Bushfire Assessment

Independent living units,
Aveo Peninsula Gardens

79 Cabbage Tree Rd, Bayview

Aveo Group

14 February 2018

(Ref: 17055)

report by
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FPA AUSTRALIA (NO.BPAD18882)
BPAD LEVEL 3 ACCREDITED PRACTITIONER
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1 Introduction

Street or property name:	79 Cabbage Tree Road		
Suburb, town or locality:	Bayview	**Postcode:**	2104
Lot/DP no:	Lot 20 DP 632081		
Local Government Area:	Northern Beaches Council		
Type of development:	Addition of independent living units (SFPP)		

1.1 Background

Aveo Group commissioned Peterson Bushfire to prepare a bushfire assessment of a proposed addition to a retirement and aged care facility located at the above address. This report presents the assessment and recommendations to achieve compliance with the relevant bushfire protection legislation and policy.

This bushfire assessment has been prepared by a consultant accredited by the Fire Protection Association of Australia's BPAD scheme (Accreditation No. BPD-L3-18882).

1.2 Location and description of subject land

The subject land is located at the southern edge of Bayview as shown in Figure 1. It contains the Aveo Peninsula Gardens retirement village within the southern portion of the site. The western and northern portion is steep, vegetated land contiguous with bushland to the west in Katandra Bushland Sanctuary Reserve. The site has its primary access from Cabbage Tree Road to the north and secondary emergency access via Gulia Street to the east.

1.3 Proposed development

The proposal consists of the addition of a series of Independent Living Units (ILUs) for seniors living in the northern part of the site as shown in Figure 2. A graphic impression of the development by architects Jackson Teece is provided in Figure 3.

1.4 Assessment requirements

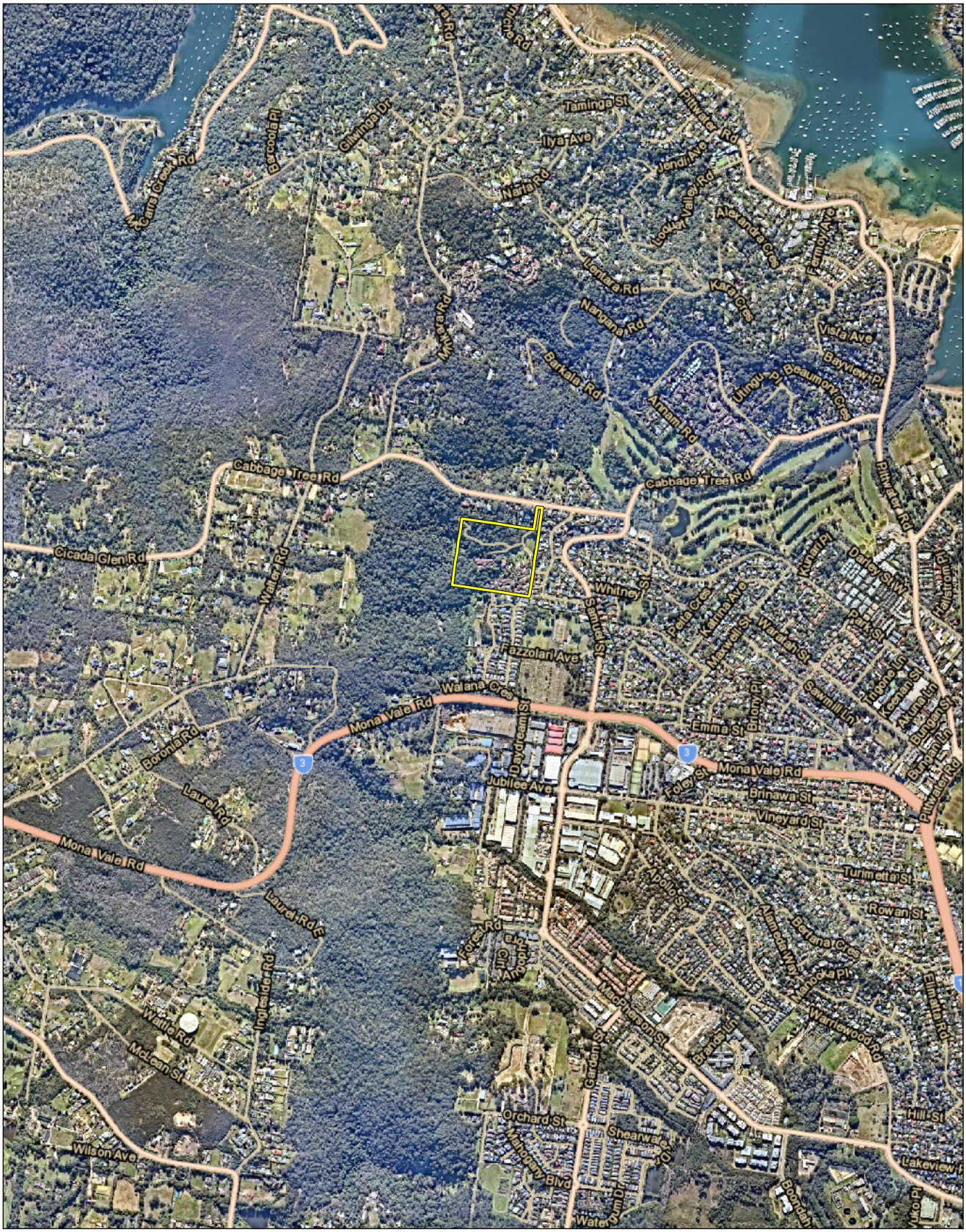
The subject land and development site is identified as 'bushfire prone land' (see Figure 4). Development proposals involving retirement living on bushfire prone land are defined 'Special Fire Protection Purpose' (SFPP) development by s100B *Rural Fires Act 1997* and require assessment in accordance with the NSW Rural Fire Service (RFS) document *Planning for Bushfire Protection 2006* (referred to as 'PBP' throughout this report). Section 4.2 of PBP addresses SFPP development and outlines the assessment methodology and protection measures, such as asset protection zones.

1.5 Assessment methodology

This bushfire assessment report is the result of detailed investigation and analysis including site inspection, examination of desk-top mapping, and liaison with the consulting ecologist. Table 1 below summarises the tasks undertaken.

Table 1: Methodology

Methodology	Task	Considerations
Desk-top review	A review of the mapping was undertaken to guide the field work.	• Aerial imagery (Nearmap image capture 23 February 2017, updated to 11 December 2017). • Vegetation mapping (Sydney Metropolitan vegetation mapping OEH 2013)). • Topographical data (2 m contour interval).
Site inspection	Inspection of site and bushfire hazard	The inspection took place on 27 April 2017 to ground-truth the desk top review and to gather site specific data on slope and vegetation that inform determination of asset protection zones.
Determination of constraints	Determine requirements of 'Planning for Bushfire Protection 2006' related to the site and development potential.	Planning requirements consists of: • Asset protection zone location, dimension and vegetation management • Bushfire Attack Levels • Access • Water supply and utilities • Evacuation
Reporting	Prepare constraints analysis report.	



Legend

Subject Land

N

DKGIS

Date: 19/01/2018

0 125 250 500

Metres

Figure 1: The Location of the Subject Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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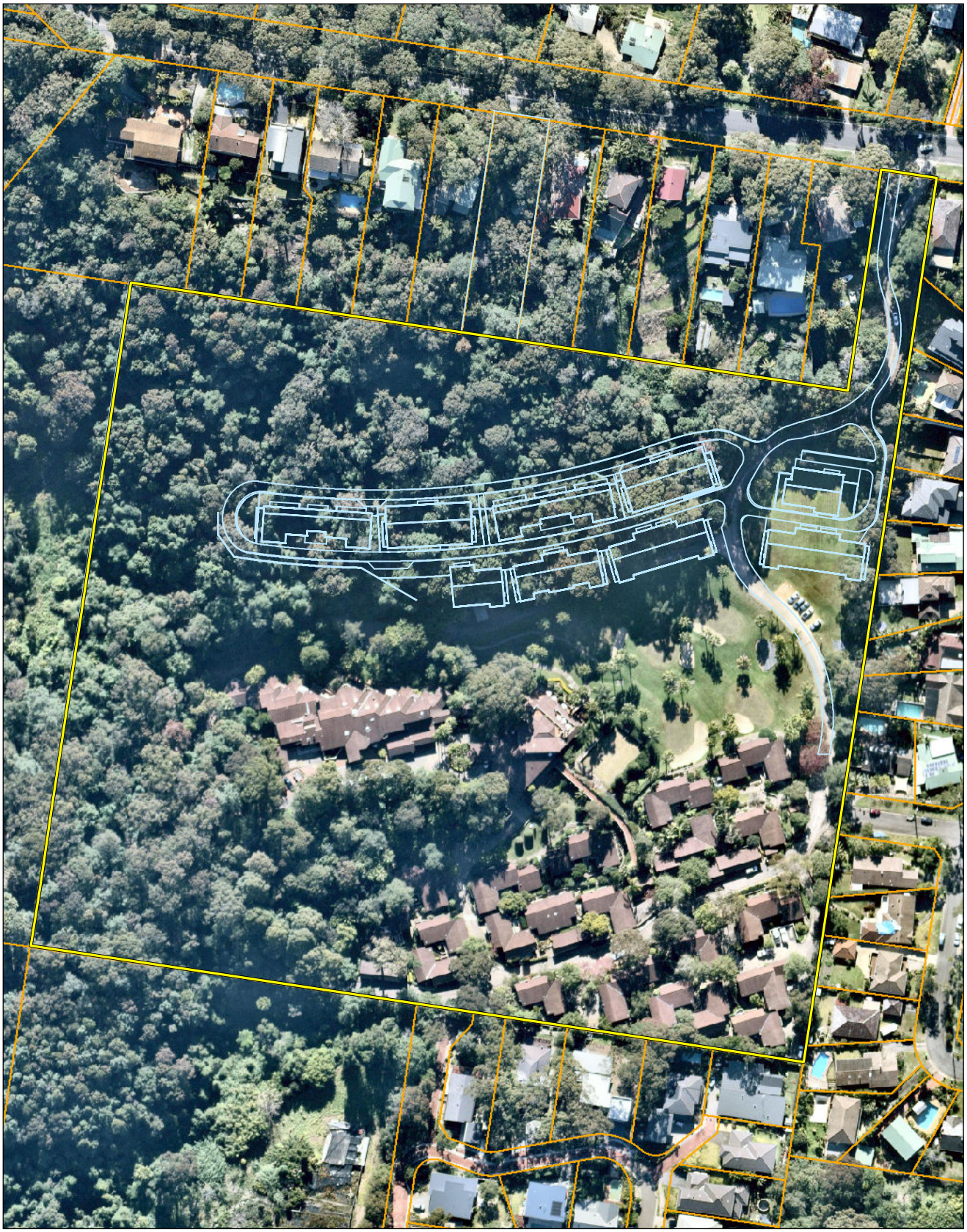

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Subject Land

Site Plan

N

DKGIS

Date: 31/01/2018

0 12.5 25 50

Metres

Figure 2: The Proposal

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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Figure 3: Graphic impression of proposed development

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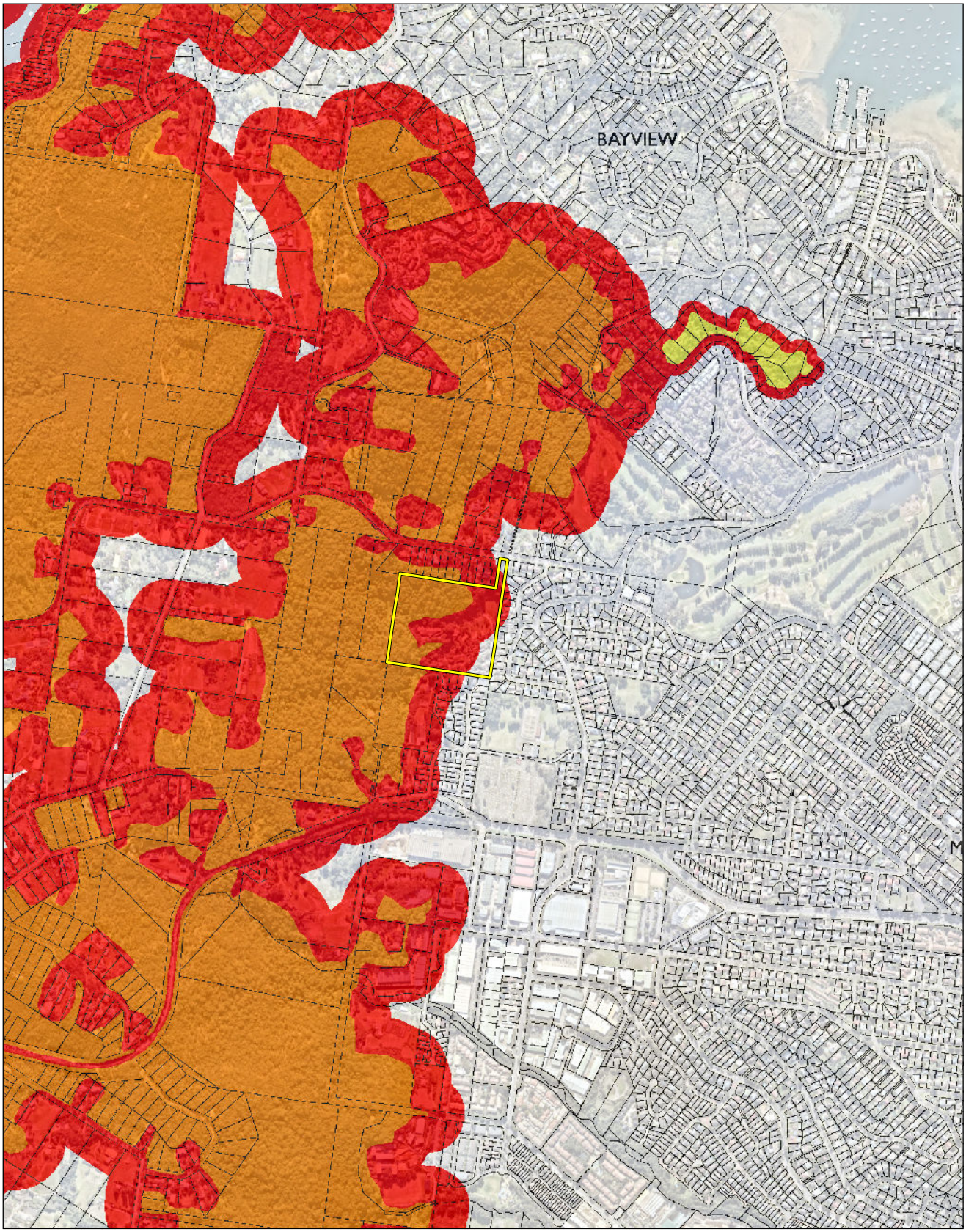

Legend

Subject Land

Bushfire Prone Land

Vegetation Buffer

Vegetation Category 1

Vegetation Category 2

N

DKGIS

Date: 16/01/2018

0 125 250 500

Metres

Figure 3: Bushfire Prone Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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2 Bushfire hazard assessment

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as Asset Protection Zone location and dimension and Bushfire Attack Level. The following sub-sections provide a detailed account of the vegetation communities (bushfire fuels) and the topography (effective slope) that combine to create the bushfire hazard that may affect bushfire behaviour approaching the development site.

Site assessment occurred on 27th April 2017. Photographs of the hazard are included in Appendix 1.

2.1 Predominant vegetation

The hazard within 140 m of the development site has been assessed in accordance with the methodology specified within PBP. The hazard consists of the bushland that will remain on-site to the south of the existing facility and off-site to the west and north as mapped on Figure 5. The vegetation on the northern portion of the site where the development is to occur is Central Coast Escarpment Moist Forest (OEH 2013) which grades into Coastal Enriched Sandstone Moist Forest in the westerly direction onto adjoining properties. These communities are classified as 'forest' for the purpose of determining APZs.

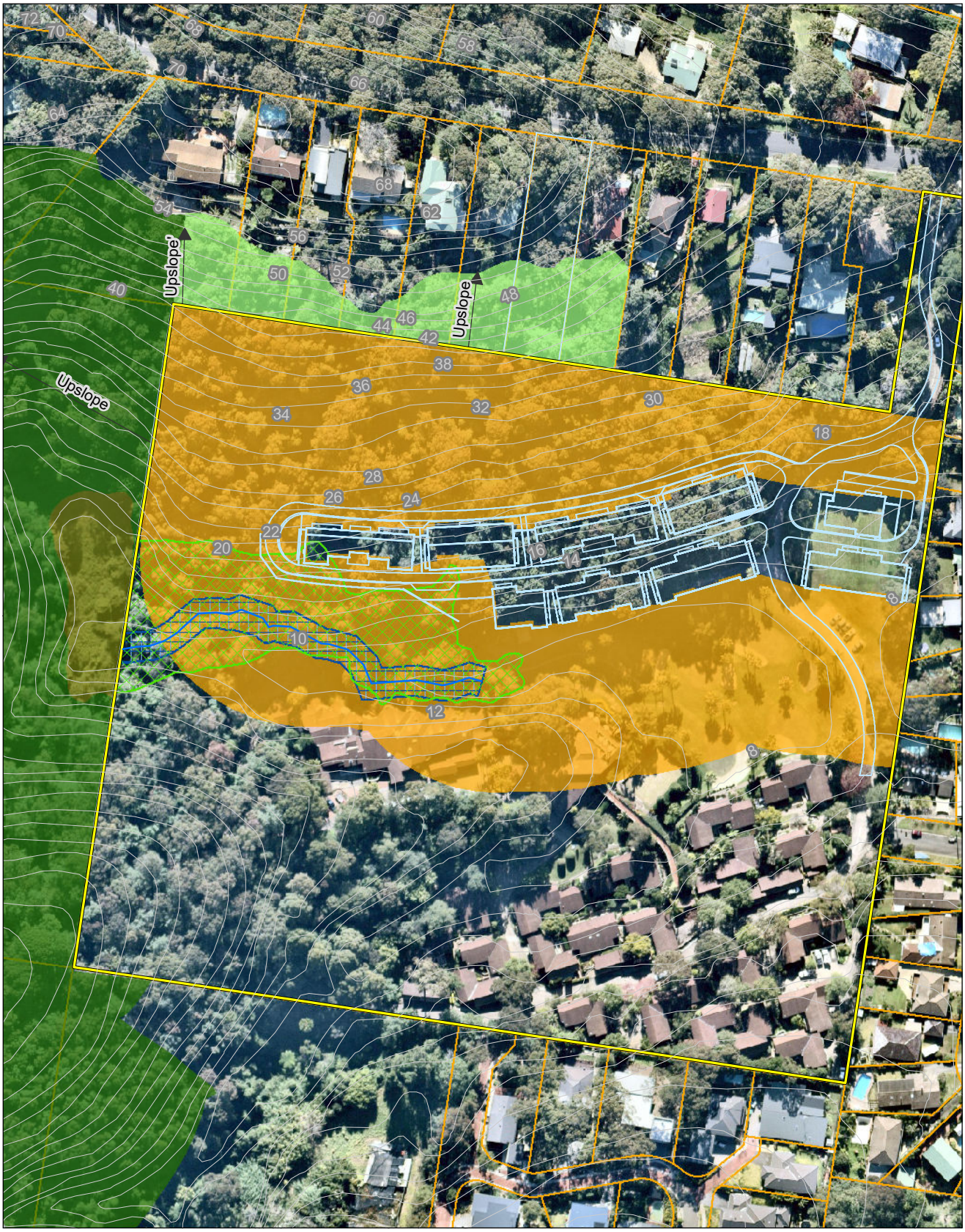
Once the development site is cleared and managed for buildings, access roads, infrastructure and open space, a narrow forest corridor will remain adjacent the northern boundary comprised of the unmanaged and steeper parts in the rear of existing residential lots along Cabbage Tree Road (refer to Figure 5). Due to the narrow width of the corridor that would remain, the hazard can be classified as 'low hazard' in accordance with the provisions on page 52 of PBP.

A small drainage line dissects the site west to east and a 20 m wide riparian corridor (10 m either side of channel) will be retained unmodified within the APZ consisting of Coastal Warm Temperate Rainforest (refer to Figure 5). As it will consist of rainforest forming a very narrow corridor, it is not classified as a hazard, and will have a defendable space between it and the nearest apartment building of at least 15 m at the narrowest point.

2.2 Effective slope

The 'effective slope' influencing fire behaviour has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the slope that would most influence fire behaviour where the hazard occurs. The slope was determined using a 2 m contour layer as shown on Figure 5.

The effective slope underneath the forest that will remain to the north, west and south after APZ establishment is in the PBP slope class of 'upslope/flat'.



Legend

Hydrology
Subject Land
Contour - 2m
Riparian Zone
Vegetation Formation
Forest
Low Hazard
Rainforest
Weed
Asset Protection Zone

N
DKGIS
Date: 31/01/2018
0 12.5 25 50
Metres

Figure 4: Bushfire Hazard Analysis and Asset Protection Zone

Coordinate System: GDA 1994 MGA Zone 56
Imagery: © Nearmap

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3 Bushfire protection measures

PBP requires the assessment of a suite of bushfire protection measures that in total provide an adequate level of protection for SFPP development. The measures required to be assessed are listed in Table 2 below and are discussed in detail in the remainder of this section.

Table 2: PBP bushfire protection measures

Bushfire protection measures	Considerations
Asset Protection Zones (APZ)	Location and dimension of APZ building setbacks from vegetation including prescriptions of vegetation management within the APZ.
Bushfire Attack Levels (BAL)	Assessment of BAL that corresponds to construction specifications for bushfire protection of buildings.
Access	Assessment to include access and egress in and out of a developable area, and design standards of access roads.
Water supply and other utilities	List requirements for reticulated water supply and hydrant provisions, and any static water supplies for fire-fighting.

3.1 Asset protection zones (APZ)

Using the vegetation and slope data discussed in Section 2, an APZ suitable for SFPP development has been calculated. The required APZ is mapped on Figure 5 and listed in Table 3 on the following page.

PBP Table A2.6 requires a 60 m APZ between the ILUs and the forest hazard located to the west and south. Figure 5 shows how the apartments have been setback 60 m from the western boundary and the extent of the 60 m APZ in the south direction, noting that the majority of the land within the APZ to the south is managed. It is also proposed to manage the vegetation to the northern boundary to ensure the corridor of vegetation within adjoining residential lots to the north is retained as ‘low hazard’ status. Any retention of vegetation within the site along the northern boundary that would allow the corridor to widen greater than the 50 m low hazard threshold would result in the need for a 60 m APZ in this direction.

Table 3: APZ determination

Location[1]	Vegetation[2]	Slope[3]	Required APZ[4]	How the APZ is to be achieved
North	Low hazard	Upslope	30 m (IPA=30 m)	Management of vegetation to the northern boundary will exceed 30 m requirement.
West	Forest	Upslope	60 m (IPA=40 m, OPA=20 m)	Management of vegetation to the western boundary will meet 60 m requirement.
South	Forest	Upslope	60 m (IPA=40 m, OPA=20 m)	Management of vegetation to the south-west required opposite creek. Remainder of site is managed.
East	Managed	Not required	Not required	No hazards in the east direction.

[1] Direction of assessment from proposed development. Refer to Figure 5.

[2] Predominant vegetation classification over 140 m from development.

[3] Effective slope assessed over 100 m from development where the bushfire hazard occurs.

[4] Asset Protection Zone (APZ) required by Table A2.6 of 'Planning for Bushfire Protection 2006'. Refer to Section 3.2 for description of IPA (inner Protection Area) and OPA (Outer Protection Area).

3.2 Vegetation management

The vegetation within the APZ is to be managed to achieve the performance objectives of an Inner Protection Area (IPA) and Outer Protection Area (OPA) as described by PBP. The IPA is located closest to the asset and requires a more intense modification and reduction in fuels, whilst the OPA is located on the outer edge of the APZ featuring slightly higher fuel levels.

The recommended APZ vegetation management guidelines to achieve the IPA and OPA performance requirements is listed below. The guidelines have been designed with the steepness of the site in mind. The slope underneath the APZ extending to the northern boundary exceeds 18 degrees in places, therefore sensitive fuel management techniques guided by a Vegetation Management Plan (VMP) are required to ensure the APZ performance criteria relating to slopes in excess of 18 degrees are satisfied (i.e. '*APZ maintenance is practical, soil stability is not compromised and the potential for crown fire is negated*'). A VMP based on the principles and recommendations listed below will safeguard the ability to maintain the vegetation on slopes greater than 18 degrees as well as guarantee a stable slope where erosion above natural limits does not occur. Crown fire is not an issue at this site due to the hazard being upslope of the development.

The following fuel management guidelines are recommended to achieve the IPA and OPA performance requirements as well as the requirements for maintaining APZs on steep slopes:

1. General considerations:

    a. All works to be undertaken under the guidance of an approved Vegetation Management Plan (VMP) to minimise the impact on the vegetation and manage the establishment and maintenance of the APZ on steep slopes.

b. The riparian zone as mapped on Figure 5 is not to be treated for APZ compliance.

c. All works to be undertaken by an experienced ecological management and restoration company under the guidance of a suitably qualified bushfire consultant.

d. All works are to be undertaken by hand-held machinery such as brush-cutters and chainsaws. No vehicles or machines with wheels or tracks are permitted within, or remove fuels from, the APZ.

e. Priority must be given to manage and eliminate all weeds in order to reduce the bushfire fuel loads and prevent weeds from spreading. This is to be undertaken using a combination of hand removal, cut/scrape and painting, brush cutting and spot spraying as required.

2. IPA treatment:

a. Canopy treatment: Trees are to be removed (if required) to achieve a discontinuous canopy by achieving gaps between crowns of 2 to 5 m. Small clumps of trees can remain forming one larger crown providing larger gaps to the next adjacent crown of minimum 5 m is achieved. Preference for removal is to be given to trees with lower Safe Useful Life Expectancy (SULE) rating and with least ecological benefit.

b. Understorey treatment: Understorey shrubs and saplings are to be thinned to form clumps or individuals so that they do not comprise more than 20% of the total IPA area. Shrubs are not to be located directly underneath retained tree crowns.

c. Groundcover treatment: Groundcovers such as grasses and ferns are to be regularly mowed or slashed to minimal height (i.e. 100 mm) and mulch is to be keep to a minimum (i.e. 50 mm) whilst allowing a full ground cover to prevent weed growth and soil erosion.

3. OPA treatment:

a. Canopy treatment: Trees are to be removed (if required) to achieve a canopy that does not overlap. Crowns may be touching. Preference for removal is to be given to trees with lower Safe Useful Life Expectancy (SULE) rating and with least ecological benefit.

b. Understorey treatment: Understorey shrubs and saplings are to be thinned to form clumps or individuals so that they do not comprise more than 20% of the total IPA area. Shrubs are not to be located directly underneath retained tree crowns.

c. Groundcover treatment: Groundcovers such as grasses and ferns are to be regularly mowed or slashed to a short height (i.e. 300 mm), and mulch is to be

keep to a minimum (i.e. 100 mm) whilst allowing a full ground cover to prevent weed growth and soil erosion.

3.3 Bushfire Attack Level (BAL)

With a compliant APZ as specified in Table 3 and shown on Figure 5, all buildings are rated BAL-12.5, determined in accordance with a Method 1 assessment under Australian Standard *AS 3959-2009 Construction of buildings in bushfire-prone areas* (AS 3959).

The buildings are therefore to be designed and constructed to comply with BAL-12.5. The NSW variation to AS 3959 listed within PBP Appendix 3 Addendum May 2010 is also to be applied to design and construction in addition to the BAL specifications.

3.4 Access

Alternate access and egress

PBP requires an access design that enables safe evacuation whilst facilitating adequate emergency and operational response. All bushfire prone areas should have an alternate access or egress option depending on the bushfire risk, the density of the development, and the chances of the road being cut by fire for a prolonged period.

The site has its existing primary access off Cabbage Tree Road to the north and alternate emergency access to Gulia Street to the east. Both access points allow emergency response and evacuation to occur in a variety of directions, and of most importance the access is amongst managed lands providing direct linkage to the built-up suburb of Mona Vale adjacent to the east. As such, the alternate access and egress complies with PBP.

Design of internal roads

A one-way internal access road is proposed to loop around a cluster of ILUs on each side of the existing access road as shown on Figures 2 to 4. The section of the road on the northern edge of the ILUs on the western side of the existing access road will also act as the perimeter road. Although not having a carriageway width of 8 m as listed by the PBP Acceptable Solutions for road access (see Table 4), the one-way design is considered adequate in achieving the performance criteria (*"public road widths and design that allow safe access for firefighters while residents are evacuating an area"*) as it controls vehicle direction ensuring that passing is not required. The section of perimeter road is also placed at the edge of an APZ that exceeds the required minimum dimension providing a safer operational environment than the minimum standard. In addition, the vegetation is located on an upslope from the development and classified 'low hazard', effectively reducing fire intensity and spread towards the development.

It is noted that the existing access drive off Cabbage Tree Road is 6 m wide, falling short of the PBP Acceptable Solution width of 6.5 m for a two-way access road. It would be considered that this non-compliance be tolerated for an addition to an existing facility, particularly as there is an alternate access option via Gulia Street.

Table 4: PBP road design and construction standards for SFPP development

Performance Criteria	Acceptable Solutions
• *Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources)*	• *Public roads are two-wheel drive, all weather roads*
• *Public road widths and design that allows safe access for firefighters while residents are evacuating an area*	• *Urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with PBP Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle) taken from 'AS 2890.2-2002 Parking facilities – Off-street commercial vehicle facilities'.* • *The perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas* • *Traffic management devices are constructed to facilitate access by emergency services vehicles* • *Public roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard* • *Curves of roads (other than perimeter roads) are a minimum inner radius of six metres* • *Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient* • *There is a minimum vertical clearance to a height of four metres above the road at all times*
• *The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles*	• *The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicated load rating*
• *Roads that are clearly sign posted (with easy distinguishable names) and buildings / properties that are clearly numbered*	• *Public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression* • *Public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression*
• *There is clear access to reticulated water supply*	• *Public roads up to 6.5 metres wide provide parking within parking bays and located services outside of the parking bays to ensure accessibility to reticulated water for fire suppression* • *One way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and located services outside of the parking bays to ensure accessibility to reticulated water for fire suppression*
• *Parking does not obstruct the minimum paved width*	• *Parking bays are a minimum of 2.6 metres wide from kerb to kerb edge to road pavement. No services or hydrants are located within the parking bays* • *Public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road*

3.5 Water supply and utilities

Water supply

The development will require fire hydrants to be installed to comply with *AS 2419.1 – 2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419) so that all sides of a building are within 70 m of a hydrant by lay of the hose (or 90 m with a tanker parked in-line maximum 20 m from the hydrant).

Electricity supply

The electrical supply will be below ground and will therefore comply with PBP.

Gas supply

Any gas services are to be installed and maintained in accordance with *AS/NZS 1596-2008 The storage and handling of LP gas*.

4 Conclusion and recommendations

4.1 Conclusive summary

The proposal consists of an addition to an existing retirement village, being the construction of a series of apartment buildings containing independent living accommodation units for seniors. A 60 m APZ is required to the south and west, reducing in size to the northern boundary. The APZ is to managed under the guidance of a VMP to ensure the vegetation modification on slopes greater than 18 degrees performance requirement is sufficiently addressed.

With the adoption of the recommendations below, the proposed development will comply with *Planning for Bushfire Protection 2006* for Special Fire Protection Purpose (SFPP) development.

4.2 Recommendations

The recommendations made within this assessment are repeated below:

1. A 60 m APZ is to be established and maintained to the south and west of the proposed buildings, and to the northern lot boundary, as shown on Figure 5. The 20 m wide rainforest riparian zone is not to be treated for APZ compliance.

2. The recommended APZ vegetation management guidelines to achieve the Inner Protection Area (IPA) and Outer Protection Area (OPA) performance requirements is listed at Section 3.2 of this report. Sensitive fuel management techniques guided by a Vegetation Management Plan (VMP) are required to ensure the APZ performance criteria relating to slopes in excess of 18 degrees are satisfied.

3. The buildings are to be designed and constructed to comply with BAL-12.5. The NSW variation to AS 3959 listed within PBP Appendix 3 Addendum May 2010 is also to be applied to design and construction in addition to the BAL specifications.

4. The access roads are to comply with the PBP Acceptable Solutions for public access roads as listed in Table 4, with the exception that any road acting as a perimeter road may be the one-way access road as proposed.

5. Hydrants are to be installed to achieve compliance with *AS 2419.1 – 2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419).

6. Any gas services are to be installed and maintained in accordance with *AS/NZS 1596-2008 The storage and handling of LP gas* (Standards Australia, 2008).

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Standards Australia. 2008. *The storage and handling of LP Gas*, AS/NZS 1596-2008, Fourth edition 2005, Standards Australia International Ltd, Sydney.

Standards Australia. 2009 (Amendment 3). *Construction of buildings in bushfire-prone areas*, AS 3959, Third edition 2009, Standards Australia International Ltd, Sydney.

Appendix 1 - Photographs

Photograph 1: Typical section of forest leading upslope to the north-west of the development

Photograph 2: View west of forest on upslope taken from western boundary

Photograph 3: View north of low hazard corridor on upslope taken from northern boundary

Photograph 4: Rainforest along drainage line

Photograph 5: Cessation of natural drainage line below development site

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