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NSW RFS Ref:2014/1062
NSW LEC Ref: 2017/236706 (3227082)

11 April 2019

Mr D Maurici
Senior Development Manager
Henroth Group
Level 6, 180 Ocean Street
EDGECLIFF NSW 2027



Dear Daniel

**Re: Oxford Falls Aged Care Facility, Barnes Road, Frenchs Forest
Addendum bushfire assessment**

Travers bushfire & ecology has been requested to provide a review of the architectural plans, in support of a new development application (DA) at the above address. The previously approved development has been modified in light of current market expectations. The proposal does not cause any further impacts than already approved under the L&EC decision or as approved by the NSW Rural Fire Service in previous applications.

Proposed amendments to the architectural plans / subject to current DA

The revised architectural layout plan has been prepared by *Marchese Architects* (Revision K, dated 20 March 2019). The revised site layout converts the approved floor space into independent living units (self-care) with basement parking (as opposed to previous aged care use). The building footprints do not encroach within the approved asset protection zones. The proposed changes include;

- Creation of forty one (41) self-contained independent living units (previously seventy one (71) aged care units).
- Internal layout amendments to accommodate the changed use
- Minor building envelope changes (no encroachment within the APZ)
- Inclusion of basement car parking (entry and exit points / garage door outside of APZ area)
- Internal and external evacuation routes remain the same (as approved)

Bushfire review

The revised layout as prepared by *Marchese Partners International Pty Ltd* (dated 20/3/19, revision K) ensures that the proposed buildings (used for special fire protection purposes (SFPP) and entry point to the basement parking does not extend towards the bushfire hazard beyond the approved development line (refer Figure 1 & 3).

In addition *TBE* can confirm that the APZ provided complies with or exceeds the minimum required APZ as determined using the deemed to satisfy methodology (i.e. Appendix 2 – Table A2.3 of PBP).

As outlined within Table 1 the APZ provided, based on the amended development design (column 6), complies with or exceeds the minimum required APZ (column 4).

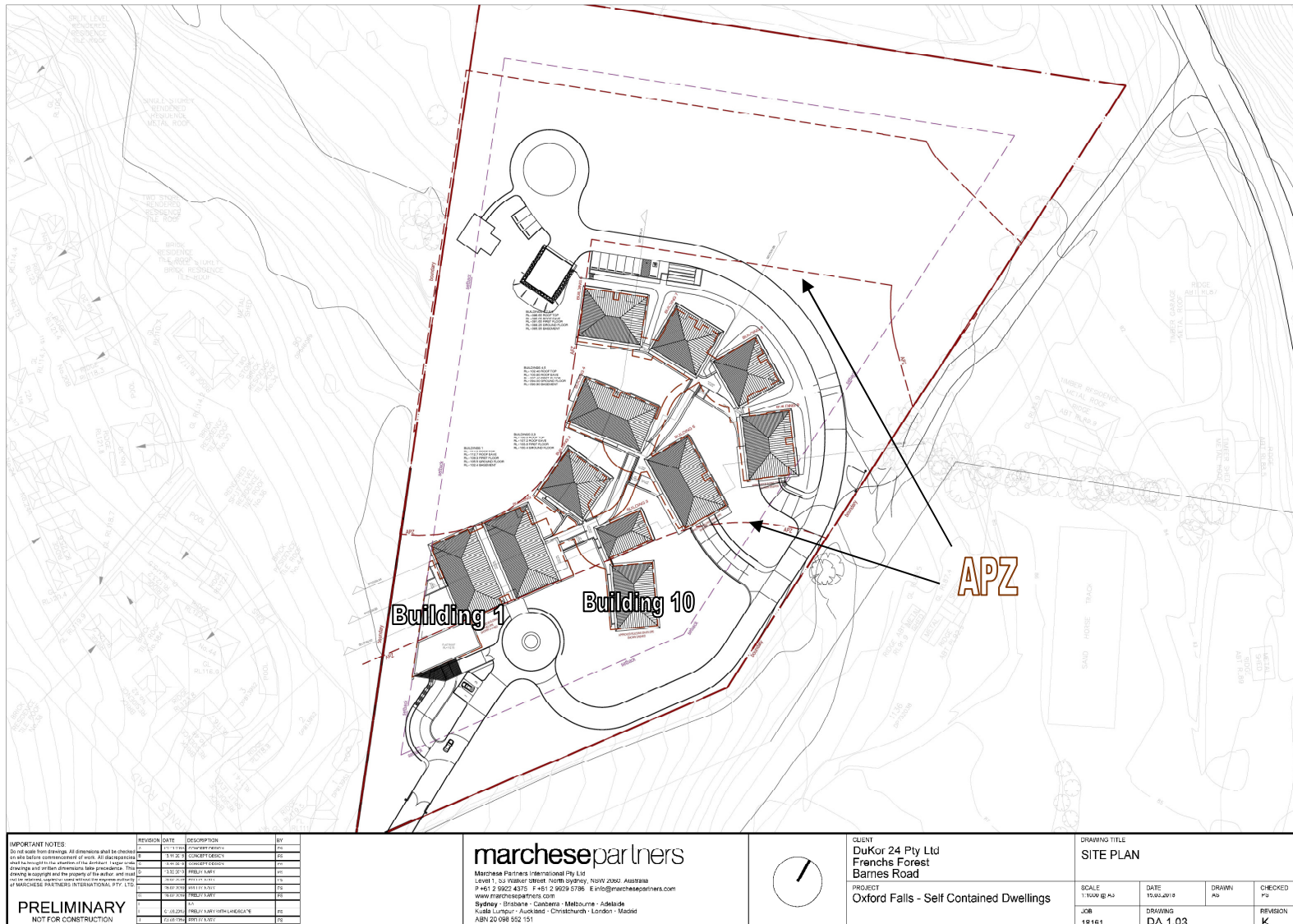


Figure 1: Site plan

Table 1 – Bushfire Attack Assessment – SFPP buildings

Aspect	Vegetation within 140m of development	Effective slope of land	APZ required (Appendix 2 of PBP) (metres)	Approved APZ (based on previous building layout) (metres)	APZ provided based on amended development design (metres)	APZ on neighbouring lands
North	Proposed wildlife corridor (to be revegetated)	Level	30	66	56 -65 (refer Note 1)	Nil
North-west	Tall Heath	0-5 ^{0D}	50	50	50	Nil
West	Tall Heath	Level to upslope	45	45	45	Nil
North-east	Forest	Level to upslope	60	110	92 (refer Note 1)	Nil
South	Forest	0-5 ^{0D}	70	70 (50m IPA & 20m OPA)	70 (50m IPA & 20m OPA)	20m within Barnes Road
South-east, east & west	Grassland / managed rural residential	0-5 ^{0d}	N/A	>100	>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 APZ provided in these two instances are less than those provided for the previous building layout. This difference is irrelevant as the asset protection zone provided is larger than the minimum required and therefore compliance has been effectively met. RFS will approve the revised design as it is consistent with previous approvals. Although the proposed SFPP buildings extend further downhill (i.e. to the north-west) they do not encroach within the minimum APZ setback.

The following Table 2 provides the APZ setbacks for the 'other' buildings (office, storage, and kitchen) not utilised for SFPP use (refer Figure 2 - 4). These buildings have been identified in the architectural plans as Buildings 1 & 10. As outlined within Table 2 below the APZ provided, based on the amended development design (column 6), complies with or exceeds the minimum required APZ (column 4 below).

Table 2.3 – Bushfire Attack Assessment – 'other' development'

Aspect	Vegetation within 140m of development	Effective slope of land	APZ required (metres)	Approved APZ (based on previous building layout) (metres)	APZ provided based on amended development design (refer Note 1)	APZ on neighbouring lands
North, North-west, west	Grassland / managed rural residential	0-5 ^{0d}	N/A	>100	>100	Not required due to existing lawn management on adjacent urban lands
South (portions of building 1 & 10 used for 'other' uses)	Forest	0-5 ^{0D}	32	51 - 60 (31-40m IPA & 20m OPA)	46 - 60 (31-40m IPA & 20m OPA)	20m within Barnes Road (refer Note 2)

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

Note 1: Building 10 and a portions of Building 1 are located within the minimum 70m APZ required for 'aged care' use. The development design has ensured these portions of the building are not used for aged care or associated 'congregation' of people whom may be vulnerable to bushfire (as per previous approvals). Building 10 is provided with a separation of 46m and will therefore be constructed in accordance with BAL 19 standards

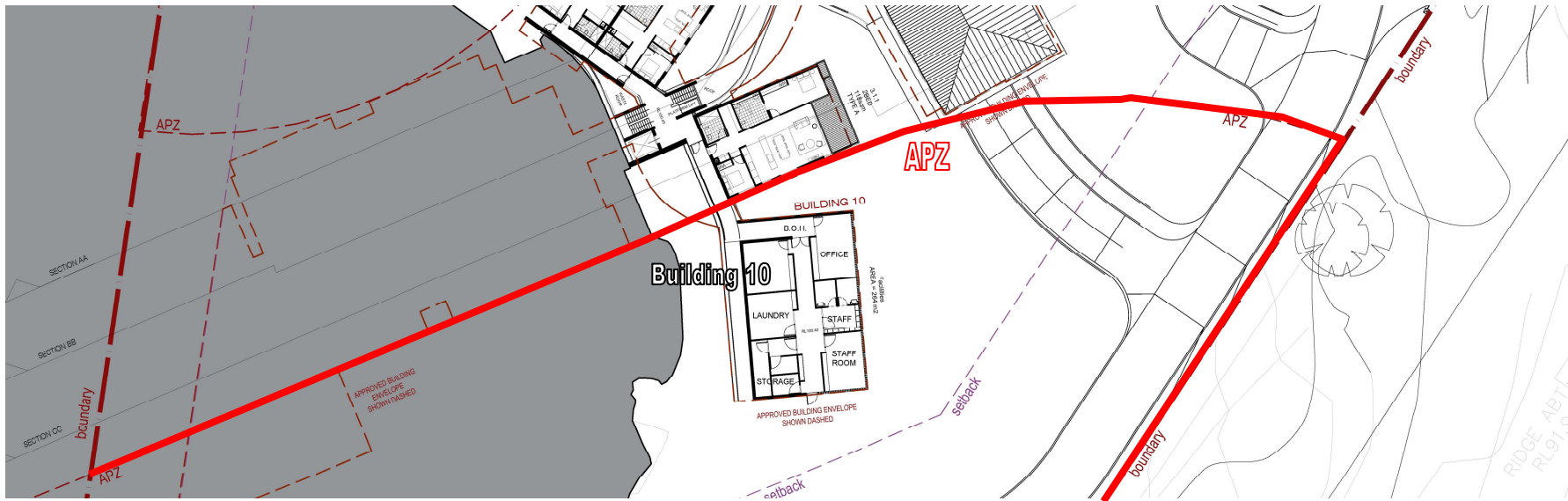


Figure 2: Building 10 (back of house use)

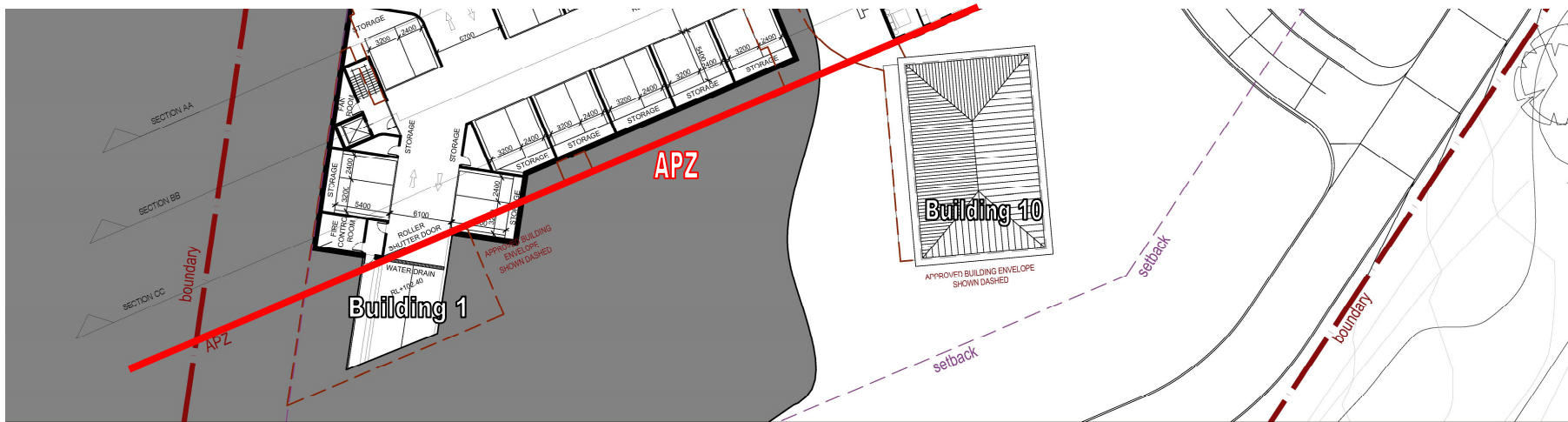


Figure 3: Garage door to underground carpark outside of APZ



Figure 4: Building 1 (back of house use)

In addition *TBE* can confirm that there are no changes to the internal access road which has been maintained at the minimum 6.5m carriageway as per the previous NSW Rural Fire Service (RFS) approval. A turning circle (12m radius) has been retained at the termination of this road with a secondary exit route provided onto Barnes Road as per the previous approvals. In addition the internal evacuation routes through the buildings will remain unchanged.

In conclusion *TBE* supports the proposed amendment to the building layout and we can confirm that the revised layout complies with the conclusions and recommendations outlined the bushfire report (refer attachment 1) prepared by this firm.

Should you have any questions regarding this correspondence please do not hesitate to contact the undersigned on (02) 4340 5331 or at info@traverseecology.com.au.

Yours faithfully

John Travers

BA Sc. / Ass Dip / Grad Dip / BPAD-Level 3-15195 (FPA)

Principle bushfire consultant – **Travers bushfire & ecology**



Attachment 1: Bushfire Protection Assessment, dated 27th June, 2016

**Travers bushfire & ecology employs a
Bushfire Planning and Design (BPAD) Accredited Practitioner**



Travers

bushfire & ecology

bushfire protection assessment

The Falls Estate
Lot 1113 DP 752038
Barnes Road
Frenchs Forest

June 2016
(REF: A16087B)



Addendum Bushfire Protection Assessment

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

Report Authors:	John Travers BPAD-L3 15195, Nicole van Dorst BPAD-L2 23610
Plans prepared:	Kelly Tucker, Emma Buxton, Trent Matheson
Checked by:	John Travers
Date:	27 th June 2016
File:	A16087B

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GLOSSARY OF TERMS

AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
AS1596	<i>Australian Standard – The storage and handling of LP Gas</i>
AS2419	<i>Australian Standard – Fire hydrant installations</i>
AS3745	<i>Australian Standard – Planning for emergencies in facilities</i>
AS3959	<i>Australian Standard – Construction of buildings in bushfire-prone areas 2009</i>
BAL	<i>bushfire attack level</i>
BCA	<i>Building Code of Australia</i>
BSA	bushfire safety authority
EP&A Act	<i>Environmental Planning & Assessment Act 1979</i>
FDI	fire danger index
IPA	inner protection area
LEP	Local Environmental Plan
OPA	outer protection area
PBP	<i>Planning for Bush Fire Protection 2006</i>
RF Act	<i>Rural Fires Act 1997</i>
RFS	NSW Rural Fire Service
SFPP	special fire protection purpose

EXECUTIVE SUMMARY

The current development consent for the seniors living facility was issued in 2015 - reference no. DA2014/1062. The RFS issued their consent on the 12th of August, 2015

The proposed changes subject to this new assessment include:

- Increase the number of units from 45 to 71.
- 1,375sqm of new floor space to the pre-approved 6830m².

Whilst the building footprint has been slightly amended they are not located any closer to the bushfire hazard than the previous approval.

The proposed expansion of the residential age care facility is categorised by the NSW Rural Fire Service (RFS) as being a special fire protection purpose (SFPP) development. *PBP* dictates that the subsequent extent of bushfire attack that can potentially impact a SFPP building must not exceed a radiant heat flux of 10kW/m². This rating assists in determining the size of the asset protection zone (APZ) to provide the necessary defensible space between hazardous vegetation and a building.

The assessment found that bushfire can potentially affect the proposed development from the existing tall heath / short heath vegetation located to the north west, the forest vegetation associated with the creek line in the north-east and the forest 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 continue to provide compliance with *PBP*

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

The following table confirms the proposals compliance with the NSW Bushfire Safety Authority provided above.

NSW RFS BSA	Compliance statement
An amended plan shall be provided clearly showing a feasible alternate route/s of exit/s through the northern part of the facility (Building 4 or 5) which can be utilised in an emergency situation should a bush fire threaten from the South. A suitable 'residents pickup point/s' shall be provided and shown on the plans.	Complies. An amended plan has been prepared (refer Schedule 1 attached) to depict a feasible alternative route and suitable resident pickup points. Section 3.7 of this report details the internal evacuation route through buildings 1, 2 & 4 to the northern part of the facility. A further detailed evacuation plan will be prepared prior to the issue of an occupation certificate.
Proposed Building 6 shall not be used by the Residents.	Complies. Building 6 is now Building 3 on the new plans. The proposed use of this building is limited to staff rooms and offices. This building will not be used by residents.
At the commencement of building works and in perpetuity the entire property shall be managed as an inner protection area (IPA) as outlined within Appendices 2 & 5 of 'Planning for Bush Fire Protection 2006' and the NSW Rural Fire Service's document 'Standards for asset protection zones'. The following exclusions apply: the wildlife restoration corridor and riparian zone and buffer located in the northern part of the site as shown in Schedule 1 of the Bushfire Protection Assessment (Addendum) dated April 2015, ref. A14054B2.	Complies. The entire site will be managed as an APZ as per this condition. The landscape plan complies with this requirement.
Water, electricity and gas supplies shall comply with sections 4.1.3 and 4.2.7 of 'Planning for Bush Fire Protection 2006'.	Water, electricity and gas will comply with this condition.
Internal roads shall comply with section 4.2.7 of 'Planning for Bush Fire Protection 2006'.	Complies.
Internal roads shall have a minimum 6.5 metre wide carriageway width.	Complies. The internal road is now 6.5m for its entire length.
The internal road shall be linked into the northern end of Barnes Road.	Complies. The internal road is linked to Barnes Road in the north and south.
A Bush Fire Emergency Evacuation Plan shall be prepared in accordance with the NSW Rural Fire Service document 'Guide for Developing a Bush Fire Emergency Evacuation Plan'. The plan shall include an alternative evacuation point/s, other than the Main Entrance, located in the northern part of the facility, should a bush fire threaten from the South.	An evacuation plan will be prepared prior to the issue of an occupation certificate. The plan will detail evacuation routes to the north and south via Barnes Road

NSW RFS BSA	Compliance statement
Proposed Buildings 2, 3, 4 & 5 shall comply with Sections 3 and 5 (BAL 12.5) Australian Standard AS3959-2009 'Construction of buildings in bush fire-prone areas' and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006'.	Based on the revised plans proposed buildings 1, 2, 4 & 5 are provided with an APZ of 60 – 70m and can therefore be constructed to comply with BAL 12.5.
Proposed Buildings 1 & 6 shall comply with Sections 3 and 6 (BAL 19) Australian Standard AS3959-2009 'Construction of buildings in bush fire-prone areas' and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006'.	Based on the revised plans the proposed building 3 is provided with an APZ of 51m and can therefore be constructed to comply with BAL 19.
The existing building proposed to be used as the Manager's Residence shall be upgraded to improve ember protection. This shall include enclosing all openings (excluding roof tile spaces) or covering openings with a non-corrosive metal screen mesh with a maximum aperture of 2mm. Where applicable this includes any sub floor areas, openable windows, vents, weepholes and eaves. External doors are to be fitted with draft excluders.	The Managers residence will be upgraded to comply with this condition.
Landscaping within the site shall comply with the principles of Appendix 5 of 'Planning for Bush Fire Protection 2006'.	Complies. A review of the landscape plan has been undertaken. The plan complies with the principles of Appendix 5 of PBP.
This approval is reliant on the Council granting approval for the unformed section of Barnes Road to be managed as an APZ	

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REFERENCES

SCHEDULE 1 – Bushfire Protection Measures

APPENDIX 1 – Management of Asset Protection Zones

APPENDIX 2 – Performance based assessment



Introduction

1

Travers bushfire & ecology has been requested by *Dukor 24 Pty Limited* to undertake an addendum bushfire protection assessment for the proposed expansion of the low care seniors living facility at Frenchs Forest.

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

The current development consent for the seniors living facility was issued in 2015 - reference no. DA2014/1062. The RFS issued their consent on the 12th of August, 2015

The proposed changes subject to this new assessment include:

- Increase the number of units from 45 to 71.
- 1,375sqm of new floor space to the pre-approved 6830m².

Whilst the building footprint has been slightly amended they are not located any closer to the bushfire hazard than the previous approval.

Changes also include minor amendments to the access road and the development footprint. It is important to note that the buildings are provided with the same setback distances to ensure the buildings are not located any closer to the bushfire hazard than the previous approval. The proposed changes can be seen in Figures 1.1 – 1.4

The revised proposal maintains the 70m APZ (within the development site and adjoining Barnes Road Reserve) to all buildings used for aged care (accommodation / cinema / pool area). Buildings for non-aged care use (i.e. kitchen, storage & offices) have been provided with a smaller APZ, as allowable under PBP.

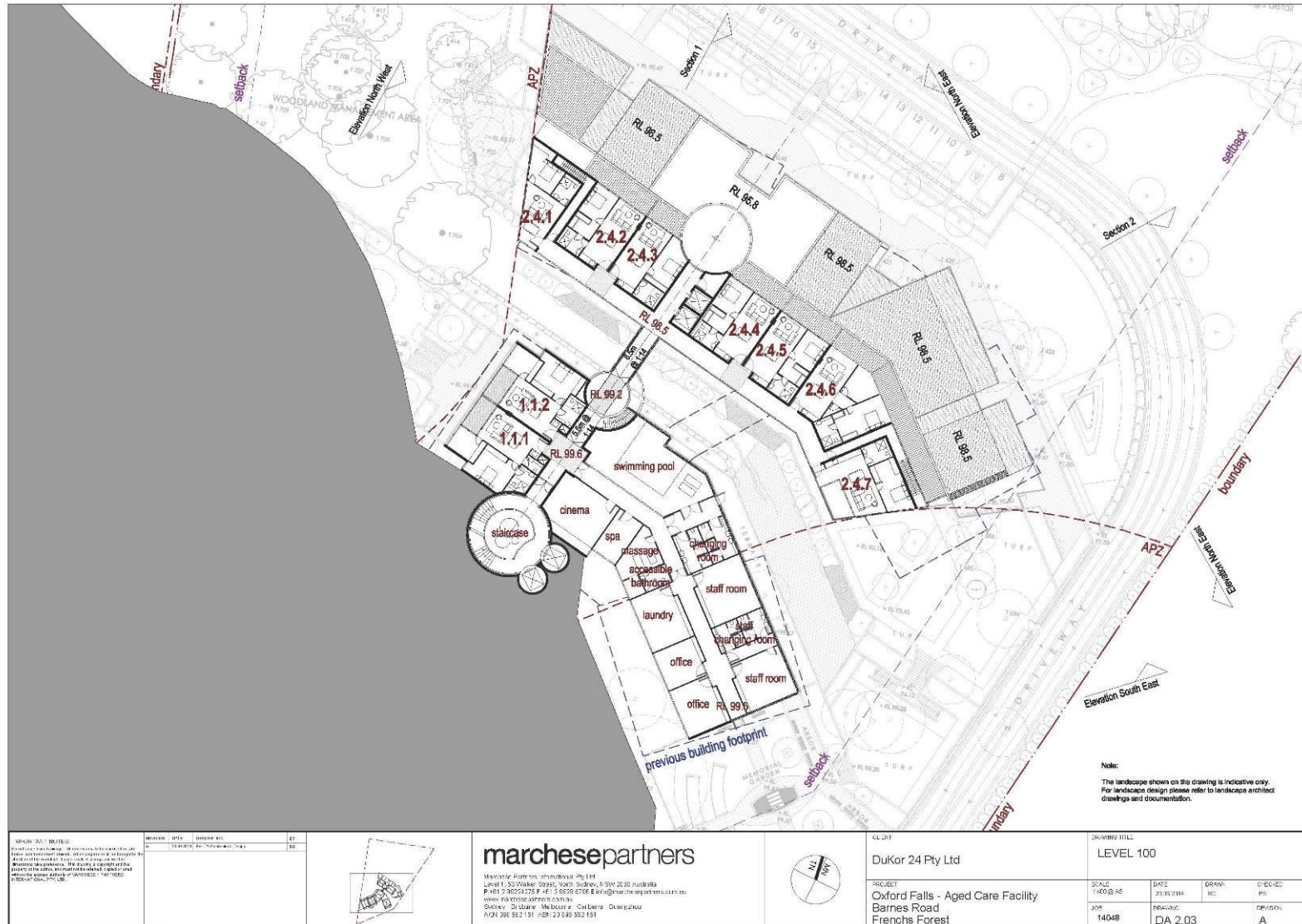


Figure 1.2 – Building use

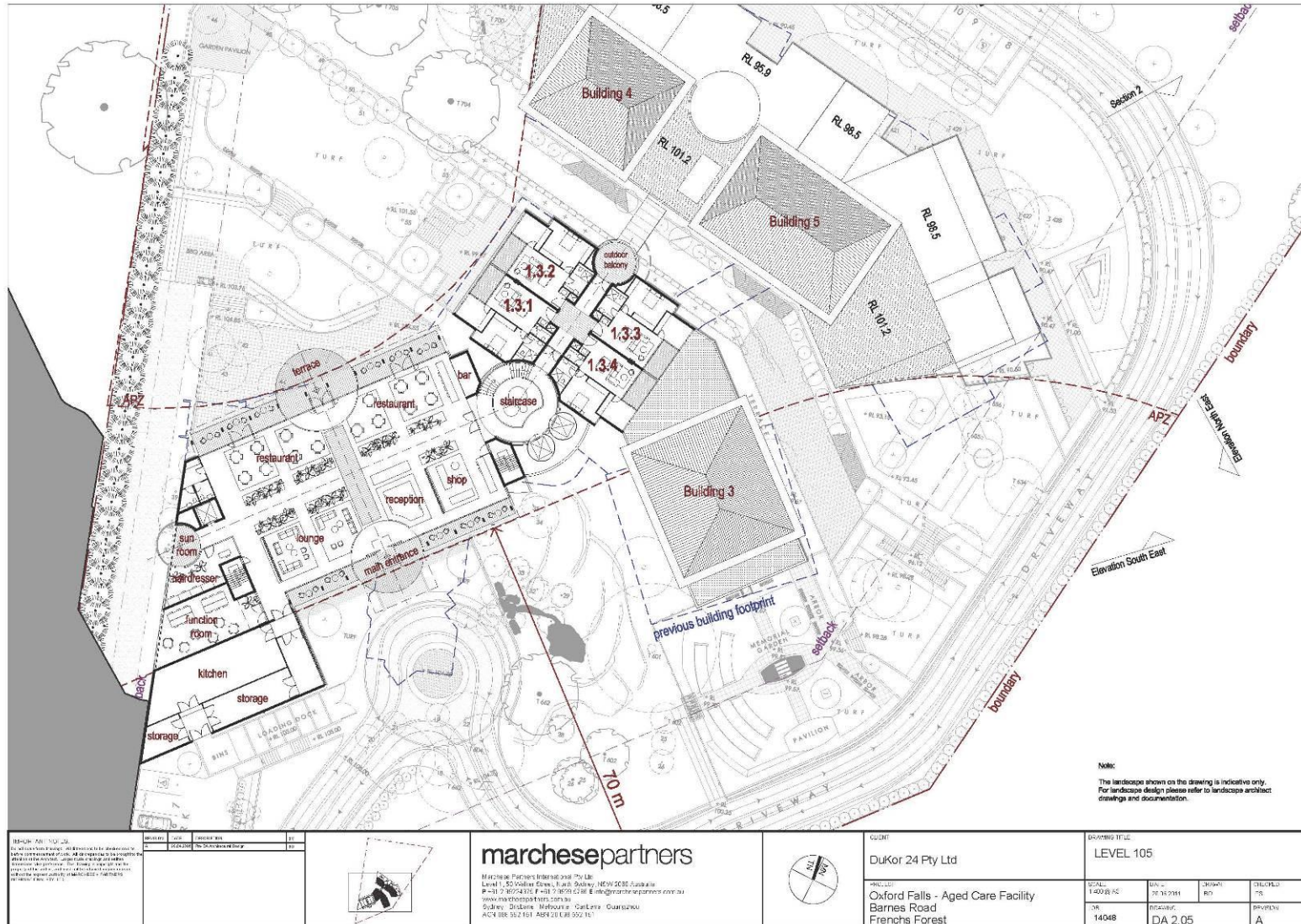


Figure 1.3 – Building use

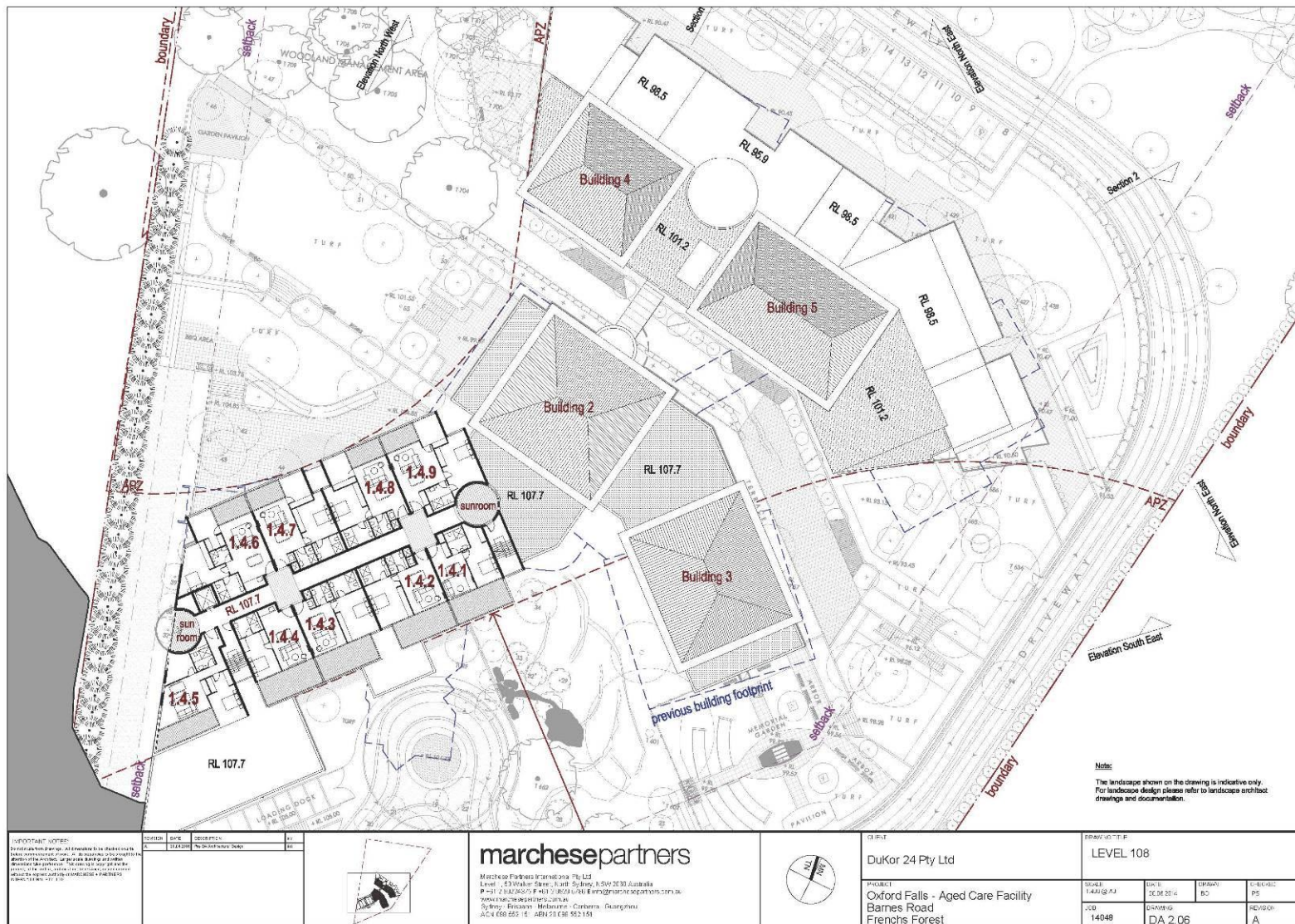


Figure 1.4 – Building use

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 28/4/2016
- Landscape plans prepared by *John Chetham & Associates*, Revision P14 dated 22/6/2016
- 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 March 2015 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 1.5.



Figure 1.5 – Location plan

The majority of the property is currently approved and used 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 1.6.

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.

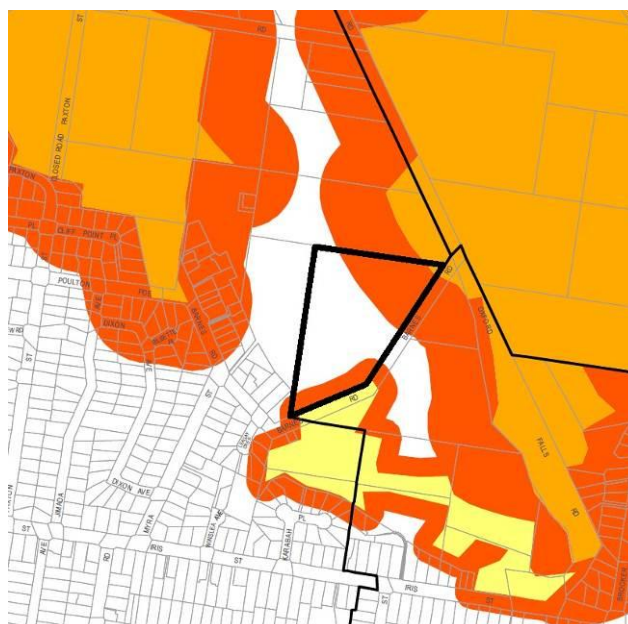


Figure 1.6 – Bushfire Prone Land Map

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 defensible 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 / 2015 / 2016)*.

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. 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 of 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*, 2016 and the Vegetation Management Plan also undertaken by *Travers bushfire & ecology*, 2016.

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 & 2.3 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 and 'other' buildings (i.e. office, storage, kitchen etc.).

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 (building 4)	Proposed wildlife corridor (to be revegetated)	Level	30	66 (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 (portions of building 1,2 & 5 used for aged care)	Forest	0-5 ^{0D}	70	70 (50m IPA & 20m OPA)	20m within Barnes Road (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 (within Barnes Road Reserve) 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)	Existing management on neighbouring lands
North & north-east	Proposed wildlife corridor (to be revegetated)	Level	11	>16 (IPA)	Nil
South & East	Managed Land	Level to upslope	N/A	>100 (IPA)	Nil
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: 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 11⁰ (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.

Table 2.3 – Bushfire Attack Assessment – ‘other’ development’

Aspect	Vegetation within 140m of development	Effective slope of land	APZ Required (metres)	APZ Provided (metres) (refer Note 1)	APZ on neighbouring lands
North, North-west, west	Grassland / managed rural residential	0-5 ^{0d}	N/A	>100	Not required due to existing lawn management on adjacent urban lands
South (portions of building 1 & 3 used for ‘other’ uses)	Forest	0-5 ^{0D}	32	51 - 60 (31-40m IPA & 20m OPA)	20m within Barnes Road (refer Note 2)

Note 1: Portions of buildings 1 (Figure 1) & 3 (Figure 2) are located within the minimum 70m APZ required for ‘aged care’ use. The development design has ensured these portions of the building are not used for aged care or associated ‘congregation’ of people whom may be vulnerable to bushfire (as per previous approvals). The southern portion of Building 1 will be used for kitchen and storage whilst the southern portion of Building 3 will be used for staff offices. Building 3 is provided with a separation of 51m and will therefore be constructed in accordance with BAL 19 standards.

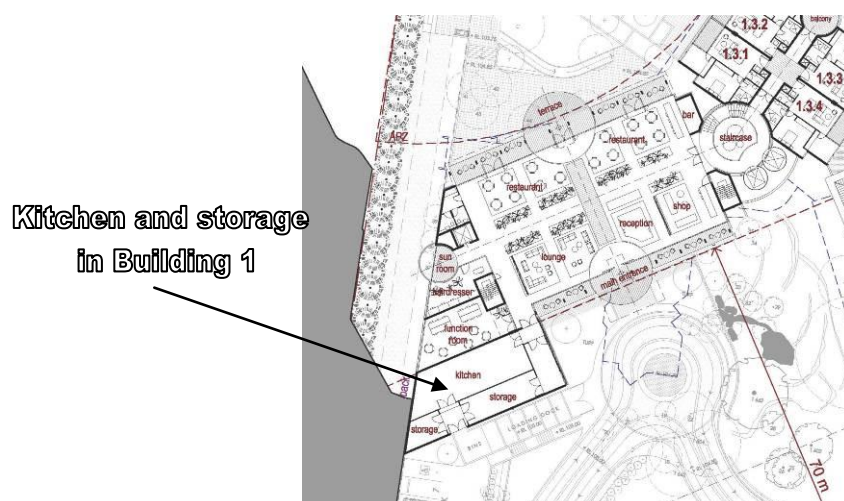


Figure 2.1 - Depicts building uses in Building 1

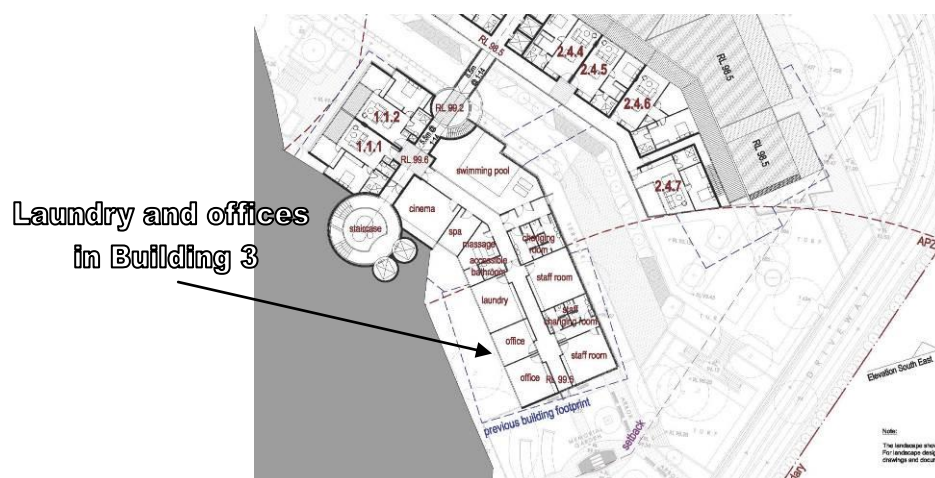


Figure 2.2 - Depicts building uses in Building 3

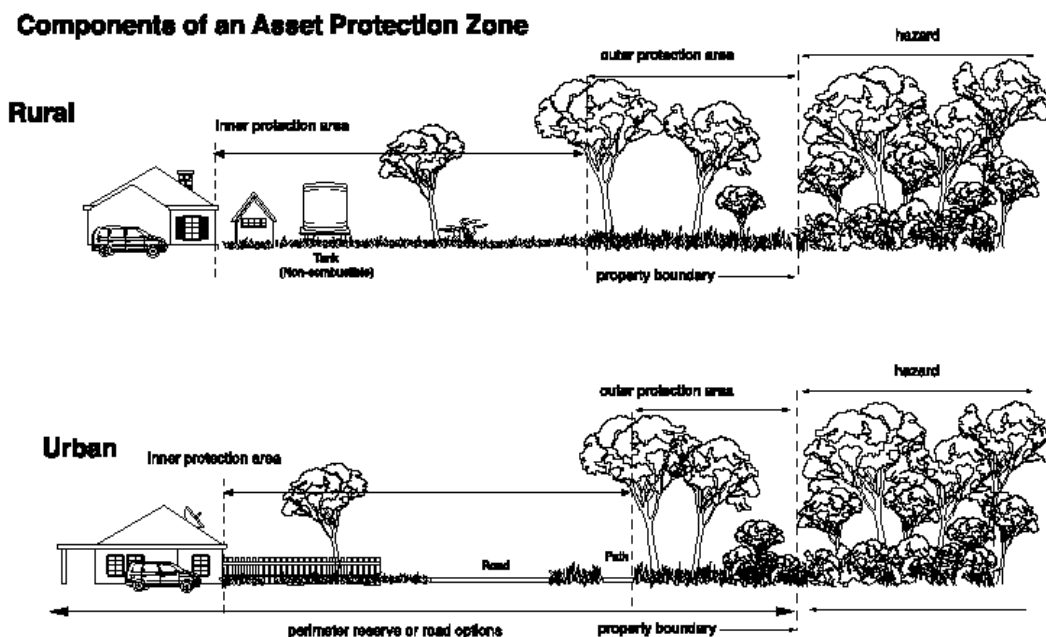


Specific Protection Issues

3

3.1 Asset protection zones

APZs are areas of defensible 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 defensible 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 10kW/m^2 for SFPP developments and 29kW/m^2 for residential or 'other' development (i.e. staff management cottage, offices & kitchen).

These ratings assist in determining the size of the APZ in compliance with Appendix 2 of *PBP* to provide the necessary defensible 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 / other development 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 experienced 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 <i>PBP</i>. 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 <i>PBP</i> 2006. The APZs do extend over Barnes Road reserve in the south. The ongoing maintenance of the APZ within Barnes Road Reserve 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 <i>fuel management plan</i> will ensure ongoing maintenance of APZ. 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°. 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 <i>Standards for Asset Protection Zones</i> (RFS 2005).	Complies – Can be made a condition of consent.

Table 3.2 – Performance criteria for asset protection zones (Residential and ‘other’) (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 for the Managers Residence (refer Table 2.2 & Appendix 2) and APZs provided allow for a BAL rating of 29. The 10–16 metre 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 <i>Standards for Asset Protection Zones</i> (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°	Yes. APZs are located on slopes less than 18°



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 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 proposed aged care buildings (Buildings 1, 2, 4 & 5) should comply with BAL 12.5 building construction standards.

Buildings 3 will be constructed to comply with BAL 19 building construction standards.

Note: There is no BAL 10 in AS3959.

3.2.1 Existing building – staff management cottage

The manager's residence is to be upgraded to improve ember protection as follows:

- 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 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.

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

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.

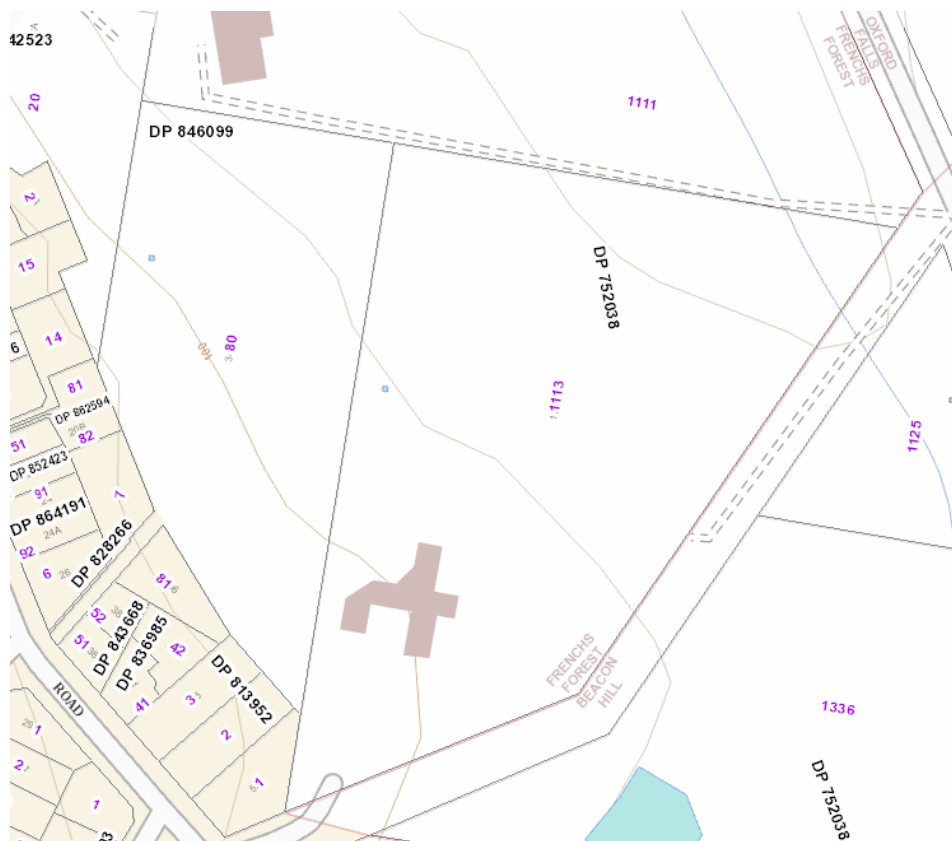


Figure 3.1 – Cadastral plan of adjoining allotments

A landscaping plan has been prepared for the site by *John Chetham & Associates*.

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 (RFS 2006)*.

3.4 Access for firefighting 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 internal dead end road is 6.5 metres in width with the provision of a 12m outer radius turning circle at its termination. A secondary access point to Barnes Road will be provided in the north-east.

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 3.3 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. The proposed internal road has a width of 6.5m.
	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.
	Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress.	Complies.

Performance Criteria as determined by PBP	Acceptable Solutions required by RFS PBP	Compliance or not
	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. <i>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.</i>	Complies - can be made a condition of consent. (refer Note 1)
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.

Note 1: The RFS bushfire safety authority outlined the following deferred commencement condition;

'An amended plan shall be provided clearly showing a feasible alternate route/s of exit/s through the northern part of the facility (Building 4 or 5) which can be utilised in an emergency situation should a bush fire threaten from the south'

A suitable 'residents pickup point/s' shall be provided and shown on the plans.

Schedule 1 attached and Figure 3.2 below depicts a feasible exit route through Buildings 1, 2 & 4 towards a resident pick up point in the northern portion of the property. This exit route provides safe egress through the buildings and away from the direct threat of bushfire.

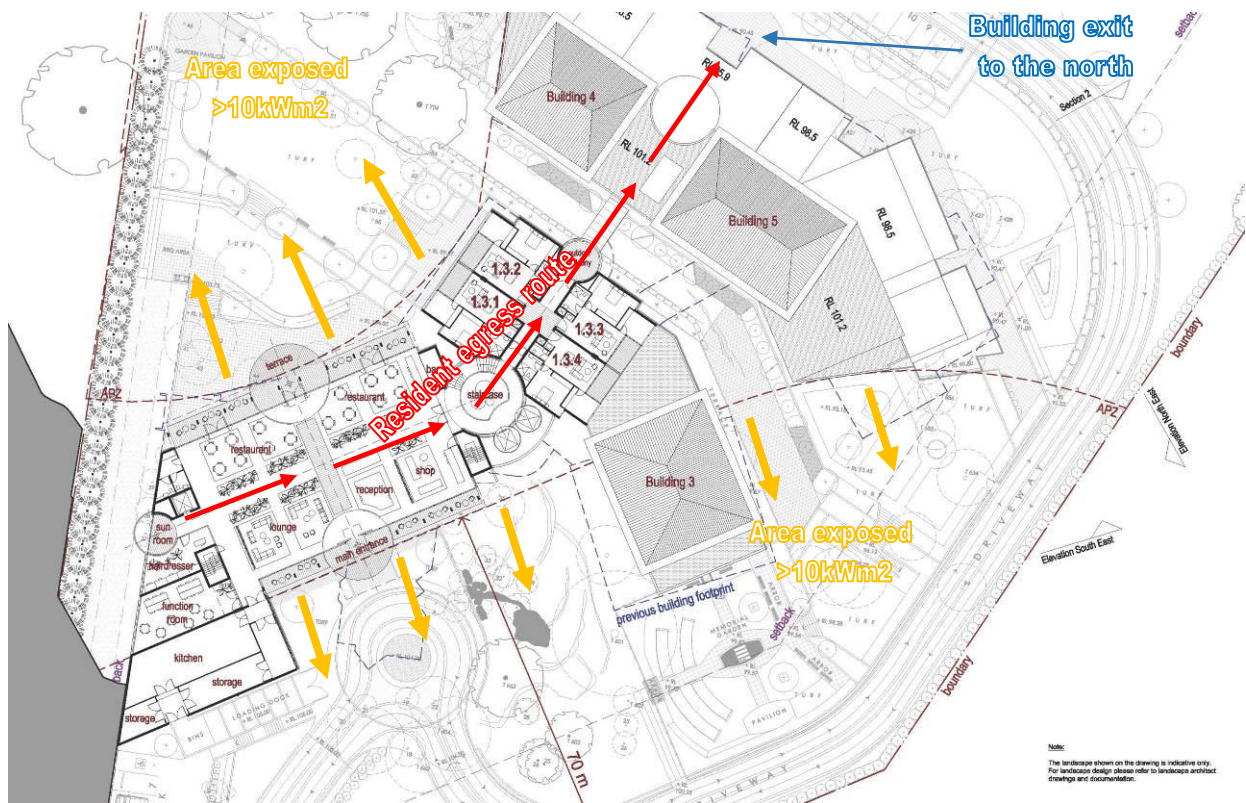


Figure 3.2 – Resident evacuation route



Conclusion & Recommendations

4

4.1 Conclusion

This 2016 addendum report has been prepared for the proposed expansion of the previously approved development consent issued in 2015 (reference no. DA2014/1062). This revised bushfire protection assessment has been updated to reflect the proposed increase in height of the existing seniors living facility as well as minor changes to the footprint of the approved development at Barnes Road, Frenchs Forest.

Whilst the building footprint has been slightly amended they are not located any closer to the bushfire hazard than the previous approval. The revised proposal maintains the 70m APZ (within the development site and adjoining Barnes Road Reserve) to all buildings used for aged care (accommodation / cinema / pool area). Buildings for non-aged care use (i.e. kitchen, storage & offices) have been provided with a smaller APZ.

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 condition.
- 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*.
- Compliance with the NSW Bushfire Safety Authority (refer Appendix 3)

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.

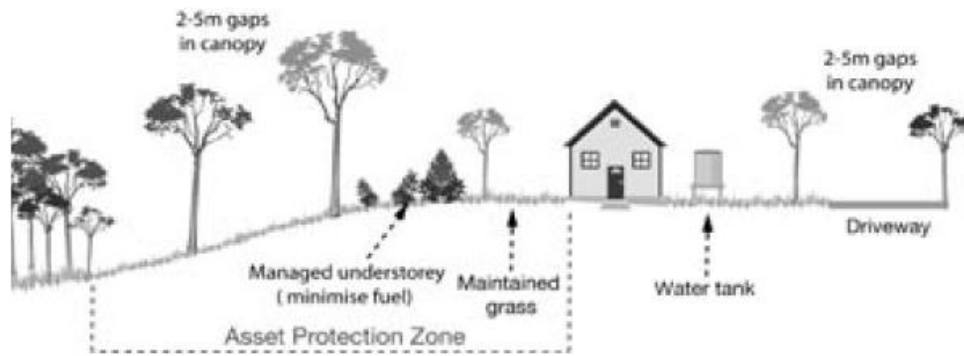
Recommendation 2 - APZs are to be provided to the proposed development. APZs are to be measured from the exposed wall of the aged care facility toward the hazardous vegetation. The APZs shall be as nominated in Table 2.1, 2.2 & 2.3 and also as generally depicted in Schedule 1.

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 managers residence are to comply with BAL 12.5 (Buildings 1, 2, 4 & 5) and BAL 19 (Buildings 3) 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 managers residence 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 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*.

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



Legend

- | | | | | |
|---|--------------------------|--|------------------------------------|----------------------------------|
| Subject site | Access road and carpark | 30m wildlife corridor (for restoration) | Asset Protection Zone (APZ) | Evacuation Route |
| Lot boundary (Lot 2873 DP 824283) | Stormwater basin | Core Riparian Zone (10m) | Inner Protection Area | Resident exit / evacuation route |
| Previous building footprint | Metal shed | Managed Vegetated Buffer (10m) | Outer Protection Area | Resident pickup point |
| Proposed building envelope (SFPP) | Staff management cottage | Proposed canopy planting (Zone 4 & Zone 8) | | |
| Proposed building envelope (other uses) | | | | |



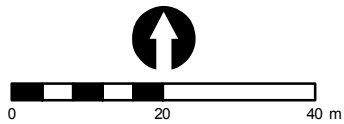
PROJECT & MXD REFERENCE
Barnes Road, Frenchs Forest
A16087_BF001

DATE & ISSUE NUMBER
24/06/2016
Issue 1

SCALE & COORDINATE SYSTEM
1:1,000 @ A3
GDA 1994 MGA Zone 56

TITLE
Schedule 1 - Bushfire Protection Measures

Document Path: n:\GIS STORAGE\IN Drive\A14054 BarnesRd FrenchsForest\MXDs\A16087_BF001.mxd



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 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 defensible 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.

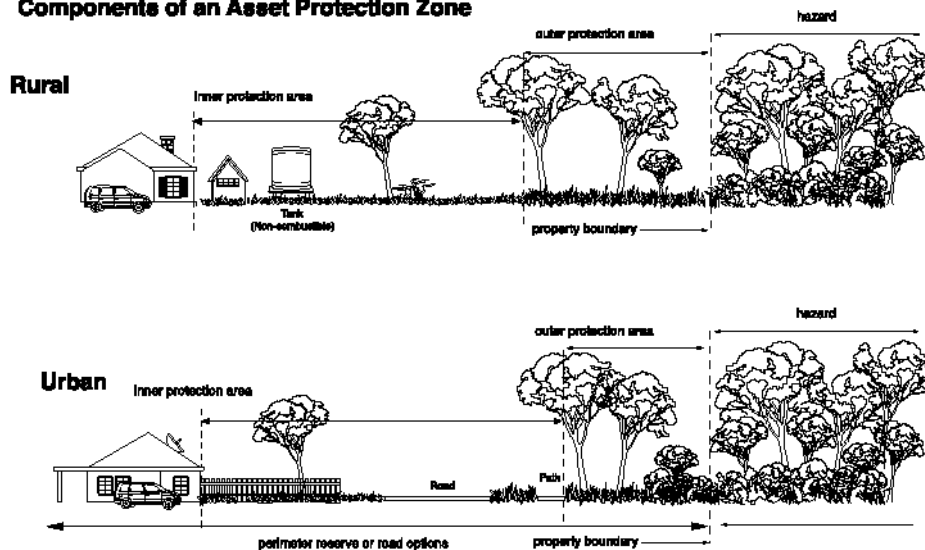
Table 1 – Fuel Layers

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.

Components of an Asset Protection Zone



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 100m² (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



NSW RFS Bushfire Safety Authority

A3

All communications to be addressed to:

Headquarters
15 Carter Street
Lidcombe NSW 2141

Telephone: 1 300 NSW RFS
e-mail: csc@rfs.nsw.gov.au

Headquarters
Locked Bag 17
Granville NSW 2142

Facsimile: 87 41 54 33



The General Manager
Warringah Council
Civic Centre, 725 Pittwater Road
DEE WHY NSW 2099

Your Ref. DA2014/1062
Our Ref. D14/3053
DA14101694232 GB

ATTENTION: Lashta Haidari

12 August 2015

Dear Sir/Madam

Integrated Development for Oxford Falls Road Frenchs Forest NSW 2086

I refer to your letter dated 4 May 2015 seeking general terms of approval for the above Integrated Development in accordance with Clause 55(1) of the Environmental Planning and Assessment Regulation 2000.

This response is to be deemed a bush fire safety authority as required under section 100B of the 'Rural Fires Act 1997' and is issued subject to the following numbered conditions:

1. Deferred commencement condition.

An amended plan shall be provided clearly showing a feasible alternate route/s of exit/s through the northern part of the facility (Building 4 or 5) which can be utilised in an emergency situation should a bush fire threaten from the South.

A suitable 'residents pickup point/s' shall be provided and shown on the plans.

2. Proposed Building 6 shall not be used by the Residents.

Asset Protection Zones

The intent of measures is to provide sufficient space for fire fighters and other emergency services personnel, ensuring radiant heat levels permit operations under critical conditions of radiant heat, smoke and embers, while supporting or evacuating occupants. To achieve this, the following conditions shall apply:

3. At the commencement of building works and in perpetuity the entire property shall be managed as an inner protection area (IPA) as outlined within Appendices 2 & 5 of 'Planning for Bush Fire Protection 2006' and the NSW Rural Fire Service's document 'Standards for asset protection zones'.

The following exclusions apply: the wildlife restoration corridor and riparian zone and buffer located in the northern part of the site as shown in Schedule 1 of the Bushfire Protection Assessment (Addendum) dated April 2015, ref. A14054B2.

Water and Utilities

The intent of measures is to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building. To achieve this, the following conditions shall apply:

4. Water, electricity and gas supplies shall comply with sections 4.1.3 and 4.2.7 of 'Planning for Bush Fire Protection 2006'.

Access

The intent of measures 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. To achieve this, the following conditions shall apply:

5. Internal roads shall comply with section 4.2.7 of 'Planning for Bush Fire Protection 2006'.
6. Internal roads shall have a minimum 6.5 metre wide carriageway width.
7. The internal road shall be linked into the northern end of Barnes Road.

Evacuation and Emergency Management

The intent of measures is to provide suitable emergency and evacuation (and relocation) arrangements for occupants of special fire protection purpose developments. To achieve this, the following conditions shall apply:

8. A Bush Fire Emergency Evacuation Plan shall be prepared in accordance with the NSW Rural Fire Service document 'Guide for Developing a Bush Fire Emergency Evacuation Plan'.

The plan shall include an alternative evacuation point/s, other than the Main Entrance, located in the northern part of the facility, should a bush fire threaten from the South.

Design and Construction

The intent of measures is that buildings are designed and constructed to withstand the potential impacts of bush fire attack. To achieve this, the following conditions shall apply:

9. Proposed Buildings 2, 3, 4 & 5 shall comply with Sections 3 and 5 (BAL 12.5) Australian Standard AS3959-2009 'Construction of buildings in bush fire-prone areas' and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006'.
10. Proposed Buildings 1 & 6 shall comply with Sections 3 and 6 (BAL 19) Australian Standard AS3959-2009 'Construction of buildings in bush fire-prone areas' and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006'.

11. The existing building proposed to be used as the Manager's Residence shall be upgraded to improve ember protection. This shall include enclosing all openings (excluding roof tile spaces) or covering openings with a non-corrosive metal screen mesh with a maximum aperture of 2mm. Where applicable this includes any sub floor areas, openable windows, vents, weepholes and eaves. External doors are to be fitted with draft excluders.

Landscaping

12. Landscaping within the site shall comply with the principles of Appendix 5 of 'Planning for Bush Fire Protection 2006'.

General Advice – consent authority to note

This approval is reliant on the Council granting approval for the unformed section of Barnes Road to be managed as an APZ.

This letter is in response to a further assessment of the application submitted and supersedes our previous general terms of approval dated 20 March 2015.

For any queries regarding this correspondence please contact Garth Bladwell on 1300 NSW RFS.

Yours sincerely



Jason Maslen

A/Team Leader, Development Assessment and Planning

The RFS has made getting information easier. For general information on 'Planning for Bush Fire Protection, 2006', visit the RFS web page at www.rfs.nsw.gov.au and search under 'Planning for Bush Fire Protection, 2006'.