

Appendix 7

**Bushfire Assessment Report
prepared by
Peterson Bushfire**



Bushfire Assessment

**Concept DA – Retirement
Living**

**Lot 3991 Jordan Springs
Boulevard, Jordan Springs**

Lendlease

22 May 2018

(Ref: 17154)

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

ABN 28 607 444 833

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1 Introduction

Street or property name:	Lot 3991 Jordan Springs Boulevard	
Suburb, town or locality:	Jordan Springs	Postcode: 2747
Lot/DP no:	Lot 3991 DP 1190132	
Local Government Area:	Penrith City Council	
Type of development:	Retirement living (Concept DA)	

1.1 Background

Lendlease commissioned Peterson Bushfire to prepare a bushfire assessment for a conceptual development application (concept DA) for future retirement living located on land identified as bushfire prone. This report presents the assessment and recommendations to ensure 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 proposal

The subject land is one of the few remaining parcels of land to be developed within Jordan Springs. It is located on the southern side of Jordan Springs Boulevard adjacent the Wianamatta Regional Park as shown in Figure 1. The site adjoins a large stormwater basin and permanent lake to the south and west, followed by woodland within the Regional Park.

The proposal is a concept DA for future retirement living consisting of 51 villas across the northern and central parts of the site, and apartment envelopes across the southern parts of the site as shown on Figure 2.


1.3 Assessment requirements

The subject land is identified as 'bushfire prone land' on the Penrith Bushfire Prone Land Map (refer to Figure 3) as it is within 100 m of bushland that has the potential to carry a bushfire or contribute to bushfire attack. Proposals involving retirement living are defined as Special Fire Protection Purpose (SFPP) development.

Section 4.46 and 4.47 of the *Environmental Planning and Assessment Act 1979* requires a bushfire assessment of SFPP development proposals on bushfire prone land following the process and methodology set out within Section 100B of the *Rural Fires Act 1997*, Clause 44 of the *Rural Fires Regulation 2008* and the NSW Rural Fire Service (RFS) document *Planning for Bushfire Protection 2006* (referred to as 'BPP' throughout this report).



Legend

 Subject Land



Date: 23/05/2018

0 125 250 500
Metres

Figure 1: The Location of the Subject Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Legend

- Subject Land
- ~ Site Plan

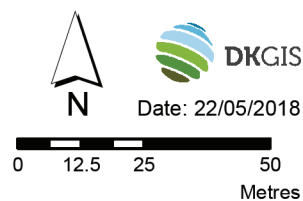
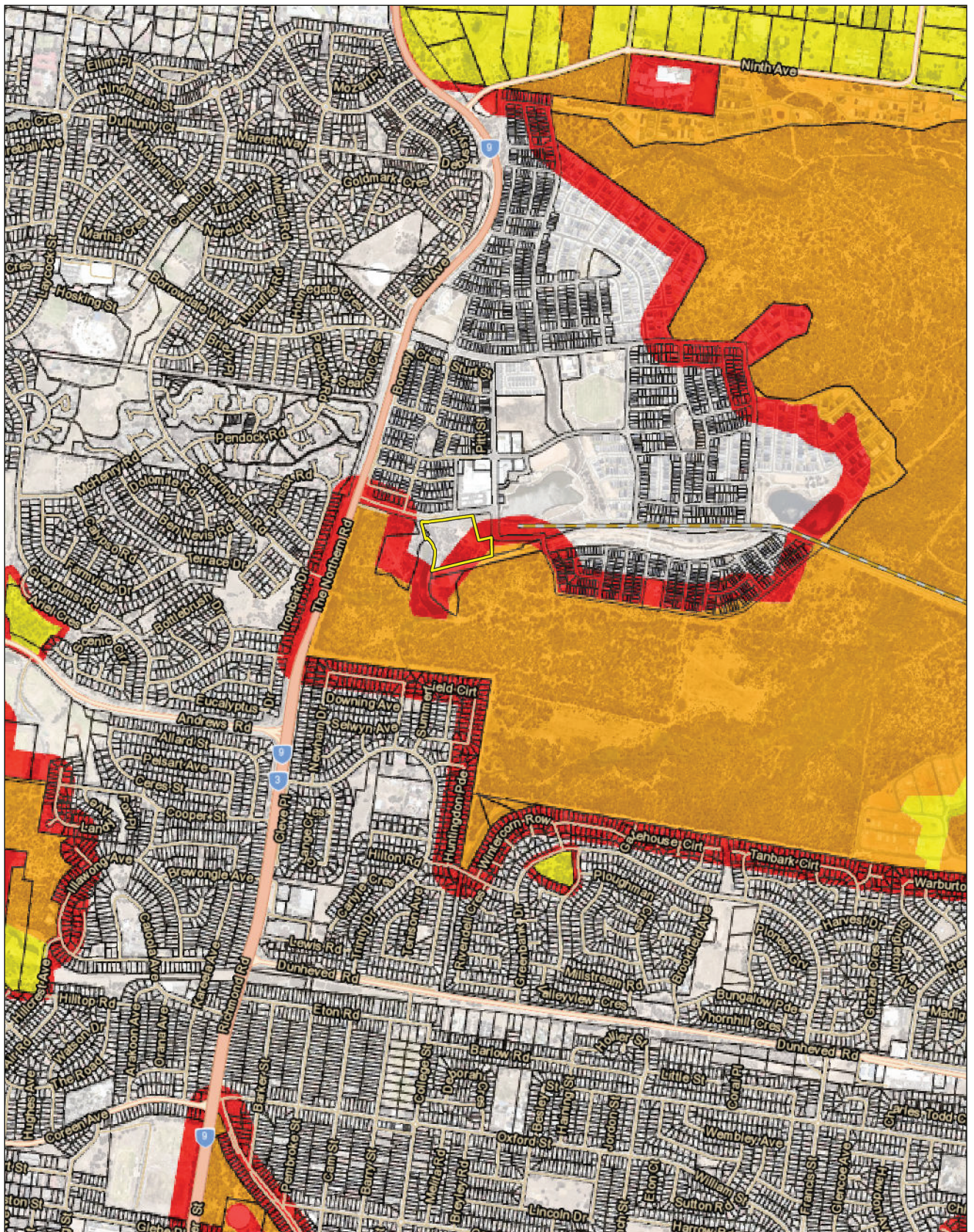







Figure 2: The Proposal

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Legend

- | | | | | | |
|---|--------------|---|---------------------|---|-----------------------|
|  | Subject Land |  | Bushfire Prone Land |  | Vegetation Category 1 |
| | |  | Vegetation Buffer |  | Vegetation Category 2 |



Date: 22/05/2018

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

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as Asset Protection Zone location and dimension. 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 at the site.

Site assessment took place on 11th January 2018. Photographs of the bushfire hazard are provided in Appendix 1.

2.1 Predominant vegetation

The vegetation within 140 m of the subject land has been assessed in accordance with the methodology specified within PBP. Figure 4 maps the current distribution of the bushfire hazard.

The hazard to the south and west of the subject land boundary is representative of the Shale Plains Woodland vegetation community which forms part of the the Coastal Valley Grassy Woodlands structural formation (Keith 2004). This vegetation classification is consistent with the approved St Marys Western Precinct Plan which was guided by the Bushfire Protection Assessment prepared by Bushfire & Environmental Services (2009) and vegetation mapping prepared by Cumberland Ecology (2008). The vegetation classification has also been approved by NSW Rural Fire Service for all previous integrated development applications at Jordan Springs. Recent site assessment has confirmed that the canopy and understorey have not evolved into 'forest' densities since original inspection in 2009. There are small sections of River-flat Forest (Alluvial Woodland) and Shale/Gravel Transition Forest at some boundary locations between Jordan Springs and the Regional Park, however forest does not occur within 140 m of the subject land.

The western side of the subject land adjoins a lake within the Regional Park which is not a classified hazard. The lake is a permanent water feature with limited vegetation on water-logged soils around the perimeter. The eastern bank of the lake adjacent the subject land features reeds and a single row of trees along the embankment of a maintenance access road. The negligible vegetation between the boundary and the water is not of a size or density to warrant classification as a bushfire hazard. The vegetation classification was discussed with and agreed by NSW Rural Fire Service during pre-DA consultation in January 2018 (refer to Appendix 2).

The southern side of the subject land adjoins a 25 m wide linear detention basin situated in a dedicated lot that diverts stormwater from the adjacent Jordan Springs residential development to the lake. The basin contains limited landscaping and has stormwater control as its primary function. It is classified as 'managed lands' which was approved as part of the integrated development DA (Council Ref: DA15/1063) for residential apartments at the subject land and adjoining Lot 3989 (NSW Rural Fire Service Ref: DA15/0568, 26 March 2015).

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 4 and verified in the field. The slope classes are indicated on Figure 4 as 'upslope/flat' to the south and west.



Legend

	Subject Land	Vegetation Formation	Asset Protection Zone - SFPP
	Site Plan		Woodland
	Contour - 2m		Asset Protection Zone - 36m
			Asset Protection Zone - 40m
			Asset Protection Zone - 50m

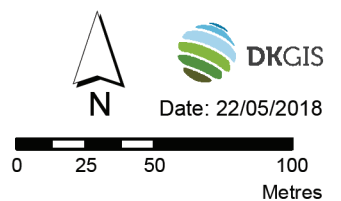
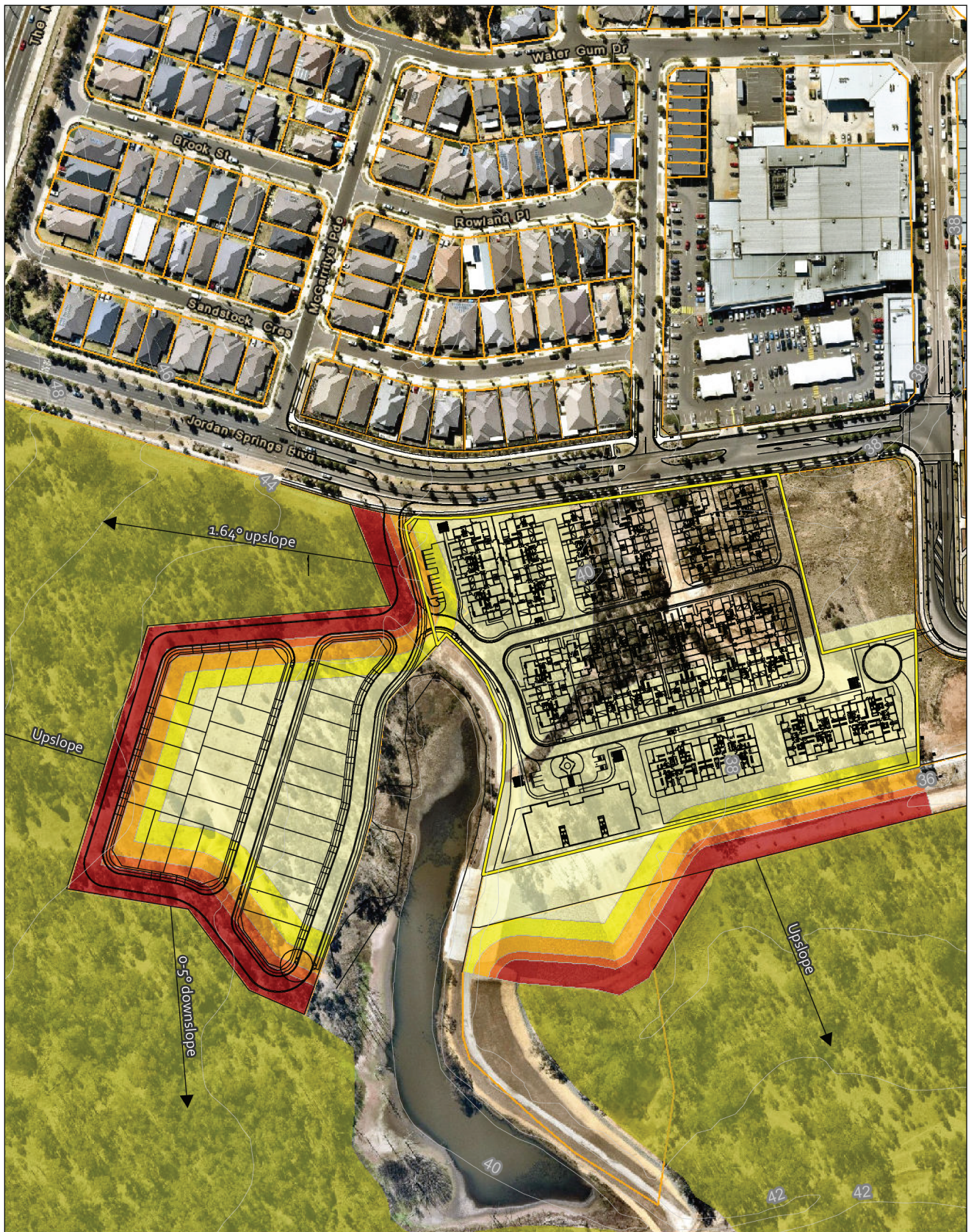


Figure 4: Bushfire Hazard Analysis and Asset Protection Zone

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Legend

	Subject Land	Vegetation Formation	Bushfire Attack Level		BAL 29
	Contour - 2m				BAL 19
	Site Plan	Woodland			BAL 12.5
					BAL 40

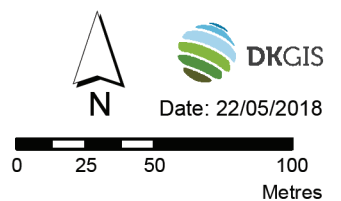


Figure 5: Bushfire Attack Level

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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 1 below and are discussed in detail in the remainder of this section.

Table 1: PBP bushfire protection measures

Bushfire protection measures	Considerations
Asset Protection Zones (APZ)	Location and dimension of APZ building setbacks from identified hazards.
Building construction standards	Determining the Bushfire Attack Level (BAL).
Access	Assessment to include access and egress in and out of a developable area, perimeter access and design standards.
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

Using the vegetation and slope data discussed in Section 2 and mapped on Figure 4, Asset Protection Zones (APZs) suitable for SFPP development have been calculated. These are mapped on Figure 4 and listed in Table 2 on the following page.

Two APZs are required; 40 m to the woodland to the south determined as per PBP Acceptable Solution (Table A2.6) and 36 m to the woodland to the west calculated by modelling the radiant heat via an alternate solution using the NBC Bushfire Attack Assessor v2.1 (i.e. Method 2 process outlined by *AS 3959-2009 Construction of buildings in bushfire-prone areas*). The alternate solution was chosen to more accurately predict the radiant heat influenced by the gentle upslope underneath the woodland rising in the westerly direction. The model report in Appendix 3 provides the inputs and outputs of the calculation including the resulting radiant heat flux, ensuring that the value does not exceed 10 kW/m² at the building envelope.

The APZ to the west will comprise of a 36 m building setback within the subject land that will feature the entry road into the development. The APZ to the south is comprised of a stormwater basin within a 25 m wide lot, which includes a 4 m wide perimeter maintenance road, followed by a 15 m building setback within the subject land. Utilising the 25 m wide basin as part of the APZ has been approved in DA15/1063 for residential apartments.

Any landscaping proposed within the APZ or across the development site is to achieve performance objectives of an Inner Protection Area (IPA) as described by PBP.

Table 3: BAL determination

Direction ¹	Vegetation ²	Slope ³	Proposed APZ ⁴	RHF ⁵	APZ provided by ⁶
South	Woodland	Upslope	40 m	Assumed 10 kW/m ²	Drainage reserve and perimeter maintenance road
West	Woodland	Upslope 1.64°	36 m	9.9 kW/m ²	Proposed road

¹ Direction of assessment from proposed development (refer to Figure 4).

² Predominant vegetation classification over 140 m from the proposed development.

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

⁴ Proposed APZ to achieve compliance with 'Planning for Bushfire Protection 2006'.

⁵ Radiant heat flux (RHF) based on minimum proposed APZ (refer to Model Report in Appendix 3).

⁶ Land management arrangement to ensure APZ is maintained in perpetuity.

3.2 Bushfire Attack Levels (BAL)

Bushfire Attack Levels (BALs) have been determined for the site in accordance with PBP and Method 1 of as per AS 3959-2009 *Construction of buildings in bushfire-prone areas*. The BALs are mapped on Figure 5 demonstrating that approximately half of the proposed buildings are affected by BAL-12.5 with the remainder rated BAL-LOW. There are no proposed building construction works as part of the concept DA, therefore the BALs as they affect building footprints are indicative only.

3.3 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 retirement living site will have a logical road layout featuring a loop road accessed from Jordan Springs Boulevard to the north. Three short cul-de-sacs (less than 50 m) will service villas adjacent Jordan Springs Boulevard to the north, and a service road off Lakeside Parade to the east will provide emergency access for the entire site.

The proposed layout and option for alternate access and egress complies with PBP.

Perimeter access

The hazard to the west and south will have a perimeter road along the interface with future buildings. The proposed entry road of Jordan Springs Boulevard will act as the perimeter road to the west and the existing maintenance road along the stormwater basin to the south will act as the perimeter in that direction. The maintenance road is 360 m long, 4 m wide and culminates at a cul-de-sac with 17 m diameter. The use of the maintenance road as a perimeter road has been approved in DA15/1063.

Design and construction standards

The internal roads servicing the villas and apartments are to be designed in accordance with the PBP Acceptable Solutions (see Table 3 on the following page).

3.4 Water supply and utilities

Water supply

Future 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 envelope 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

In accordance with PBP, electricity should be underground wherever practicable. Where overhead electrical transmission lines are installed, the vegetation clearance distances are to comply with *ISSC 3 Guideline for Managing Vegetation Near Power Lines* (Industry Safety Steering Committee 2005). The guidelines specify a clearance distance of 0.5 m for a typical connection for residential dwellings.

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*.

Table 3: Design and construction for public roads

Performance Criteria	Acceptable Solutions
<ul style="list-style-type: none"> Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources) 	<ul style="list-style-type: none"> Public roads are two-wheel drive, all weather roads
<ul style="list-style-type: none"> Public road widths and design that allows safe access for firefighters while residents are evacuating an area 	<ul style="list-style-type: none"> 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), which is a minimum of 6.5 metre carriageway for two-way road with inside edge curve radius >100 and swept path 2.5 metres. 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
<ul style="list-style-type: none"> The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Roads that are clearly sign posted (with easy distinguishable names) and buildings / properties that are clearly numbered 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> There is clear access to reticulated water supply 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Parking does not obstruct the minimum paved width 	<ul style="list-style-type: none"> 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

4 Conclusion and recommendations

4.1 Summary

The proposal consists of a concept DA for future retirement living (Special Fire Protection Purpose development) consisting of 51 villas and three apartment blocks on land mapped as bushfire prone. The concept plan demonstrates that future development will have compliant APZs to woodland hazard to the south and west located in the Wianamatta Regional Park. The concept layout can accommodate a compliant access design with alternate emergency egress and perimeter access.

4.2 Conclusion

This report presents an assessment of future retirement living development at Lot 3991 Jordan Springs Boulevard, Jordan Springs. The assessment demonstrates that the proposal, together with the recommendations (see below), complies with s100B *Rural Fires Act 1997*, Clause 44 of the *Rural Fires Regulation 2008* and *Planning for Bushfire Protection 2006*.

4.3 Recommendations

The recommendations made within this assessment are repeated below:

1. APZs are to be applied to the subdivision as listed in Table 2 and shown on Figure 4 of this Bushfire Assessment Report. A 36 m APZ is required to the woodland hazard within the Regional Park to the west and a 40 m APZ is required to the woodland hazard to the south within the Regional Park beyond the stormwater basin.
2. Any landscaping proposed within the APZ or across the development site is to achieve performance objectives of an Inner Protection Area (IPA) as described by PBP.
3. Future buildings are to comply with the relevant Bushfire Attack Levels (BAL) in accordance with *AS 3959-2009 Construction of buildings in bushfire-prone land* as mapped on Figure 5 of this Bushfire Assessment Report.
4. The proposed internal roads are to be designed in accordance with the PBP Acceptable Solutions for the design and construction of public roads in bushfire prone areas (see Table 3 of this Bushfire Assessment Report).
5. Future 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).
6. Electricity should be underground wherever practicable. Where overhead electrical transmission lines are installed, the vegetation clearance distances are to comply with *ISSC 3 Guideline for Managing Vegetation Near Power Lines* (Industry Safety Steering Committee 2005).

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



David Peterson



References

Bushfire & Environmental Services (BES) 2009. *Bushfire Protection Assessment – St Marys Western and Central Precincts*. A technical report prepared for Maryland Development Company, April 2009.

Cumberland Ecology 2008. *St Marys Property – Western Precinct Biodiversity Assessment*. A technical report prepared for Maryland Development Company.

Keith (2004). *Ocean shores to desert dunes: The native vegetation of New South Wales and the ACT*. Department of Environment and Conservation NSW, Hurstville.

NSW Rural Fire Service (RFS). 2006. *Planning for Bush Fire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners*. Australian Government Publishing Service, Canberra.

Standards Australia. 2005. *Fire hydrant installations - System design, installation and commissioning*, AS2419.1, Fourth edition 2005, Standards Australia International Ltd, Sydney.

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 – Site photographs



Photograph 1: Woodland on upslope to the west of the site



Photograph 2: Insignificant vegetation along eastern side of lake



Photograph 3: Stormwater basin and perimeter maintenance road along southern interface

Appendix 2 – RFS pre-DA consultation

From : Jason Maslen <Jason.Maslen@rfs.nsw.gov.au>
To : "David Peterson" <david@petersonbushfire.com.au>
Subject : RE: Jordan Springs seniors living site
Date : Thu, 25 Jan 2018 16:37:51 +1100

Hi Dave,

Thanks for our brief discussion. As discussed, the revised layout looks to be an improvement over the previous plan with the second independent living unit building relocated to the eastern side of the lake. This location benefits from a perimeter road. On the basis of your comments, it would appear reasonable to consider the lake shores as a non-hazard at the northern end of the lake. As much information about the current and future condition of the lake would be helpful to reinforce this. Treatment of the interface of the lots which directly abut the eastern side of the lake should also be provided.

I hope this assists with your discussions with Council.

Regards,

Jason



Jason Maslen | Team Leader, Development Assessment and Planning | Planning and Environment Services
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PREPARE. ACT. SURVIVE.

From: David Peterson [<mailto:david@petersonbushfire.com.au>]
Sent: Tuesday, 16 January 2018 5:04 PM
To: Jason Maslen <Jason.Maslen@rfs.nsw.gov.au>
Subject: Jordan Springs seniors living site

Hi Jason,

Happy new year.

I just left a message on your office phone in regards to a catch-up on this pre-DA. You would recall we had a pre-DA meeting over the phone in late November regarding this site. I have attached the RFS advice summary you provided.

I was hoping we could have a 10 minute chat about the revised layout options attached. The issues raised were how to classify the lake and to address the perimeter access. Since we spoke I have gone to site and liaised with Lendlease and come up with the bushfire constraints. The two options vary only slightly. In short:

1. Hazard is woodland predominantly on upslope except to south of Lots 7-13 where it is downslope 0-5 degrees.
2. The lake is a permanent water feature with minor vegetation on water-logged soils around the perimeter up to the lot boundary. The western bank has grasses in mud, dead trees and exotics, and the eastern bank is very narrow at a few metres wide. After viewing the site my opinion is that it is not a classifiable hazard.
3. Perimeter roads have been provided where there is a hazard adjoining. The adjoining land at the eastern end below Lakeside Parade has been cleared.

Can we chat sometime this week?

Cheers

Appendix 3 – Model report

NBC Bushfire Attack Assessment Report V2.1

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 22/05/2018 Assessment Date: 18/04/2018

Site Street Address: Lot 3990 Jordan Springs Boulevard, Jordan Springs

Assessor: Mr Admin; admin

Local Government Area: Penrith

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: North-west

Vegetation Information

Vegetation Type: Woodland

Vegetation Group: Forest and Woodland

Vegetation Slope: 1.64 Degrees

Vegetation Slope Type: Upslope

Surface Fuel Load(t/ha): 10

Overall Fuel Load(t/ha): 15

Site Information

Site Slope: 0 Degrees

Site Slope Type: Level

Elevation of Receiver(m): Default

APZ/Separation(m): 36

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K) 1200

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: LOW

Peak Elevation of Receiver(m): 4.33

Level of Construction: BAL 12.5

Fire Intensity(kW/m): 8305

Radiant Heat(kW/m2): 9.9

Flame Angle (degrees): 81

Flame Length(m): 8.77

Maximum View Factor: 0.11

Rate Of Spread (km/h): 1.07

Inner Protection Area(m): 36

Transmissivity: 0.803

Outer Protection Area(m): 0
