning Committee is established to consult with staff in developing and implementing and Emergency Procedures Manual. Detailed plans of all Emergency Assembly Areas including on site and off site arrangements as stated within AS3745 are clearly displayed, and an annual trial emergency evacuation is conducted.	Complies - can be made a condition of consent.

Conclusion & Recommendations

4

4.1 Conclusion

This bushfire protection assessment has been undertaken for the proposed expansion of the recently approved low care seniors living facility at Barnes Road, Frenchs Forest.

The assessment found that bushfire can potentially affect the proposed development from the existing tall heath vegetation located to the north west and the forest vegetation associated with the creek line in the north-east and within the adjoining residential land to the south resulting in possible ember and radiant heat attack.

The bushfire risk posed to the development can however be effectively mitigated if appropriate bushfire protection measures are put in place and managed in perpetuity.

The assessment has concluded that the proposed development will provide compliance with *PBP* through;

- The application of APZs in accordance with *PBP*, with the provision of an 88b easement agreement within Barnes Road reserve (Lot 1113 in DP 752038) as per Council conditions as well as Lot 1336 DP752038.

- On site safety through the implementation of an emergency incident and evacuation plan in accordance with the NSW Rural Fire Service evacuation planning guidelines.

- Compliance with the access provisions of *PBP*.

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

4.2 Recommendations

Recommendation 1 - The development is as generally indicated on the attached Schedule 1 – Plan of Bushfire Protection Measures.

Recommendation 2 - APZs are to be provided to the proposed development. APZs are to be measured from the exposed wall of the aged care facility toward the hazardous vegetation. The APZs shall be as nominated in Table 2.1 & 2.2 and also as generally depicted in Schedule 1. An 88b easement agreement should be formalised with the owner of Lot 1336 to ensure the ongoing fuel management of the blue area as shown on Schedule 1 attached.

Recommendation 3 - The landscape plan is to ensure compliance with Appendix 5 of *PBP*. A summary of the guidelines for managing APZs are attached as Appendix 1 to this report and are summarised below:

- *Mowing of grass*: Grass needs to be kept short (approximately 5cm in height) and green where adequate water supplies are available.

- *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. 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 is not to overhang a dwelling unless specifically approved by the RFS. Native trees and shrubs should be retained as clumps in landscape beds and should not exceed a covering of more than 20% of the IPA.

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

- Trees may remain within close proximity of a building where it can be demonstrated that the tree is not able to produce a build-up of fuel on the roof of a dwelling due to:

    1. A roof pitch which self sheds leaf litter
    2. Ongoing roof maintenance by staff or contractors
    3. Adequate ember protection has been installed

- Trees that are likely to be structurally unstable such that they could cause a limb to fall would require removal for the RFS to agree to a dwelling in proximity to the trees.

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

- Ensure that vegetation does not provide a continuous ignition path to the building.

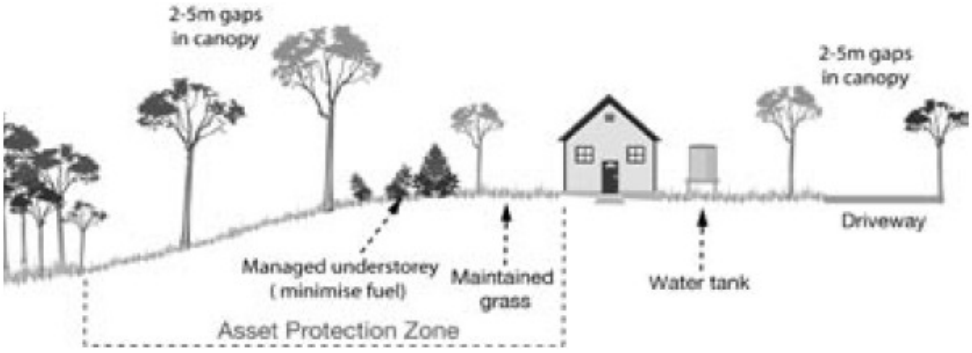
- Plant or clear vegetation into clumps rather than continuous rows.

- Prune low branches 2m from the ground to prevent a ground fire from spreading into trees.

- Locate vegetation far enough away from the proposed building so that plants will not ignite the dwelling 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 tiles.

- The following RFS diagram depicts one version of an ideal situation. Divergence from this ideal should not be undertaken without expert advice.



Recommendation 4 - The proposed buildings and refurbishments to the existing buildings are to comply with BAL 12.5 (aged care building) and BAL 29 (staff management cottage) 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 *(Planning for Bush Fire Protection, 2006).*

To improve the bushfire protection measures offered to the existing buildings the following measures are to be implemented into the building design to protect the building from ember attack.

- Where a circular probe of 3mm diameter is capable of being passed through external vents, weepholes or gaps, the vents, weepholes and gaps shall be screened with a mesh with a maximum aperture of 2mm, made of corrosion resistant steel, bronze or aluminium.

- To determine the maximum aperture size of screening material, it shall not be possible to pass a circular probe of 2mm diameter through the aperture.

- Gaps between doors and the door jambs, heads or sills shall be protected by draught excluders.

- All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt jointed to prevent gaps greater than 3mm.

- All doors and the openable portions of all windows are to be screened internally or externally with screens that that have a mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion-resistant steel, bronze or aluminium. Gaps between the perimeter of the screen assembly and the building element to which it is fitted shall not exceed 3mm.

- Roof ventilation openings, such as gable and roof vents (where applicable), shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion-resistant steel, bronze or aluminium.

- Gutter and valley leaf guards are to be installed and shall be non-combustible.

Recommendation 5 – Access, water, electricity and gas supply is to comply with Section 4.2.7 of *PBP*. The internal road access is to be upgraded to 6 m in width.

Recommendation 6 – The emergency / evacuation plan is to be prepared for the new proposal and is to be consistent with the RFS *Guidelines for the Preparation of Emergency / Evacuation Plan.*

Recommendation 7 - The landowner / manager is to be made aware of their liability to manage the development lands for the ongoing protection of themselves and their neighbours (refer Section 63(2) *RF Act*)

Recommendation 8 - Landowners living in bushfire prone areas should familiarise themselves with publications published by the RFS. These are located on the RFS web site www.rfs.nsw.gov.au under 'Publications'.

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 bushfire-prone areas.*

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.

Plan of Bushfire Protection Measures

S1

SHORT HEATH

TALL HEATH

16m

10m

44m

82m

30m

24m

60m

10m

10m

110m

METAL SHED

45m

Building 4

Building 3

Building 5

Building 6

Building 2

Building 1

50m

20m

70m

70m

70m

Legend

- Subject site
- Proposed building envelope (SFPP)
- Manager's Residence
- Access road and carpark
- Site survey (CAD)
- 24m wildlife corridor (for restoration)
- Core riparian zone (10m)
- Managed vegetated buffer (10m)

Drainage

- Roadside drainage channel
- Stream Order 1

Asset Protection Zone (APZ)

- Inner Protection Area (within site)
- Inner Protection Area (88b easement for Barnes Rd)
- Outer Protection Area (88b easement over Lot 1336 DP752038)

Aerial source: NearMap (26.06.2014)

Travers bushfire & ecology
www.traversecology.com.au

PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
Barnes Road, Frenchs Forest A14054_BF001	14/07/2014 Issue 1	1:1,000 @ A3 GDA 1994 MGA Zone 56

0 25 50 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.

Document Path: B:\Pete_Travers\Projects\A14054_BarnesRd_FrenchsForest\MXDs\A14054_BF001.mxd

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 RFS provide 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.

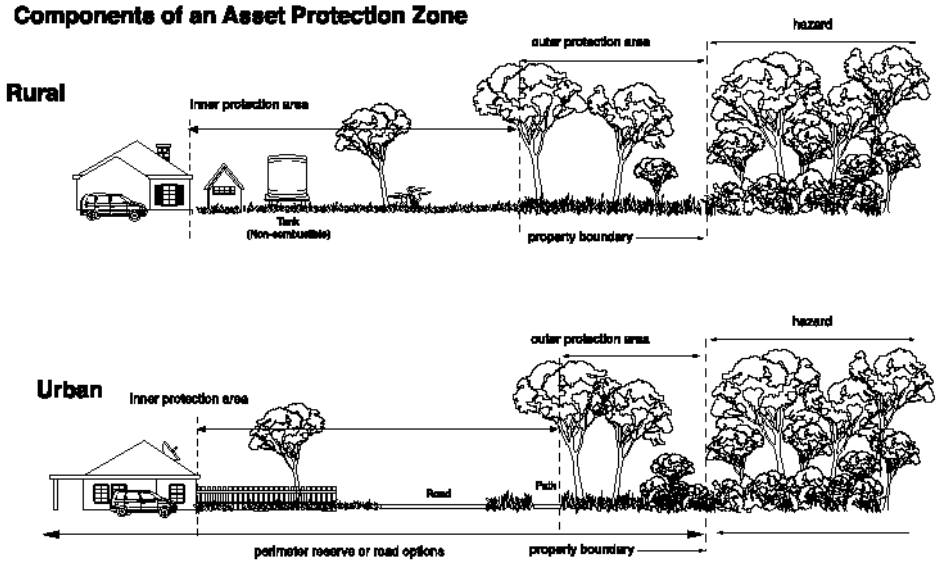
When considering bushfire fuel it is important to understand that it occurs in our native bushland in three vertical layers – see Table 1.

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 – 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 reduce 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 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.

Performance based assessment

A2

NBC Bushfire Attack Assessment Report V2.1

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 11/07/2014 **Assessment Date:** 8/07/2014

Site Street Address: Barnes Road, Frenchs Forest

Assessor: Nicole Van Dorst; Travers Bushfire and Ecology

Local Government Area: Warringah **Alpine Area:** No

Equations Used

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

Run Description: West - managers residence

Vegetation Information

Vegetation Type:	Scrub/Tall Heath	**Vegetation Group:**	Shrub & Heath
Vegetation Slope:	11 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	25	**Overall Fuel Load(t/ha):**	25

Site Information

Site Slope	0 Degrees	**Site Slope Type:**	Upslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	10

Fire Inputs

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

Calculation Parameters

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

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	3.75
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	25193
Radiant Heat(kW/m2):	27.08	**Flame Angle (degrees):**	66
Flame Length(m):	8.2	**Maximum View Factor:**	0.409
Rate Of Spread (km/h):	1.95	**Inner Protection Area(m):**	10
Transmissivity:	0.87	**Outer Protection Area(m):**	0

Instrument setting out terms of easement

A3

INSTRUMENT SETTING OUT TERMS OF EASEMENT INTENDED TO BE CREATED PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919, AS AMENDED

PART 1

Figure 1 – Asset Protection Zone

Land Owner

(Insert)

Schedule of Lots

Lot Burdened – Barnes Road Reserve & Lot 1336 DP 752038

Lot Benefited – Lot 1113 DP 752038

Identity of easement

Easement for asset protection zone of varying width (depicted by the colour blue (Lot 1336) and green cross hatch (Barnes Road Reserve) on Figure 1, page 1) as prepared by *Travers bushfire & ecology* August 2014.

The easement will permit the ongoing management of the vegetation in that easement for the benefit of Lot 1113 DP 752038. Management of the vegetation will be in accordance with RFS guidelines *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 5 of *PBP*. The implementation of the APZ will be undertaken in accordance with a Fuel Management Plan, which will be prepared specifically for the site.

PART 2

Terms of Easement for Asset Protection Zone firstly referred to in the abovementioned plan

1. Full and free right for ("grantee") and every person authorised by the grantee, from time to time, and at all times to enter onto the Lot Burdened within the site of the easement indicated on the plan ("Asset Protection Zone"), together with the right to carry out bushfire hazard reduction work in the Asset Protection Zone to manage or reduce the bushfire hazard to the improvements on the Lot Benefited and to do anything reasonably necessary for that purpose including but not limited to:

(a) the establishment or maintenance of fire breaks within the Asset Protection Zone;

2. In exercising its rights the grantee (being the owner of Lot 1336 DP 752038) must:

(a) ensure that all work is done properly;

(b) cause as little inconvenience as is practicable to the registered proprietor of the Lot Burdened and any occupier of the Lot Burdened;

(c) cause as little damage as is practicable to the Lot Burdened and any improvement on it;

(d) make good within a reasonable time any damage it causes to the surface of the Lot Burdened and any improvement on it; and

(e) restore the Lot Burdened as nearly as practicable to its former condition and make good any collateral damage.

3. The registered proprietor of the Lot Burdened must not:

(a) do or neglect to do or permit or suffer anything to be done which may result in the Asset Protection Zone being interfered with or comprised in terms of its capacity to reduce the bushfire hazard to the improvements on the Lot Benefited; or

The grantee and the registered proprietor of the Lot Burdened covenant and agree that:

(a) the grantee will maintain the Asset Protection Zone being the subject of this easement so that the Asset Protection Zone will be managed in accordance with the following documents:

- RFS guidelines *Standards for Asset Protection Zones* (RFS, 2005),
- Landscaping to comply with Appendix 5 of *Planning for Bushfire Protection*.
- Fuel Management Plan, which will be prepared specifically for the site.

The cost of such maintenance and repair shall be borne by the grantee (Lot 1113 DP 752038);

(b) the grantee is to undertake routine maintenance of the Asset Protection Zone and must repair any damage it causes to the Lot Burdened;

(c) the grantee indemnifies and keeps indemnified the registered proprietor of the Lot Burdened against all actions suits claims and damages of whatsoever nature which may be brought against the registered proprietor of the Lot Burdened to the extent that they arise because of the exercise by the grantee of its rights under this easement and all costs charges and expenses which the registered proprietor of the Lot Burdened may incur as a result of any act or omission of the grantee to the extent that they arise because of the exercise by the grantee of its rights, or the grantee's failure to comply with its obligations, under this easement; and

(d) without limiting 4(c) above, the grantee and the registered proprietor of the Lot Burdened acknowledge that, from time to time, the local authority for the Land under the *Rural Fires Act* 1997 ("**Rural Fires Act**") or the Commissioner under section 12A of the Rural Fires Act may issue notices to the registered proprietor or occupier of the Lot Burdened in respect of the Land pursuant to section 66 of the Rural Fires Act.

Where a notice referred to in this clause 4(d) is issued to the registered proprietor of the Lot Burdened, the registered proprietor must provide a copy of the notice to the grantee as soon as practicable after receiving the notice;

Upon receipt of a copy of the notice referred to in this clause 4(d), the grantee must comply with the terms of such a notice:

(i) within the time specified in the notice; and
(ii) at the grantee's expense.

Where:

(i) the grantee fails to comply with the terms of a notice referred to in this clause 4(d); and

(ii) the local authority or the Commissioner elects to perform the work the subject of such a notice; and

(iii) the local authority or the Commissioner seeks to recover the costs of performing such work from the registered proprietor of the Lot Burdened, pursuant to section 70 of the Rural Fires Act, the grantee indemnifies the registered proprietor of the Lot Burdened from any costs, liabilities, suits or other actions which may arise by virtue of the operation of section 12A of the Rural Fires Act may issue notices to the registered proprietor or occupier of the Lot Burdened in respect of the Land pursuant to section 66 of the Rural Fires Act.

Where a notice referred to in this clause 4(d) is issued to the registered proprietor of the Lot Burdened, the registered proprietor must provide a copy of the notice to the grantee as soon as practicable after receiving the notice;

Upon receipt of a copy of the notice referred to in this clause 4(d), the grantee must comply with the terms of such a notice: (i) within the time specified in the notice; and (ii) at the grantee's expense.

Where:

(i) the grantee fails to comply with the terms of a notice referred to in this clause 4(d); and

(ii) the local authority or the Commissioner elects to perform the work the subject of such a notice; and

(iii) the local authority or the Commissioner seeks to recover the costs of performing such work from the registered proprietor of the Lot Burdened, pursuant to section 70 of the Rural Fires Act, the grantee indemnifies the registered proprietor of the Lot Burdened from any costs, liabilities, suits or other actions which may arise by virtue of the operation of easement and all costs charges and expenses which the registered proprietor of the Lot Burdened may incur as a result of any act or omission of the grantee to the extent that they arise because of the exercise by the grantee of its rights, or the grantee's failure to comply with its obligations, under this easement; and

(d) without limiting 4(c) above, the grantee and the registered proprietor of the Lot Burdened acknowledge that, from time to time, the local authority for the Land under the Rural Fires Act 1997 ("Rural Fires Act") or the Commissioner under section 70 of the Rural Fires Act; and

(e) the grantee agrees that the use will be abandoned and the Easement will be released if:

(i) the grantee intends to permanently cease using the Asset Protection Zone;

(ii) the local authority or the Commissioner under the Rural Fires Act gives notice in writing to the grantee or the registered proprietor of the Lot Burdened that an Asset Protection Zone is no longer required on the Lot Burdened;

(f) the terms of the Easement may not be varied except with the prior written agreement of the Commissioner of the New South Wales Rural Fire Service ("RFS") from time to time, or the successor of the RFS.

If there is a dispute relating to the need to carry out work under this easement or the nature of the work, that dispute shall be determined by a single arbitrator (being a barrister of at least five (5) years standing) appointed under the Commercial Arbitration Act 1984 (NSW) whose determination shall be conclusive. The costs incurred in the determination of such dispute shall be borne by the parties equally or in the proportions determined by the appointed arbitrator.

EXECUTION:

Executed by

in the presence of:

Signature of Director

Signature of Secretary/other Director

Name of Secretary/other Director in full