Appendix N

BUSHFIRE PROTECTION ASSESSMENT (TRAVERS BUSHFIRE & ECOLOGY)

D09530927

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Bushfire Protection Assessment

Proposed staged residential subdivision (DA1)

Northern Sector, Central Precinct, Pinny Beach

Under Section 100B of the Rural Fires Act (1997)

November 2019
(REF: 18MURR04)

Travers
bushfire & ecology

Bushfire Protection Assessment

Proposed staged residential subdivision (DA1)
Northern Sector, Central Precinct, Pinny Beach

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Date:	4/11/2019
File:	18MURR04

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This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person, including the client, then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be relied upon as meaning it reflects any advice by this firm. The report does not suggest or guarantee that a bush or grass fire will not occur and or impact the development. This report advises on policies and specifications published by the *NSW Rural Fire Service* e.g. *Planning for Bush Fire Protection 2006*.

The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

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EXECUTIVE SUMMARY

This bushfire protection assessment has been undertaken for the proposed residential subdivision development located at Northern Sector, Central Precinct, Pinny Beach. The subdivision is proposed over six (6) stages and will involve the creation of two-hundred and sixty-two (262) new residential allotments, as well as Village Centre, Public Park allotments and drainage / riparian reserves. The application also involves the removal of vegetation and bulk earthworks over proposed Stage 7-9 to the south.

The development is categorised by the NSW Rural Fire Service (RFS) as being a residential subdivision and this requires the RFS to issue a bushfire safety authority (BSA) in accordance with *Planning for Bush Fire Protection, 2006 (PBP).* This proposal has been prepared in accordance with the pre-release version of *Planning for Bush Fire Protection 2018 (PBP 2018)* in its entirety and the development complies with all relevant performance requirements in this version of *PBP.*

The proposed residential subdivision component of the development must ensure that the extent of bushfire attack that can potentially impact a building envelope should not exceed a radiant heat flux of 29kW/m^2. This rating assists in determining the size of the asset protection zone (APZ), which provides the necessary defendable space between hazardous vegetation and a building.

The proposed Village Centre, within Stage 1D, is categorised by the NSW RFS as being 'other' development. The RFS requires that the development application should satisfy the aims and objectives of *PBP,* propose a combination of bushfire protection measures and provide evidence that the intent of each measure can be satisfied.

This assessment has found that bushfire can potentially affect the proposed development from the extensive bushland vegetation surrounding the development, resulting in future buildings being exposed to potential radiant heat and ember attack.

The proposed development forms part of Lake Macquarie City Council's approved North Wallarah Masterplan which includes Development Land Use Plan (DLUP), with the adjoining land to the north and south-east subject to future development. This assessment has taken into consideration the DLUP and provides temporary APZs to those aspects which can be developed in the future.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures;

- APZs in accordance with the minimum setbacks outlined within *Pre-release PBP 2018* for most aspects*;*
- Use of an alternative solution to determine minimum APZ and bushfire attack level (BAL) setbacks for the southern aspect of Stages 1A and 1C using the short fire run (SFR) methodology. This narrow riparian corridor is identified as low risk vegetation due to its consistent linear width which is at right angles to the development.
- Provision of access in accordance with the acceptable solutions outlined in *Pre-release PBP 2018*;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *Pre-release PBP 2018;*

- Future dwelling construction in compliance with the appropriate construction sections of *AS3959-2009*, and *Pre-release PBP 2018*.

- Creation of 88B easements to ensure the ongoing maintenance of APZs within individual allotments as well as Community Title land and / or land owned and managed by *Wakefield Ashurst Developments Pty Ltd (WAD).*

GLOSSARY OF TERMS

AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
AS1596	*Australian Standard – The storage and handling of LP Gas*
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2009*
BAL	*bushfire attack level*
BCA	*Building Code of Australia*
BSA	bushfire safety authority
DA	development application
DLUP	Development Land Use Plan
EP&A Act	*Environmental Planning & Assessment Act 1979*
FDI	fire danger index
IPA	inner protection area
LEP	Local Environmental Plan
m	metres
OPA	outer protection area
PBP	*Planning for Bush Fire Protection 2006*
PBP 2018	*Pre-release Planning for Bush Fire Protection 2018*
RF Act	*Rural Fires Act 1997*
RFS	NSW Rural Fire Service
SFR	short fire run
SFPP	special fire protection purpose
TBE	*Travers bushfire & ecology*
WAD	*Wakefield Ashurst Developments*

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Introduction 1

Travers bushfire & ecology has been engaged to undertake a bushfire protection assessment for the proposed staged residential subdivision development located at the Northern Sector, Central Precinct, Pinny Beach.

The proposed development is identified as bushfire prone on the *Lake Macquarie City Council's* bushfire prone land map (refer Figure 1.1). This triggers a formal assessment by Council in respect of the NSW Rural Fire Service (RFS) policy against the provisions of *Planning for Bush Fire Protection 2006 (PBP).*

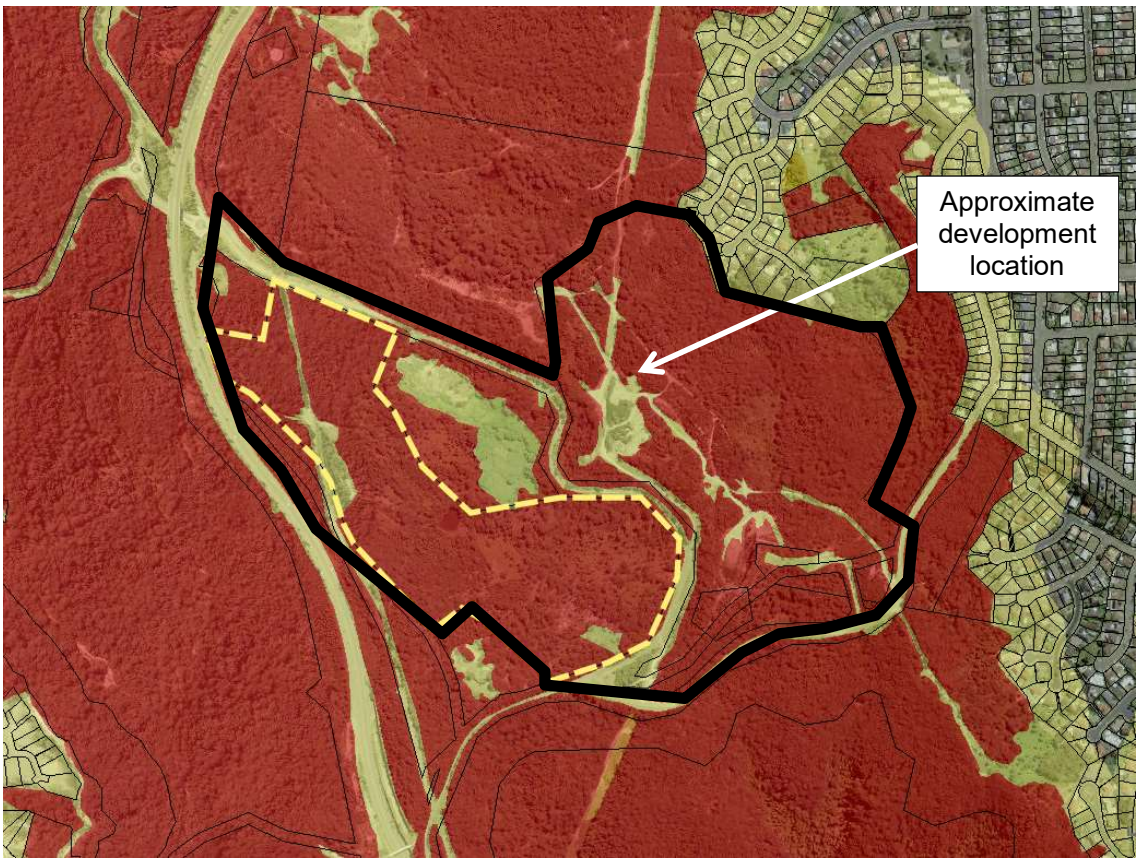


Figure 1.1 – Bushfire Prone Land Map
(source: Planning Portal, 2019)

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 Proposed development

The proposal includes clearing and bulk earthworks to facilitate a staged subdivision of existing Lots 2, 3, 5, 7 and 8 DP 1240365, Part Lot 4 DP 1240365, Lot 3 DP 1090496 and the former Old Pacific Highway (subject to road closure and new road dedications).

This will involve targeted remediation, targeted stability works, new public roads (including shared pathway and pathway network), new Community Title road, bushfire management, stormwater drainage including basin and swales, utilities, revegetation and landscaping.

Due to the brownfield nature of the site, major bulk earthworks are required to realise the approved zoning and masterplan outcomes. These include remediating the former landfill, removing high walls and the open cut mining areas and edges, fixing slope stability issues and other disturbance areas, and providing a new finished surface over those and adjoining areas in an integrated and co-ordinated manner.

The proposal includes the creation of:

- two-hundred and sixty-two (262) new residential allotments;
- one (1) commercial and park area;
- new public roads (including shared pathway and pathway network);
- new Community Title road and associated internal road network;
- stormwater drainage system including basins, swales, riparian and drainage reserve; and
- vegetation removal and bulk earthworks for future stages.

The initial subdivision consists of a six (6) into two-hundred and sixty-two (262) residential lot subdivision in stages (including Stage 4 - a fifteen (15) lot Community Title subdivision with individual lot building envelopes with community property lot), Stage 1D - a village centre lot, a public reserve lot (for neighbourhood park and dog park), drainage reserves including a riparian corridor) and residue lots for future development. Clearing and bulk earthworks extend into some of the residue lots as shown in Figure 1.2. Future development application/s will follow relating to the residue lots, as well as the specific development to occur on the non-residential lots.

The proposal also includes works within the unformed road reserve (between Lots 5 and 7 DP 1240365) and to parts of Scenic Drive as shown on Figures 1.2 and 1.3.

The proposed development forms part of the approved North Wallarah Masterplan Development Land Use Plan (DLUP) with the adjoining land to the north-west and east subject to future development (refer Figure 1.4). The DLUP illustrates the broad level development outcomes within the North Wallarah Peninsula such as development footprints, land uses, open spaces, major transport linkages, Wallarah National Park, habitat corridors and parks.

Schedule 1 shows the proposed staged subdivision development and bushfire protection measures, including APZs, incorporating the surrounding land uses as identified within the North Wallarah DLUP.

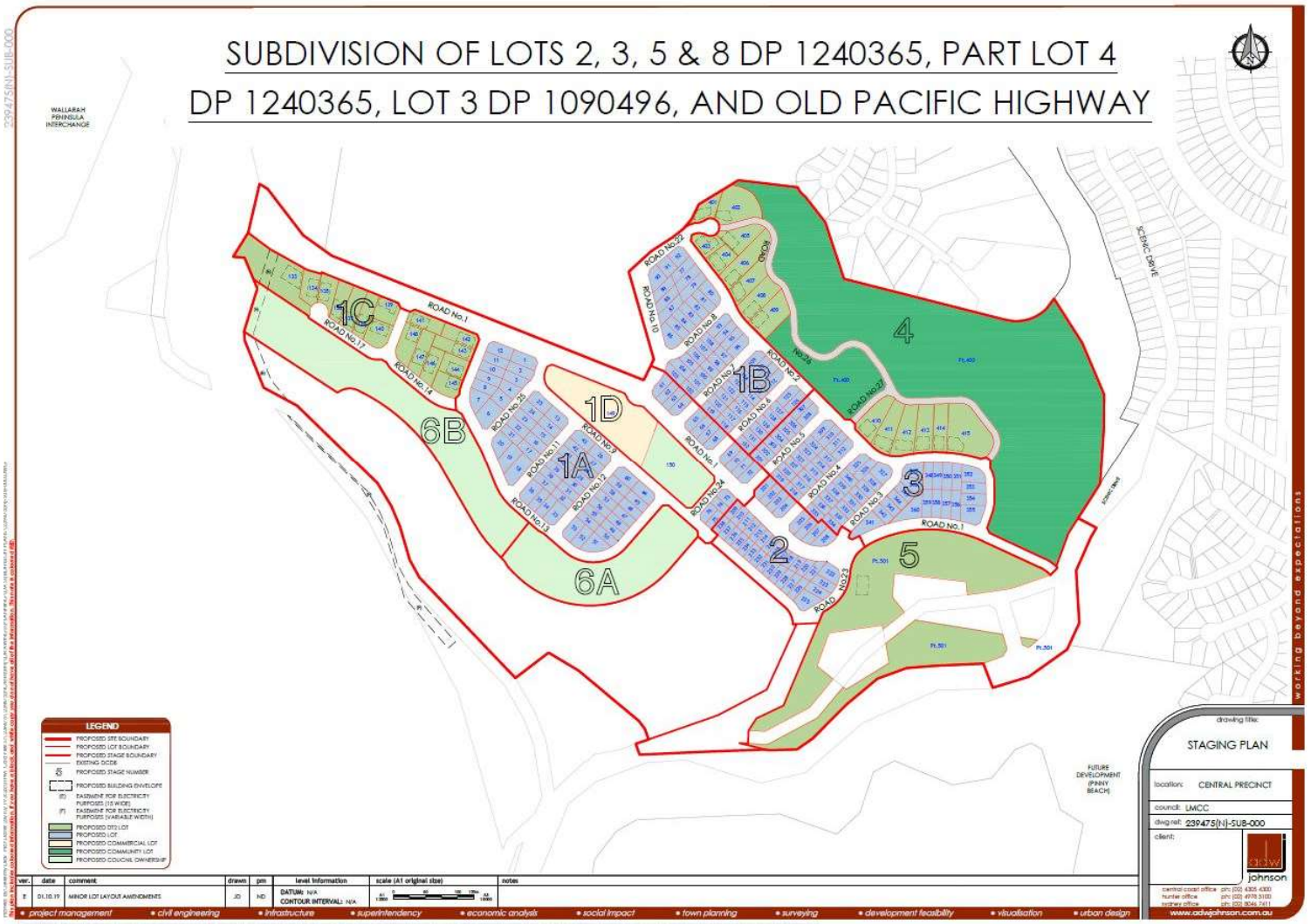


Figure 1.2 – Overall DA1 Plan
(source: ADW Johnson. Dwg. ref – 239475(N)-SUB-000, dated 01/10/2019)

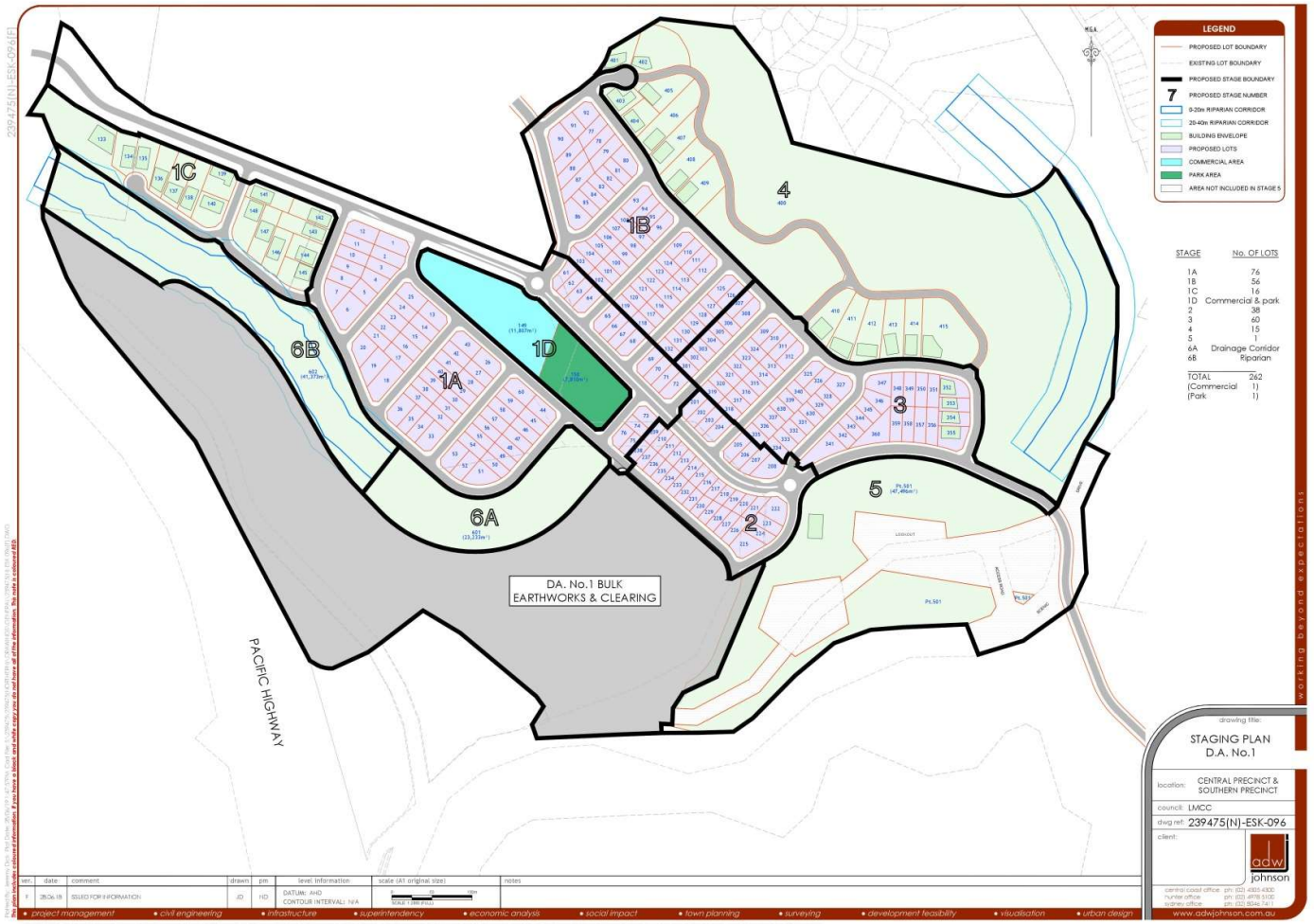


Figure 1.3 – Staging Plan DA No. 1 (noting bulk earth works over future Stages 7/8/9)
(source: ADW Johnson. Dwg. ref – 239475(N)-ESK-096- dated 28/06/2018)

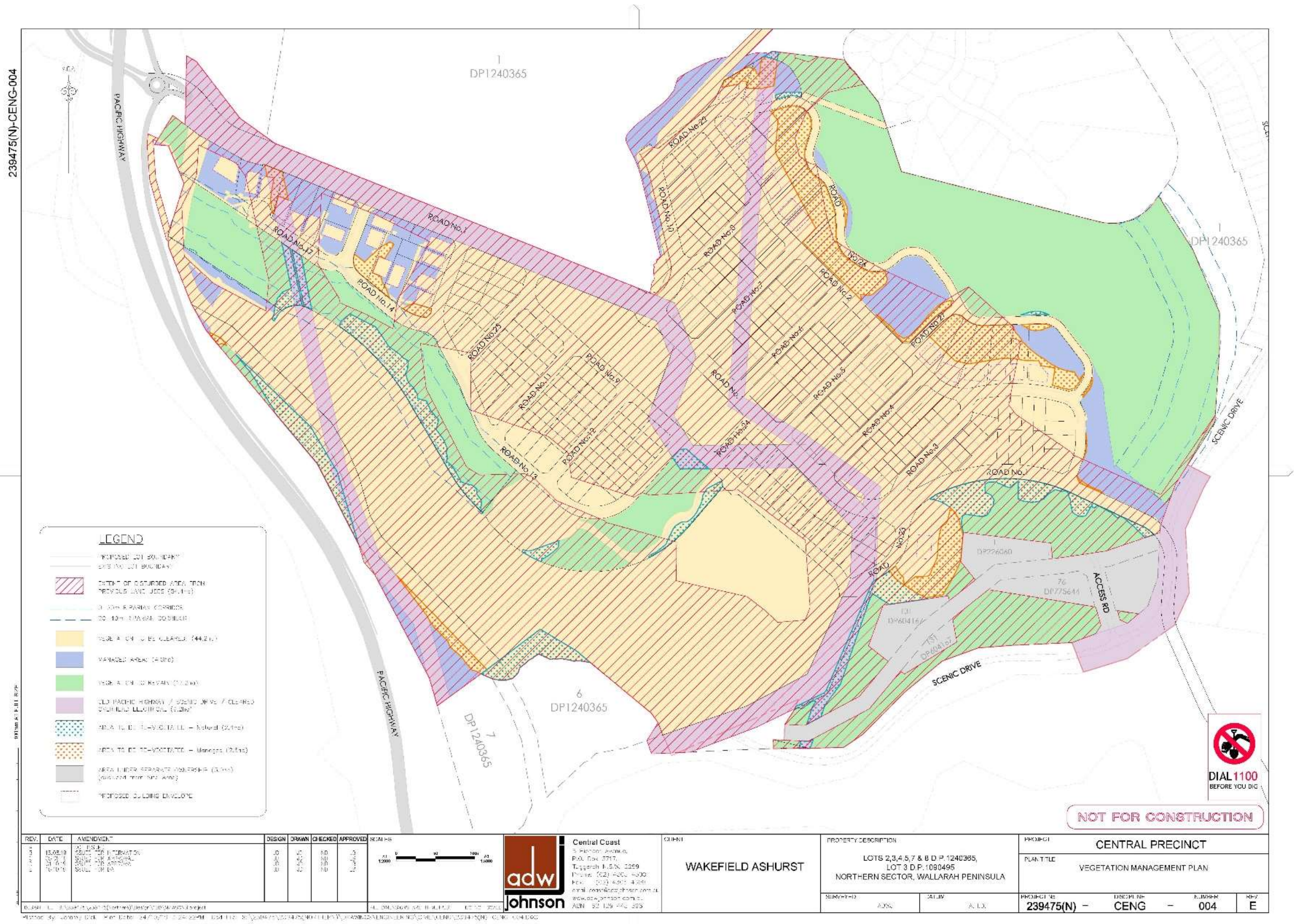


Figure 1.4 – Vegetation Management Plan
(source: ADW Johnson. Dwg. ref – 239475(N)-Revision E - dated 15/10/2019)

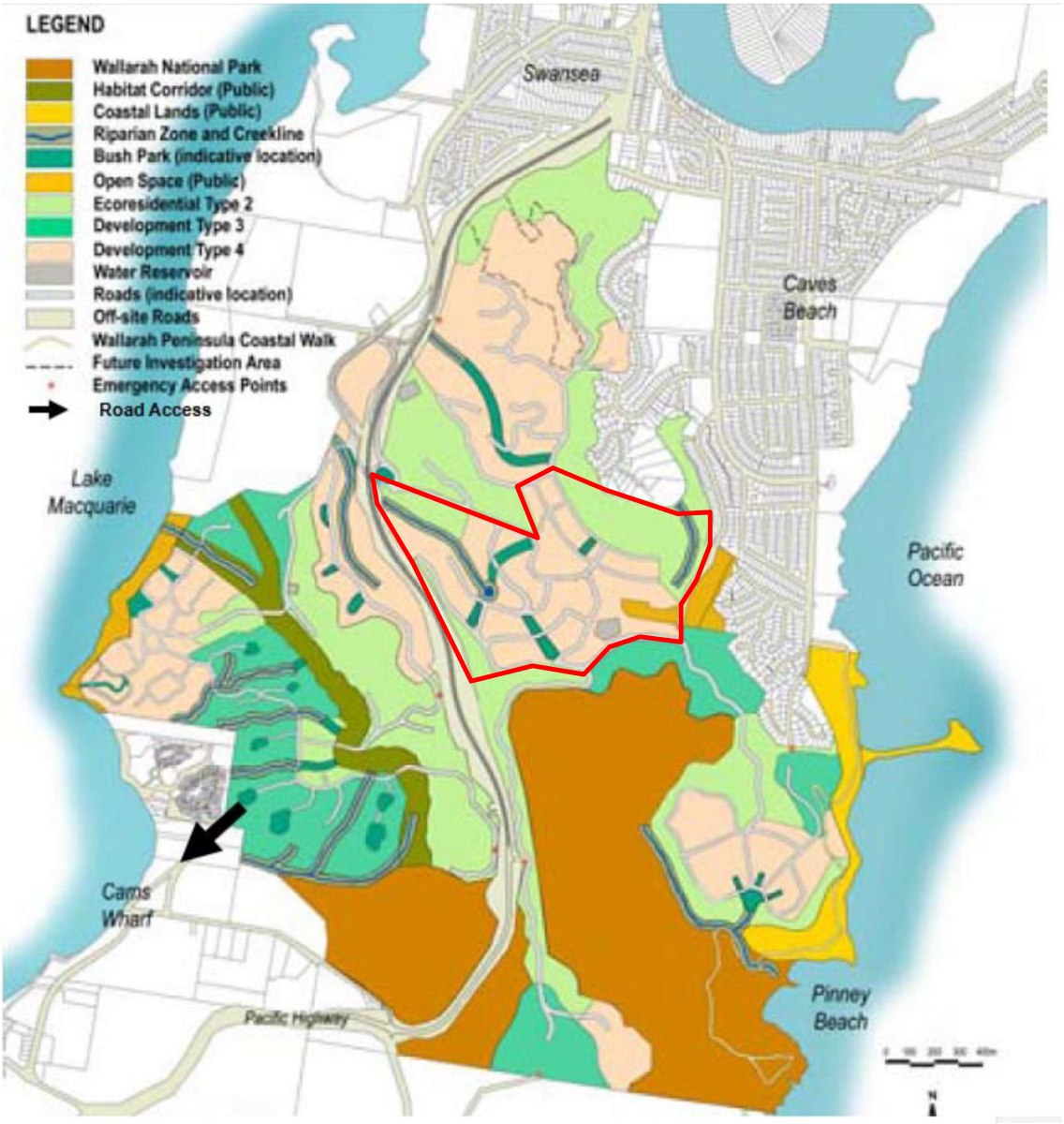


Figure 1.5 – North Wallarah Development Land Use Plan (DLUP)
(source: LMCC DCP 2014, Part 12 North Wallarah Peninsula)

1.3 Information collation

Information sources reviewed for the preparation of this report include the following:

- Staging Plan DA No. 1 prepared by *ADW Johnson*, Dwg. Ref – 239475 (N) – ESK-096 , dated 28/06/2018
- Vegetation Management Plan, prepared by *ADW Johnson*, Dwg. Ref – 239475 (N) – ESK-056, dated 28.06.19
- Lake Macquarie City Council, North Wallarah Peninsula Masterplan – Concept Development Planning – a reference for the masterplan, dated 3 February 2003

- Lake Macquarie City Council, North Wallarah Peninsula Masterplan – Ecological Site Management Plan, dated 3 February 2003
- Lake Macquarie City Council Development Control Plan (DCP) Part 12 – Area Plans – North Wallarah Peninsula, Revision 20, dated 23 July 2018
- Lake Macquarie City Council, North Wallarah Peninsula Masterplan – Bushfire Management Plan, dated 3 February 2003
- Vegetation mapping prepared by EcoFocus, October 2019
- *NearMap* aerial photography
- Topographical maps DLPI of NSW 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas (AS3959)*
- *Pre-release Planning for Bush Fire Protection 2018 (PBP)*

An inspection of the proposed development site and surrounds was undertaken by John Travers on numerous occasions during 2018 and 2019 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 proposal relates to the majority of land identified as the Central Precinct, Northern Sector, North Wallarah Peninsula, including:

- Lots 2, 3, 5, 7 and 8 DP 1240365;
- Part Lot 4 DP 1240365;
- Lot 3 DP 1090496; and
- former Old Pacific Highway (subject to road closure and new road dedications).

The development site is located within the local government area (LGA) of Lake Macquarie City Council and is located to the east of the Pacific Highway (with road connection via the Wallarah Peninsula interchange), north of Scenic Drive (with Wallarah National Park further to the south) (refer Figure 1.4).

The entire site is zoned R1 General Residential, and forms part of the North Wallarah Peninsula site. The site and surrounding land are subject to an approved Masterplan (DA 2717/2003).

The site has an area of 74.6ha, of which 54.4ha (or 73%) has been identified as previously disturbed by past activities including large sections of highly disturbed former landfill, clay extraction pits, open cut mine, quarry and disturbed areas. The undisturbed areas include an eastern watercourse and some lower slopes on the interface to the existing urban edge of Caves Beach to the north (i.e. to existing lots off Forest Oak Place and Callistemon Close), and a narrow area that extends from part of the upper edge of a western watercourse in a south-easterly direction towards the old Pacific Highway alignment.

The site is bound by Mawson's Lookout Reserve in the south-east and will provide access to the master plan approved Coastal Sector (Pinny Beach) and DA consent 130/2008 which will be developed in the future further south-east. Other undeveloped residential zoned land of the Northern Sector sits to the north, as well as the existing Caves Beach urban edge, with a watercourse and Scenic Drive forming the eastern boundary.

Figure 1.5 – Aerial appraisal
(source: NearMap, 2019)

1.5 Legislation and planning instruments

Is the site mapped as bushfire prone?	Yes
Proposed development type	Staged residential subdivision and 'other' development (Village Centre)
Is the development considered integrated for the purposes of Section 100B of the *Rural Fires Act 1997?*	Yes – referral to and approval by the NSW RFS is required
Is the proposal located in an Urban Release Area as defined under Clause 273 of the EP&A Regulations?	No
Zoning	R1 – General Residential (refer Figure 1.6)
Significant environmental features	Yes – the proposed development (including APZs) will involve the removal of native vegetation. A Flora & Fauna Assessment Report has been prepared by EcoFocus. The report concluded that the development will not have adverse impact on threatened species of flora or fauna.
Details of any Aboriginal heritage	A review of the Bushfire Management Plan prepared for the North Wallarah Peninsula Masterplan reveals that a Potential Archaeological Deposit sits on the boundary of the subject site in the Northern Sector.
Does the proposal rely on an alternative solution?	Yes – short fire run (SFR) methodology.

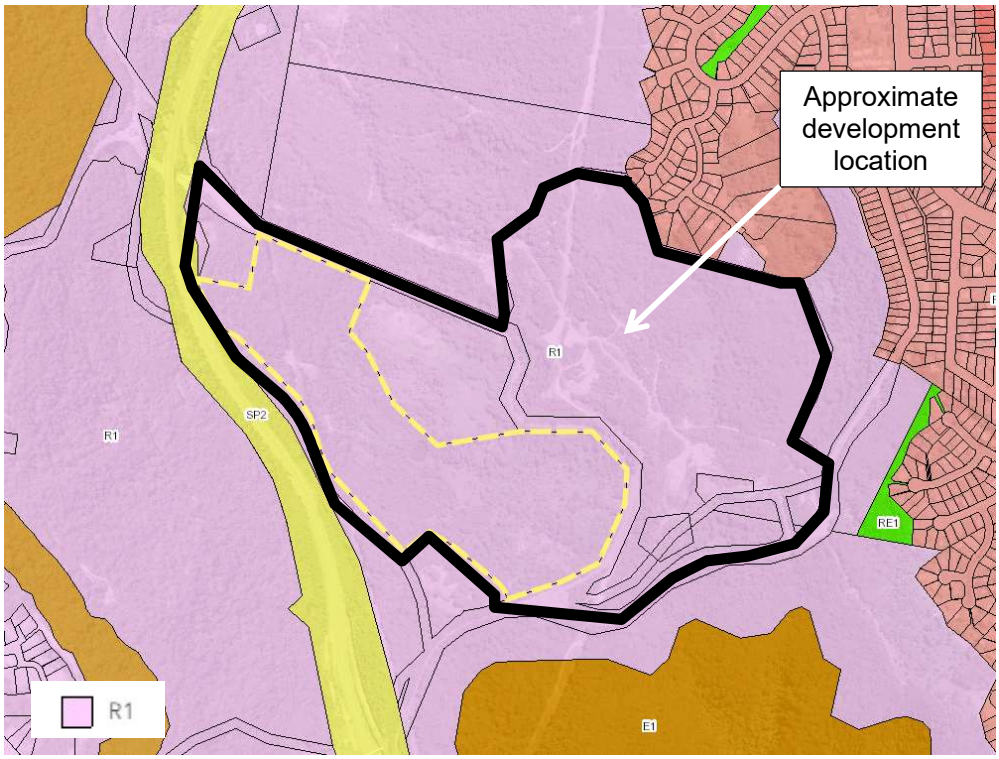


Figure 1.6 – LMCC LEP 2014 Zoning
(source: Planning Portal, 2019)

Bushfire Threat Assessment 2

To assess the bushfire threat and to determine the required width of an APZ for a development, an assessment of the potential hazardous vegetation and the effective slope within the vegetation is required.

2.1 Hazardous fuels

PBP guidelines require the identification of the predominant vegetation formation in accordance with David Keith (2004) if using the simplified acceptable solutions in the Pre-release version of PBP 2018, or alternatively the vegetation class if adopting the comprehensive vegetation fuel loads. The hazardous vegetation is calculated for a distance of at least 140m from a proposed building envelope.

Extensive vegetation survey of the development site was initially undertaken by *Travers bushfire & ecology* in 2007 for the preparation of the Wallarah Peninsula Masterplan. This vegetation has since been validated by *Eco Focus* (dated July 2019) with the preparation of a Flora and Fauna Assessment Report for the development application (DA). The results of this assessment are detailed in Figure 2.1 with the vegetation conversions identified in the following Table 2.1.

The vegetation posing a bushfire threat to the proposed development includes:

Table 2.1 – Vegetation

Vegetation community	Vegetation formation	Vegetation classification	Comprehensive fuel loads (t/ha)	Acceptable solution fuel loads (t/ha) *(PBP 2018)*
Spotted Gum Open Forest (PCT – 1590)	Dry Sclerophyll Forest (shrub/grass)	Hunter-Macleay Dry Sclerophyll Forest	14/24.6	22/36.1
Smooth barked Apple Open Forest (PCT 1619)	Dry Sclerophyll Forest (shrubby)	Sydney Coastal Dry Sclerophyll Forest	21.3/27.3	
Mixed riparian forest (PCT 1522)	Rainforest	Northern Warm Temperate Rainforest	10/13.2	10/13.2

The following assessment has adopted *PBP 2018* (column 5) fuel loads identified above for the majority of aspects in order to comply with the acceptable solutions. As detailed in Table 2.2, an alternative solution (adopting comprehensive fuel load (Column 4 above) has been used for selected lots within Stages 1A, 1C and 2.

Figure 2.1 – Vegetation communities
(source: Eco Focus, October 2019)

2.2 Effective slope

The effective slope (post earthworks) has been assessed for up to 100m from the development site. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined.

The effective slope within the hazardous vegetation is described in detail within Table 2.2 below.

2.3 Bushfire attack assessment

The following assessment has determined the APZ and BAL levels via the following approaches;

- Table A1.12.2 & A1.12.5 of *Pre-release PBP 2018*; and
- Appendix B Method 2 (alternative solution) of *AS3959 Construction of buildings in bushfire prone areas* (2009).
- Short fire run methodology as detailed in the NSW RFS document entitled *Short Fire Run Methodology for assessment bush fire risk for low risk vegetation*.

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Hunter region. Table 2.2 provides a summary of the bushfire attack assessment based on residential development and the methodologies identified above.

DA. No. 1 – Bulk Earthworks and Clearing (future Stages 7 / 8 / 9) will be subject to a separate DA, however, will be cleared as part of this DA to form an APZ. Proposed Stage 1D will consist of a Village Centre Lot (commercial) and public reserve lot (Neighbourhood Park / Dog Park).

Table 2.2 – Bushfire a

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building c star Deemed (Table A
STAGE 1A (Residential)						
North	Lots 1 & 12	Forest	Level / upslope	Deemed to satisfy *(PBP 2018)*	24 (road reserve width)	BAL 29 (BAL 19 (BAL 12.5
	Lots 13,25,43, 26, 60 & 44, 61-72	Future Stage 1D / Park & 1B	Level / upslope	Deemed to satisfy *(PBP 2018)*	55m (within Stage 1B & 3) and Stage 1D to be managed as an APZ (refer Note 1)	BAL 12.5
South-west (Design Fire C)	Lots 6 & 7, 18-20, 33-36	Forest (70m SFR length)	0-5^{oD}	Alternative solution **SFR**	16 (road reserve width) (refer Note 4)	
South	Lots 52 & 53	Detention basin (freshwater wetland)	0-5^{oD}	Deemed to satisfy *(PBP 2018)*	16 (road reserve width)	BAL 12.5
South-east (Design Fire C)	Lots 44-51	Forest (70m SFR length)	0-5^{oD}	Alternative solution **SFR**	16 (road reserve width) (refer Note 4)	
West	Lots 7-12	Managed (future Stage 1C)	0-5^{oD}	Deemed to satisfy *(PBP 2018)*	55m (within Stage 1C) (refer Note 1)	BAL 12.5

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
South	Lots 75 & 76	Forest (70m flame width)	6 ^{oD}	Alternative solution Method 2 *AS3959*	29 (includes rock lined overflow) (refer Note 3)	N/A	BAL 29 (29 - <41m) BAL 19 (41 - <55m) BAL 12.5 (55 - <100m)
STAGE 1B (Residential)							
North-east	92, 77- 80, 93-96, 109-112, 125, 126)	Forest (future Stage 4)	15-<20 ^{oD}	Deemed to satisfy *(PBP 2018)*	Stage 4 (Lots 400-409) to be managed as an APZ (refer Note 1)	BAL 29 (57-<73) BAL 19 (73-<93m) BAL 12.5 (93 - <100m)	N/A
North-west	Lots 90-92	Forest	15-<20 ^{oD}	Deemed to satisfy *(PBP 2018)*	57 (refer Note 2)	BAL 29 (57-<73m) BAL 19 (73-<93m) BAL 12.5 (93 - <100m)	N/A
West	Lots 86-90, 103-104	Forest	0-<5 ^{oD}	Deemed to satisfy *(PBP 2018)*	29 (refer Note 2)	BAL 29 (29-<40m) BAL 19 (40-<54m) BAL 12.5 (54 - <100m)	N/A
South-west	Lots 102-103, 118-119, 132	Managed (Stages 1A & 1D)	N/A	N/A	>100m	N/A	N/A

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
East	Lots 126-132	Forest (future Stage 3)	0-<5 ^{oD}	Deemed to satisfy *(PBP 2018)*	55m (within Stage 3) (refer Note 1)	BAL 12.5 (55 - <100m)	N/A
STAGE 1C (Residential)							
North	Lots 133-138, 141 & 142	Forest	Level / upslope	Deemed to satisfy *(PBP 2018)*	24	BAL 29 (24 - <33m) BAL 19 (33 - <45m) BAL 12.5 (45 - <100m)	N/A
North	Lot 139	Forest (21.3 / 27.3 t/ha)	13 ^{oU}	Alternative solution (method 2 *AS3959)*	18 (refer Note 3)	N/A	BAL 19
South (Design Fire A)	Lots 133-138 & 140	Forest (75m SFR length)	18^{oD}	Alternative solution SFR	25 (refer Note 4)	N/A	BAL 29 (25 - <31m) BAL 19 (31 - <38m) BAL 12.5 (38 - <100m)

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
South (Design Fire B)	Lots 145-147	Forest (50m SFR length)	17^{oD}	Alternative solution SFR	23 (refer Note 4)	N/A	BAL 29 (23 - <27m) BAL 19 (27 - <32m) BAL 12.5 (32 - <100m)
West	Lot 133	Forest	0-<5 ^{oD}	Deemed to satisfy *(PBP 2018)*	29	BAL 29 (29-<40m) BAL 19 (40-<54m) BAL 12.5 (54 - <100m)	N/A
East	Lots 142-145	Managed (Stage 1A)	N/A	N/A	>100m	N/A	N/A
STAGE 1D (Commercial / Park)							
North	Lot 149	Forest	Level / upslope	Deemed to satisfy *(PBP 2018)*	24	BAL 29 (24 - <33m) BAL 19 (33 - <45m) BAL 12.5 (45 - <100m)	N/A
East & south	Lot 149	Managed / Future Park & Stage 1A (refer Note 6)	N/A	N/A	>100m	N/A	N/A

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
STAGE 2 (Residential)							
South-west	Lots 236-238	Forest (70m flame width)	6 ^{oD}	Alternative solution Method 2 *AS3959*	29 (includes rock lined overflow) (refer Note 3)	N/A	BAL 29 (29 - <41m) BAL 19 (41 - <55m) BAL 12.5 (55 - <100m)
South	Lots 225-235	Managed (Bulk earth works) (refer Note 1)	N/A	N/A	>100m	N/A	N/A
East	Lots 222-225	Forest	>7 ^{oD}	Alternative solution Method 2 *AS3959)*	15 (refer Note 3	N/A	BAL 29 (15 - <22m) BAL 19 (22 - <31m) BAL 12.5 (31 - <100m)
North-west	Lots 201, 209, 238	Managed (Stage 1A)	N/A	N/A	>100m	N/A	N/A
North-east	Lots 201 - 208	Forest (future Stage 3)	0-<5 ^{oD}	Deemed to satisfy *(PBP 2018)*	55m (within Stage 3) (refer Note 1)	BAL 12.5 (55 - <100m)	N/A

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
STAGE 3 (Residential)							
North	Lots 307-312, 325-327, 347-352	Forest (future Stage 4)	15-<20 ^{oD}	Deemed to satisfy *(PBP 2018)*	>100m Stage 4 (Lots 410-415) to be managed as an APZ (refer Note 1)	BAL 19 (73-<93m) BAL 12.5 (93 - <100m)	N/A
East	Lots 352-355	Forest	15-<20 ^{oD}	Deemed to satisfy *(PBP 2018)*	57 (refer Note 5)	BAL 29 (57-<73m) BAL 19 (73-<93m) BAL 12.5 (93 - <100m)	N/A
South	Lot 355-360 & 341-342	Forest	Level / upslope	Deemed to satisfy *(PBP 2018)*	24	BAL 29 (24 - <33m) BAL 19 (33 - <45m) BAL 12.5 (45 - <100m)	N/A
West & south-west	Lots 341-347, 301-307, 318, 319, 334, 335	Managed (Stage 1B & 2)	N/A	N/A	>100	N/A	N/A
STAGE 4 (Residential – Community Title)							
North	Lots 401-402	Forest	5-<10 ^{oD}	Deemed to satisfy *(PBP 2018)*	37 (refer Note 2)	BAL 29 (37-<49m) BAL 19 (49-<65m) BAL 12.5 (65 - <100m)	N/A

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
North-east	Lots 402-408	Forest	10-<15 ^{oD}	Deemed to satisfy *(PBP 2018)*	45 (refer Note 5)	BAL 29 (45-<60m) BAL 19 (60-<77m) BAL 12.5 (77 - <100m)	N/A
North-east	Lots 409 - 415	Forest	15-<20 ^{oD}	Deemed to satisfy *(PBP 2018)*	57 (refer Note 5)	BAL 29 (57-<73m) BAL 19 (73-<93m) BAL 12.5 (93 - <100m)	N/A
STAGE 5 (Residential – single lot)							
South-east	Lot 501	Forest	15-<20^{0D}	Deemed to satisfy *(PBP 2018)*	57	BAL 29	N/A
South & north-east			5-<10^{0D}		37-40		

*Notes: * Slope is either 'U' meaning up slope or 'C' meaning cross slope or 'D' meaning down slope*

Note 1 - Future stages are to be managed as a temporary inner protection (IPA) area by *WAD* until such time as development commences. This will ensure that the bushfire risk is managed in the interim. Temporary APZs will consist of a maximum 100m distance measured from the boundary of stage under development.

Note 2 - The APZ extends within adjoining Lot 1 DP 1240365. This allotment is owned by *WAD* and will be subject to future residential development. An 88B instrument will be applied to Lot 1 (to distances depicted in Schedule 1 attached) to ensure ongoing maintenance of the APZ as an IPA by *WAD.*

Note 3 - A performance-based assessment using Appendix B of *AS3959* was undertaken to determine the required APZ and BAL levels based on the comprehensive fuel loads associated with Sydney Coastal Dry Sclerophyll Forest for the following allotments:

- Lots 75 & 76 – reduced flame width of 70m (riparian corridor) on a downslope of 6 degrees. The APZ includes the proposed rock lined overflow within the riparian corridor.
- Lot 139 – calculations based on a 13 degrees upslope.
- Lots 223-225 – calculations based on 7 degrees upslope

The results of the assessments above are provided within Appendix 2 and were prepared using the bushfire attack level calculator developed by *Flamesol.*

Note 4 - Short fire run - The vegetation corridor to the south of Stages 1A and 1B is proposed to be retained as part of a riparian corridor. This corridor is between 50-75m in width and is adjoined by bulk earthworks DA 1 to the south. As outlined in Table 2.2, and depicted in Schedule 1 attached, this area is subject to three (3) fire run scenarios based on the fire run distance and effective slope. These are entitled SFR A, SFR B & SFR C.

This vegetation has been identified as low risk vegetation due to its consistent linear width which is at right angles to the property. The proximity of this low risk vegetation in relation to the development site does not present the capacity for a fire run to progress into a bushfire that will achieve a head width exceeding 100m. In addition, a crown fire is unlikely to develop.

These assumptions are based on the following parameters / limitations:

- linear nature of the vegetation parcel which is limited to less than 75m

In addition, the corridor complies with the limitations outlined in the 'Short Fire Run' paper produced by the NSW RFS as follows:

- vegetation slope is less than the 30 degrees downslope and 15 degree upslope limit.
- site slope is less than the '20 degrees downslope limit' for fuel management
- the maximum fire run is less than 150m
- limited to maximum input of 1.4m in height for elevated fuel (Project Vesta) for Sydney Coastal Dry Sclerophyll Forest.

The results of the SFR assessments above are provided within Appendix 2 and were prepared using the short fire run calculator.

Note 5 - The APZ extends within the adjoining community allotment Lot 400 (Stage 4). An 88B instrument will be applied to proposed Lot 400 (to distance depicted in Schedule 1 attached) to ensure ongoing maintenance of the APZ as an IPA. The APZ will be maintained under Community Title and will also extend along the northern edge of the access road to provide increased bushfire protection along the road.

Note 6 - The proposed park (Stage 1D) is to be constructed / implemented and managed by *WAD* as an IPA with final ownership transferred to Council. The park will be subject to a landscape plan with ongoing maintenance / mowing in accordance with a Plan of Management.

Specific Protection Issues 3

3.1 Asset protection zones (APZs)

Table 3.1 outlines the proposal's compliance with the performance criteria for APZs.

Table 3.1 – Performance criteria for asset protection zones (*Pre-release PBP* 2018 guidelines pg. 43)

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Potential building footprints will not be exposed to radiant heat levels exceeding 29kW/m^2 on each proposed lot	APZs are provided in accordance with Tables A1.12.2 and A1.12.4 based on the FDI	☐	☑	Refer Section 2.3. An alternative solution approach has been undertaken for lots adjacent to the riparian corridor using the short fire run methodology and Method 2 of *AS3959 (2018).*
APZs are managed and maintained to prevent the spread of a fire towards the building	APZs are managed in accordance with the requirements of Appendix 4	☑	☐	The APZ consists of landscaped areas, roads and turfed areas.
The APZ is provided in perpetuity	APZs are wholly within the boundaries of the development site	☐	☑	Refer Section 3.3 for detail. APZs will be assured through 88B easements. Temporary APZs have also been applied within land owned by *WAD* (subject to future development).
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	The APZ is located on lands with a slope of less than 18^o	☑	☐	The APZ within the Community Title allotment is located on slopes currently exceeding 18^o. This land will be subject to regrading / remediation with final slopes of <18 degrees which will permit ongoing maintenance.

3.2 Building protection

Building construction standards for the proposed future dwellings located within 100m of bushfire prone land are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)* and *Pre-release Planning for Bush Fire Protection 2018*.

Building construction standards have been outlined within Table 2.1 and are depicted in Schedule 1 attached.

The BAL assessment provided in Table 2.2 is based on either a deemed to satisfy OR an alternate solution approach.

- ***Deemed to satisfy approach*** (DS) – The deemed to satisfy approach (Column 7 of Table 2.2) was undertaken in compliance with the tables provided in *PBP 2018*.

  The assessment uses Method 1 Table 2.4.2 of *AS3959*. This is a simplified process and results in a cheaper bushfire assessment at building construction stage However, it is often not the cheapest approach as BAL levels can be higher.

- ***Alternate solution approach*** (AS) – The alternative solution approach (Column 8 of Table 2.2) is undertaken in compliance with *AS3959* Appendix B Method 2 or the short fire run methodology to obtain an accurate BAL rating approval using comprehensive fuel loads and accurate slopes.

  This method maximises the developable area and can provide future lots owners with the best way to achieve cheaper building construction costs. However, future purchasers will be required to lodge their dwelling application under Section 4.14 of the *Environmental Protection and Assessment Act (EP&A Act),* which will require a further bushfire protection assessment report (i.e. increased cost for report) to support the lower BAL level. Referral of the report to the RFS is also required when using an alternative solution.

3.3 Hazard management

APZs are required to be managed as an IPA 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 would constrain hazard management from being successfully carried out by normal means (e.g. mowing). Appendix 2 provides maintenance advice for vegetation within the APZ.

The APZs identified in Schedule 1 will be maintained by the following entities:

- APZs identified in solid light green will be maintained by private lot owners.
- DA No. 1 bulk earthworks and clearing is identified in grey. The majority of this area will be completely cleared in the first instance and will form future Stages 7-9. The vegetation will be removed, and land will be maintained by the developer *(WAD)* as a temporary IPA in accordance with an 88B instrument until such time as the land is developed.
- Easement for maintenance over Lot 1 DP 1240365 is identified in two toned green cross hatch (adjoining land north-west of stage 1B). This area is to be maintained as a temporary IPA by the developer *(WAD)* in accordance with an 88B instrument until such time as the land is developed.
- Residual Lot 400 forms part of the Community Title allotment. As depicted in Schedule 1, this area is identified in green cross hatch. The APZ will be managed by the Community Association in accordance with a fuel management plan.
- Park (depicted in solid dark green) will be a dog park with associated picnic facilities. The park will be implemented by *WAD* with final ownership transferred to Council. The park will be subject to a landscape plan and a Plan of Management.

Subdivision staging

The sequence and timing of each development stage is unknown at this stage, however development should consider the implementation of APZs over future stages to ensure the bushfire risk is addressed during all aspects of the development and the entire construction period.

Future stages should be managed and maintained as temporary IPAs by *WAD* until such time as development commences. An easement or covenant will be established for the purpose of an APZ and can be extinguished when the bushfire hazard is permanently removed (i.e. when development occurs).

The following two (2) options should be considered:

Option 1 - The entire development area (Stages 1-5 and future Stages 6-8) is managed as an IPA throughout the lifetime of the development and until each lot is sold / developed and the hazard is removed; or

Option 2 - Temporary APZs apply on a staged basis as follows:

- The Bulk Earthworks area (future Stages 6-8) will remove the majority of vegetation in the first instance. This entire area is to be managed as in IPA (to be implemented in conjunction with Stage 1A and to be maintained throughout all stages)
- The entire future Stage 1D (future commercial and park) and a 55m APZ extending external from the northern boundary of Stage 1A (within Stages 1B and 3) is to be managed as an IPA (to be implemented in conjunction with Stage 1A).
- A 55m APZ is to be implemented extending from the western boundary of Stage 1A and within the eastern boundary of Stage 1C (to be to be implemented in conjunction with Stage 1A).
- The residential allotments associated with Stage 4 (i.e. Lots 401-409 and the residual portion of Lot 400 to the south-west of the perimeter road) are to be managed as an IPA (to be implemented in conjunction with Stage 1B construction)
- A 55m APZ is to be created extending from the eastern boundary of Stage 1B and within the western boundary of Stage 3 (to be implemented in conjunction with Stage 1B development).
- A 55m APZ is to be created extending from the northern boundary of Stage 2 and within the southern boundary of Stage 3 (to be implemented in conjunction with Stage 2 development).
- The residential allotments associated with Stage 4 (i.e. Lots 410-415) are to be managed as an IPA (to be implemented in conjunction with Stage 3 construction).

3.4 Access for firefighting operations

The proposed development will initially gain access from the Pacific Highway in the west with emergency access to the existing township of Caves Beach (via the Scenic Drive) to the east.

The development forms part of the approved North Wallarah Masterplan Development Land Use Plan (DLUP) with the adjoining land to the north-west and east subject to future development and future additional road linkages.

As depicted below, the proposed road network provides for a series of perimeter roads and internal road linkages. All roads have a carriageway width of 8m. There is one (1) single dead-end road (Road No. 17). This road has a length of less than 200m. A cul-de-sac is also provided in Stage 4 (Road 22). This road is provided with through road connect via Road 26 (a community title perimeter road) depicted in blue below. This road will be provided with a locked gate with access provided via the Road 2 & 27 (8m width).

The proposal's compliance with the acceptable solutions outlined in *Pre-release PBP 2018* is detailed within Table 3.2 below.

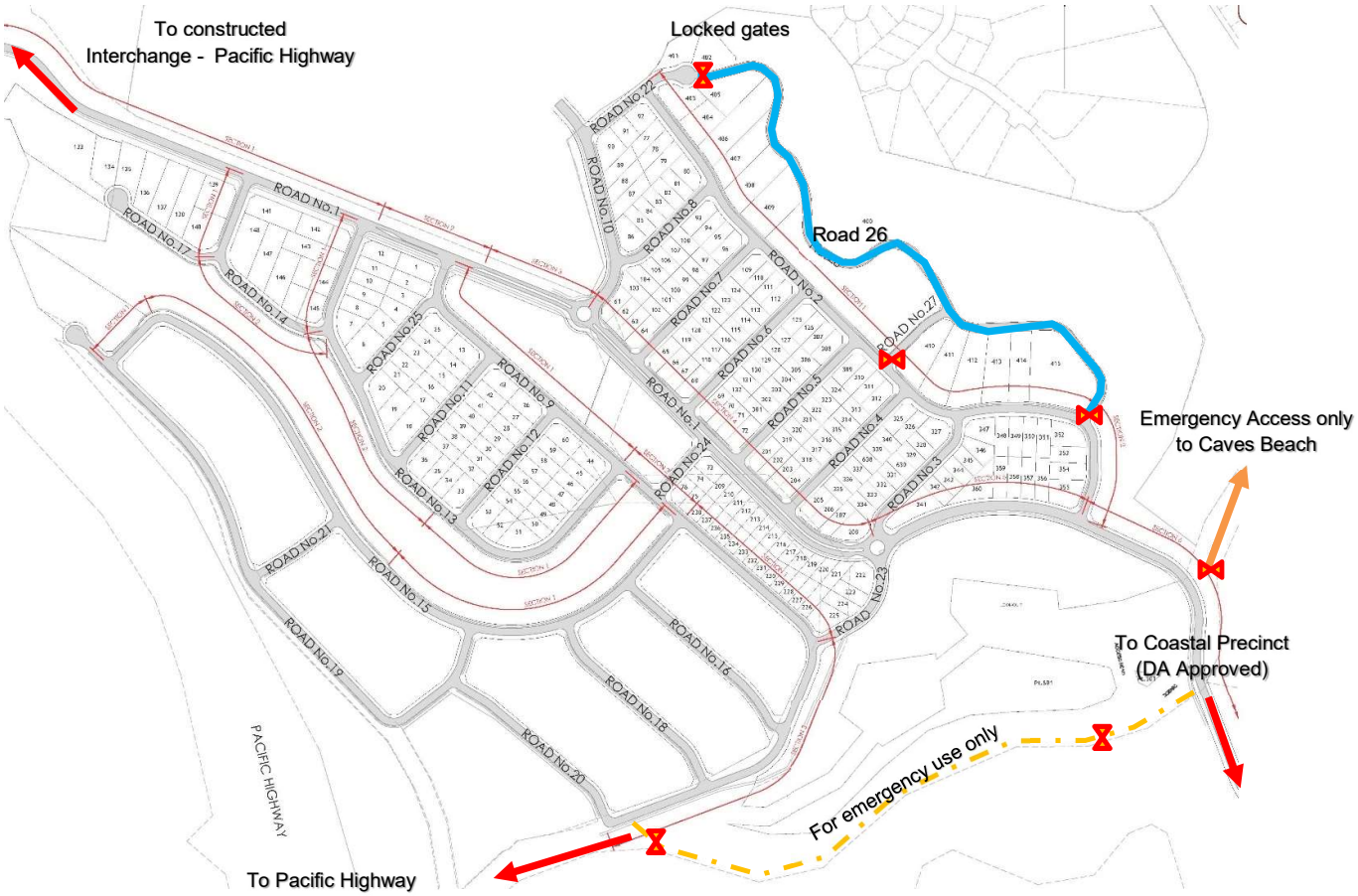


Figure 3.1 – Road network
(source: ADW Johnson, July 2019)

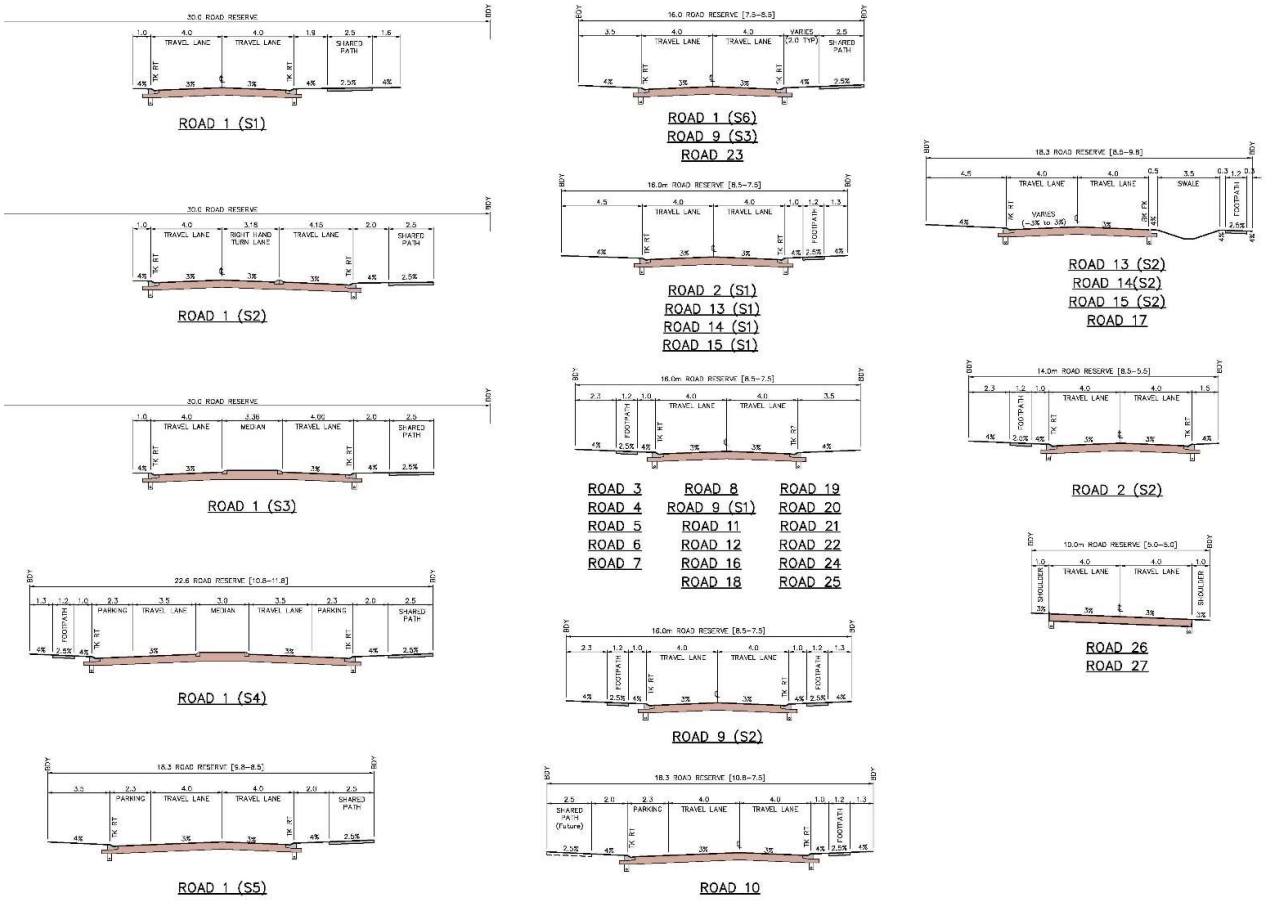


Figure 3.2 – Road cross sections
(source: ADW Johnson, July 2019)

Table 3.2 – Performance criteria for access within residential subdivisions (Pre-release *PBP* 2018) guidelines pg. 44)

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all weather access to structures and hazard vegetation.	Perimeter roads are provided for residential subdivisions of three or more allotments.	☑		Complies.
		Subdivisions of three or more allotments have more than one access in and out of the development.		☑	The main access to the site is via the Pacific Highway in the north-west. In addition there are three (3) gated emergency egress points to Caves Beach in the north-east, Pinny Beach in the south-east and the Pacific Highway (via The Scenic Road) in the south-west.
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.	☑		Can be a condition of consent.
		Maximum grades for sealed roads do not exceed 15 degrees and an average grade of no more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient.	☑		Complies. All roads will be sealed.
		All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200m in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end.	☑		There is one (1) dead end road within the development (Stage 1C). Turning heads are to be constructed in compliance with Figure 3.1.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		Where kerb and guttering are provided on perimeter roll top kerbing should be used to the hazard side of the road.	☑		Can be a condition of consent.
		Where access / egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.	☑		There is one (1) access points to the subdivision with an additional three (3) emergency egress points.
	The capacity of access roads is adequate for firefighting vehicles.	The capacity of perimeter and non-perimeter road surfaces and any bridges / causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges / causeways are to clearly indicate load rating.	☑		Can be a condition of consent.
	There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.	☑		Can be a condition of consent.
		hydrants are provided in accordance with *AS 2419.1:2005.*	☑		Can be a condition of consent.
		there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	☑		Can be a condition of consent.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
PERIMETER ROADS	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating as well as	Perimeter roads are two-way sealed roads.	☑		Complies.
		8m carriageway width kerb to kerb.	☑		Complies. All roads are 8m.
		Parking is provided outside of the carriageway width.	☑		Complies.
		Hydrants are located clear of parking areas.	☑		Can be a condition of consent.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
	providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	☑		Complies.
		Curves of roads have a minimum inner radius of 6m.	☑		Can be a condition of consent.
		The maximum grade road is 15° and average grade is 10°.	☑		Can be a condition of consent.
		The road crossfall does not exceed 3°.	☑		Can be a condition of consent.
		a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☑		Can be a condition of consent

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
NON-PERIMETER ROADS	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating.	Minimum 5.5m width kerb to kerb.	☑		Complies. All roads are 8m.
		Parking is provided outside of the carriageway width.	☑		Complies. Parking is provided outside of the 5.5m carriageway width.
		Hydrants are located clear of parking areas.	☑		Can be a condition of consent.
		Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	☑		As outlined above there is one dead end road within the development. Turning heads are to be constructed in compliance with Figure 3.1.
		Curves of roads have a minimum inner radius of 6m.	☑		Can be a condition of consent.
		The road crossfall does not exceed 3°.	☑		Can be a condition of consent.
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☑		Can be a condition of consent.

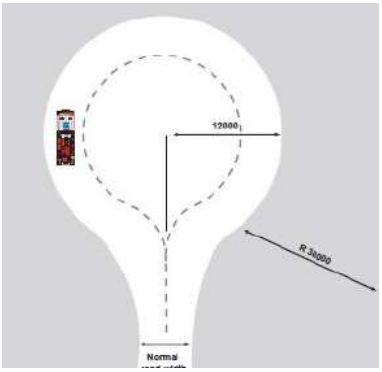


Figure 3.1 – Turning head dimensions

3.5 Temporary access during construction

The primary access to the proposed subdivision is via the roundabout and onto the Old Pacific Highway. The proposal also includes bulk earthworks and vegetation removal across the site and includes the reconstruction of the Old Pacific Highway entry and realignment of the road. The re/construction and realignment of this main access road through the proposed site to Scenic Drive is proposed over several Stages.

Until the ultimate alignment is built, it is proposed that any emergency access is provided through the site for the use of the RFS/emergency services or Caves Beach residents via Scenic Drive. Scenic Drive is currently gated and is proposed to remain gated. This route provides for access from Caves Beach onto the highway and will be available at all times during the construction process to allow for any emergency. The applicant has held discussions with Craig Holland from Lake Macquarie City Councils Bushland Management Officer Assets Delivery who agreed that this temporary route would provide the most practical suitable access from a bushfire management perspective during the construction of the proposed subdivision.

Figure 3.2 – Temporary emergency egress (during construction phase)

3.6 Water supplies

Table 3.3 outlines the proposal's compliance with the acceptable solutions for reticulated water supply.

Table 3.3 – Performance criteria for reticulated water supplies (Pre-release *PBP* guidelines pg. 48)

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
A water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available. A static water supply is provided where no reticulated water is available.	☑		Reticulated water is available to the development.
Water supplies are located at regular intervals, the water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the Australian Standard *AS 2419.1:2005.* Hydrants are not located within any road carriageway.	☑		Can be made a condition of consent.

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.			
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with *AS 2419.1:2005.*	☑		Can be made a condition of consent.
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps.	☑		Can be made a condition of consent.

3.7 Gas

Table 3.4 outlines the required acceptable solutions for gas supply.

Table 3.4– Performance criteria for gas supplies (Pre-release *PBP* guidelines pg. 48

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Location of gas services will not lead to the ignition of surrounding bushland land or the fabric of buildings.	Reticulated or bottled gas bottles are to be installed and maintained in accordance with *AS1596 (2014)* and the requirements of relevant authorities. Metal piping is to be used.	☑		Can be made a condition of consent.
	All fixed gas cylinders are to be kept clear of flammable materials to a distance of 10m and shielded on the hazard side.	☑		Can be made a condition of consent.
	Connections to and from gas cylinders are metal.	☑		Can be made a condition of consent.
	Polymer sheathed flexible gas supply lines are not used.	☑		Can be made a condition of consent.
	Above ground gas service pipes are metal, including and up to any outlets.	☑		Can be made a condition of consent.

3.8 Electricity

Table 3.6 outlines the required acceptable solutions for the subdivision's electricity supply.

Table 3.5 – Performance criteria for electricity services (Pre-release *PBP* guidelines pg. 48)

Performance criteria	Acceptable Solutions	Acceptable solution	Performance solution	Comment
Location of electricity services limit the possibility of ignition of surrounding bushland or the fabric of buildings. Regular inspection of lines in undertaken to ensure they are not fouled by branches.	Where practicable, electrical transmission lines are underground.	☑	☐	The majority of electrical lines will be underground
	Where overhead electrical transmission lines are proposed: • lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and • no part of a tree is closer to a power line than the distance set out in accordance with the specification in *Vegetation Safety Clearances* issued by *Energy Australia* (NS179, April 2002)	☑	☐	The 11kv overhead power lines will be relocated to comply with the acceptable solutions.

Conclusion & Recommendations

4

4.1 Conclusion

This bushfire protection assessment has been undertaken for the residential subdivision development located at Northern Sector, Central Precinct, Pinny Beach. The subdivision is proposed over six (6) stages and will ultimately involve the creation of two-hundred and sixty-two (262) new residential allotments, as well as a Village Centre, Public Park allotments and drainage / riparian reserves

This assessment has found that bushfire can potentially affect the proposed development from the extensive bushland vegetation surrounding the development resulting in future buildings being exposed to potential radiant heat and ember attack.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures;

- APZs in accordance with the minimum setbacks outlined within *Pre-release PBP 2018* for most aspects*;*
- Use of an alternative solution to determine minimum APZ and BAL setbacks for the southern aspect of Stages 1A and 1C using the short fire run (SFR) methodology. This narrow riparian corridor is identified as low risk vegetation due to its consistent linear width which is at a right angle to the development.
- Provision of access in accordance with the acceptable solutions outlined in *Pre-release PBP 2018*;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *Pre-release PBP 2018;*
- Future dwelling construction in compliance with the appropriate construction sections of *AS3959-2009*, and *Pre-release PBP 2018*.

Creation of 88B easements to ensure the ongoing maintenance of APZs where they occur within Community Title land and / or land owned and managed by *Wakefield Ashurst Developments Pty Ltd (WAD).*

The following recommendations are provided to ensure that the development is in accordance with, 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 as outlined in Table 2.2 and as generally depicted within Schedule 1.

Recommendation 3 - Temporary APZs are to be applied based on the final staging of the development. Future stages are to be managed as a temporary inner protection (IPA) area by *WAD* until such time as development commences. This will ensure that the bushfire risk is managed in the interim. APZ's are to be maintained in accordance with the following options:

Option 1 - The entire development area (Stages 1-5 and future Stages 6-8) is managed as an IPA throughout the lifetime of the development and until each lot is sold / developed and the hazard is removed; or

Option 2 - Temporary APZs apply on a staged basis as follows:

- The Bulk Earthworks area (future Stages 6-8) will remove the majority of vegetation in the first instance. This entire area is to be managed as in IPA (to be implemented in conjunction with Stage 1A and to be maintained throughout all stages)
- The entire future Stage 1D (future commercial and park) and a 55m APZ extending external from the northern boundary of Stage 1A (within Stages 1B and 3) is to be managed as an IPA (to be implemented in conjunction with Stage 1A).
- A 55m APZ is to be implemented extending from the western boundary of Stage 1A and within the eastern boundary of Stage 1C (to be to be implemented in conjunction with Stage 1A).
- The residential allotments associated with Stage 4 (i.e. Lots 401-409 and the residual portion of Lot 400 to the south-west of the perimeter road) are to be managed as an IPA (to be implemented in conjunction with Stage 1B construction)
- A 55m APZ is to be created extending from the eastern boundary of Stage 1B and within the western boundary of Stage 3 (to be implemented in conjunction with Stage 1B development).
- A 55m APZ is to be created extending from the northern boundary of Stage 2 and within the southern boundary of Stage 3 (to be implemented in conjunction with Stage 2 development).
- The residential allotments associated with Stage 4 (i.e. Lots 410-415) are to be managed as an IPA (to be implemented in conjunction with Stage 3 construction).

Recommendation 4 - At the issue of subdivision certificate, and in conjunction with the construction of Stages 1B and 4, a suitably worded instrument shall be created over Lot 1 DP 1240365 pursuant to section 88 of the *Conveyancing Act 1919* which:

- Ensures that the APZ as shown on the plan titled Schedule 1 – Bushfire Protection Measures prepared by *Travers bushfire & ecology* referenced 18MURR04_BF001 dated 4 November 2019 is managed as an IPA as outlined within Section 4.1.3 and Appendix 4 of *Pre-release Planning for Bush Fire Protection 2018* and the NSW Rural Fire Service document *'Standards for asset protection zones'.*

Recommendation 5 - At the issue of subdivision certificate, and in conjunction with the construction of Stages 1B, 3 and / or Stage 4, a suitably worded instrument shall be created over Community Title allotment 400 pursuant to Section 88 of the *Conveyancing Act 1919* which:

- Ensures that the APZ as shown on the plan titled Schedule 1 – Bushfire Protection Measures prepared by *Travers bushfire & ecology* referenced 18MURR04_BF001 dated 4 November 2019 is managed as an IPA as outlined within section 4.1.3 and

Appendix 4 of *Pre-release Planning for Bush Fire Protection 2018* and the NSW Rural Fire Service document *'Standards for asset protection zones'.*

Recommendation 6 - At the issue of subdivision certificate, a suitably worded instrument shall be created over future Stages 6-8 pursuant to Section 88 of the *Conveyancing Act 1919* which:

- Ensures that the APZ as shown on the plan titled Schedule 1 – Bushfire Protection Measures prepared by *Travers bushfire & ecology* referenced 18MURR04_BF001 dated 4 November 2019 is managed as an IPA as outlined within Section 4.1.3 and Appendix 4 of *Pre-release Planning for Bush Fire Protection 2018* and the NSW Rural Fire Service document *'Standards for asset protection zones'.*

Recommendation 7 - The park (Lot 150) will be subject to a landscape plan with ongoing maintenance / mowing in accordance with a Plan of Management. This will ensure that the entire lot as shown on the plan titled Schedule 1 – Bushfire Protection Measures prepared by *Travers bushfire & ecology* referenced 18MURR04_BF001 dated 4th November 2019 is managed as IPA as outlined within Section 4.1.3 and Appendix 4 of *Pre-release Planning for Bush Fire Protection 2018* and the NSW Rural Fire Service document *'Standards for asset protection zones'.*

Recommendation 8 - Access is to comply with the acceptable solutions outlined in Section 5.3 of *Pre-release Planning for Bush Fire Protection 2018.*

Recommendation 9 - Building construction standards for the proposed future dwellings within 100m of bushfire prone land are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)*, and *Pre-release Planning for Bush Fire Protection 2018.*

Recommendation 10 - Water, electricity and gas supply is to comply with Section 5.3 of *Pre-release Planning for Bush Fire Protection 2018.*

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 bush fire-prone areas.*

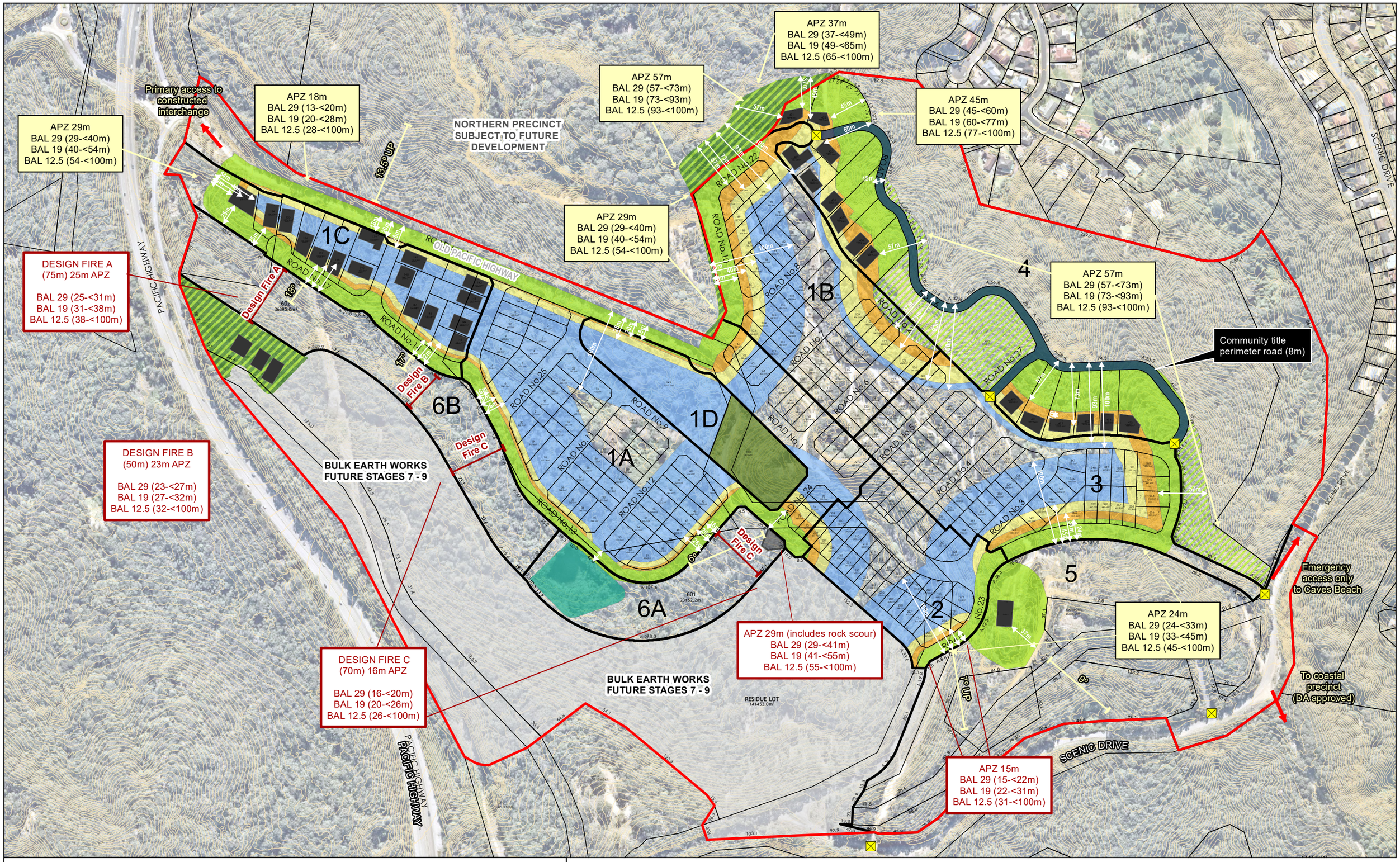
Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change.

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

- Lot boundary
- Staging boundaries
- Contours - 1m (source: LiDAR)
- Detention basin (freshwater wetland)
- Slope transects
- Design fire transect (A-C)
- Gate (5)
- Community title perimeter rd
- Indicative building envelope

Asset Protection Zone (APZ) / Management Responsibility

- IPA (Private)
- Community Title (IPA)
- WAD (Temporary IPA)
- Park area WAD / Council (IPA)
- Rock Scour
- Bulk earth works (majority of vegetation to be removed / IPA) (WAD) (future stages 7-9)

Bushfire Protection Measures AS3959* (2009)

- BAL 29
- BAL 19
- BAL 12.5

* Please refer to additional construction requirements for BAL levels which are contained in Addendum Appendix 3 of *'Planning for Bushfire Protection'* (2006).

Aerial source: Nearmap

0 100 200 m

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.

PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
Mawsons Ridge North, Murrays Beach 18MURR04_BF001	4/11/2019 Issue 1 AW	1:4,000 @A3 GDA 1994 MGA Zone 56

TITLE

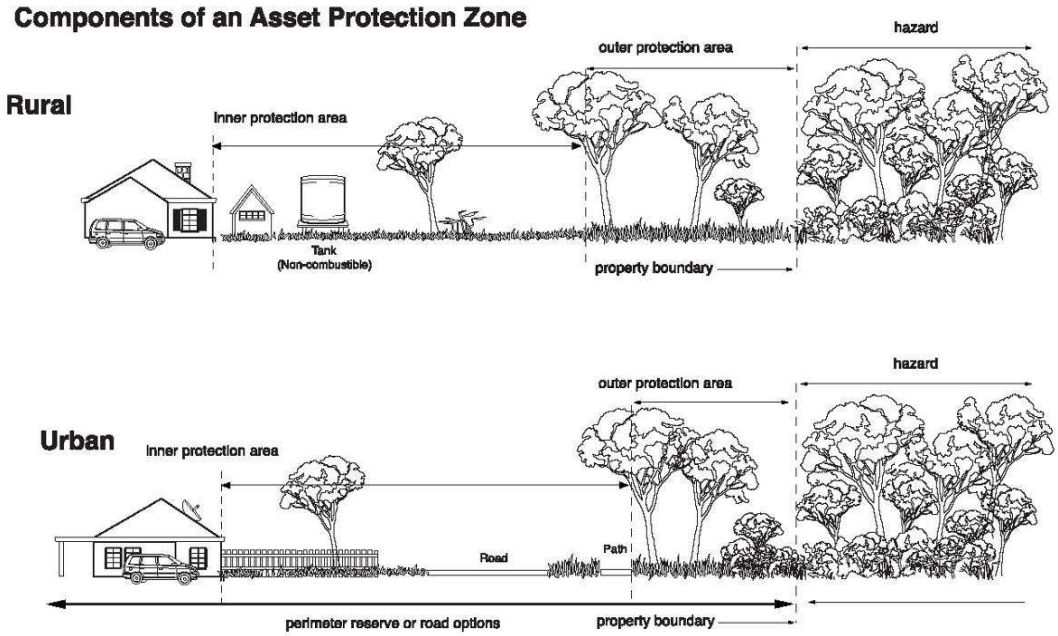
Schedule 1 - Bushfire Protection Measures

Document Path: N:\GIS STORAGE\N Drive\A17234_Mawsons Ridge North_Murrays Beach\MXDs\18MURR04_BF001.mxd

Management of Asset Protection Zones A1

The RFS provides basic advice in respect of managing APZs through documents such as, *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 5 of *PBP*.

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 property is to be managed to IPA standards only. A typical APZ is graphically represented below:



APZs and progressive reduction in fuel loads (Source: RFS, 2006)

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought regarding vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the RFS performance criteria.

The following provides maintenance advice for vegetation within the IPA and OPA.

Inner protection area (IPA)
Fuel loads within the IPA are to be maintained so it does not exceed 4t/ha.

Trees are to be maintained to ensure;

- canopy cover does not exceed 15%
- trees (at maturity) do not touch or overhang the building

- tree canopies (at maturity) should be well spread out and not form a continuous canopy
- lower limbs should be removed up to a height of 2m above ground
- preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

- large discontinuities or gaps in vegetation
- shrubs should not be located under trees
- shrubs should not form more than 10% of ground cover
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of vegetation.

Grass is to be maintained to ensure:

- a height of 10cm or less
- leaves and debris are removed.

Landscaping to the site is to comply with the principles of Appendix 5 of *PBP.* In this regard the following landscaping principles are to be incorporated into the development:

- Suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways;
- Restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come into contact with the building;
- When considering landscape species consideration needs to be given to estimated size of the plant at maturity;
- Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies;
- Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown;
- Avoid planting of deciduous species that may increase fuel at surface / ground level (i.e. leaf litter);
- Avoid climbing species to walls and pergolas;
- Locate combustible materials such as woodchips / mulch, flammable fuel stores away from the building;
- Locate combustible structures such as garden sheds, pergolas and materials such timber garden furniture way from the building; and
- Use of low flammability vegetation species.

Performance Based Assessment

A2

Stage 1C, 1A & 1D (northern aspect) – Method 2 AS3959

FPA AUSTRALIA | FLAMESOL

Calculated July 23, 2019, 9:07 am (MDc v.4.8)

Mawsons Ridge (Stage 1C, 1A & 1D) NORTH

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	1.28 km/h
Vegetation classification	Forest	Flame length	11.6 m
Surface fuel load	21.3 t/ha	Flame angle	53 °, 63 °, 72 °, 76 °, 78 ° & 83 °
Overall fuel load	27.3 t/ha	Elevation of receiver	4.63 m, 5.17 m, 5.52 m, 5.63 m, 5.67 m & 5.76 m
Vegetation height	n/a	Fire intensity	18,083 kW/m
Effective slope	-10 °	Transmissivity	0.878, 0.862, 0.838, 0.8139999999999999, 0.801 & 0.735
Site slope	0 °	Viewfactor	0.5978, 0.4412, 0.2973, 0.2012, 0.1641 & 0.0446
Flame width	100 m	Minimum distance to < 40 kW/m²	9.699999999999982 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	13.09999999999997 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	19.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	27.50000000000012 m
		Minimum distance to < 10 kW/m²	32.8000000000002 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Stage 1A, 2 (Lots 75, 76 & 236-238 southern aspect) – Method 2 *AS3959*

Calculated July 19, 2019, 10:17 am (MDc v.4.8)

Mawsons Ridge (Lots 75 & 76)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	3.86 km/h
Vegetation classification	Forest	Flame length	28.41 m
Surface fuel load	21.3 t/ha	Flame angle	50 °, 59 °, 65 °, 69 °, 71 ° & 79 °
Overall fuel load	27.3 t/ha	Elevation of receiver	10.88 m, 12.17 m, 12.87 m, 13.26 m, 13.43 m & 13.94 m
Vegetation height	n/a	Fire intensity	54,542 kW/m
Effective slope	6 °	Transmissivity	0.851, 0.824, 0.794, 0.769, 0.757 & 0.702
Site slope	0 °	Viewfactor	0.6166, 0.4615, 0.3138, 0.2132, 0.1734 & 0.0467
Flame width	100 m	Minimum distance to < 40 kW/m²	22.80000000000005 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	29.70000000000015 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	40.90000000000031 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	54.3000000000005 m
		Minimum distance to < 10 kW/m²	62.40000000000062 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980
Elevation of receiver - Douglas & Tan, 2005
Flame angle - Douglas & Tan, 2005
Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Stage 2 (Lots 223 – 225 southern aspect) – Method 2 *AS3959*

Calculated September 6, 2019, 8:59 am (MDc v.4.8)

Lots 223 - 225

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	1.57 km/h
Vegetation classification	Forest	Flame length	13.52 m
Surface fuel load	21.3 t/ha	Flame angle	53 °, 63 °, 71 °, 76 °, 77 ° & 83 °
Overall fuel load	27.3 t/ha	Elevation of receiver	5.4 m, 6.02 m, 6.39 m, 6.56 m, 6.58 m & 6.71 m
Vegetation height	n/a	Fire intensity	22,241 kW/m
Effective slope	-7 °	Transmissivity	0.874, 0.856, 0.831, 0.805, 0.792 & 0.729
Site slope	0 °	Viewfactor	0.5975, 0.4451, 0.3002, 0.2032, 0.1655 & 0.045
Flame width	100 m	Minimum distance to < 40 kW/m²	11.29999999999998 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	15.09999999999996 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	22.00000000000004 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	31.20000000000017 m
		Minimum distance to < 10 kW/m²	37.00000000000026 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980
Elevation of receiver - Douglas & Tan, 2005
Flame angle - Douglas & Tan, 2005
Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Short Fire Run results

Design Fire A

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire A (75m fire run) BAL 29

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	25	Metres	Target elevation of receiver	2	Metres
ffective slope	18	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	75	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	30.401	Metres	Default elevation of receiver	16.877	Metres
FDF Flame Angle	35	Degrees	SFR Flame Angle	27	Degrees
FDF Flame Length	60.80	Metres	SFR Flame Height	33.755	Metres
FDF Intensity	124833	kW/m	SFR Intensity	97397	kW/m
FDF FROS	8.8502	kph	SFR FROS	8.8502	kph
FDF Flame transmissivity	0.9045	kW/m	SFR Flame transmissivity	0.8641	kW/m
FDF View Factor	0.9994		SFR View Factor	0.4361	
			Calculated SFR Head Width	27.453	Metres
			SFR fire run length	75	Metres
			Approx. SFR travel time	8:28	min/sec
FDF Radiant Heat	68.73	kW/m^2	**SFR Radiant Heat**	28.65	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire A (75m fire run) BAL 19

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	31	Metres	Target elevation of receiver	2	Metres
ffective slope	18	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	75	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	30.401	Metres	Default elevation of receiver	16.877	Metres
FDF Flame Angle	5	Degrees	SFR Flame Angle	34	Degrees
FDF Flame Length	60.80	Metres	SFR Flame Height	33.755	Metres
FDF Intensity	124833	kW/m	SFR Intensity	97397	kW/m
FDF FROS	8.8502	kph	SFR FROS	8.8502	kph
FDF Flame transmissivity	0.9017	kW/m	SFR Flame transmissivity	0.8401	kW/m
FDF View Factor	0.9595		SFR View Factor	0.2914	
			Calculated SFR Head Width	27.453	Metres
			SFR fire run length	75	Metres
			Approx. SFR travel time	8:28	min/sec
FDF Radiant Heat	65.79	kW/m^2	**SFR Radiant Heat**	18.62	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation
m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run
K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire A (75m fire run) BAL 12.5

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	38	Metres	Target elevation of receiver	2	Metres
ffective slope	18	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	75	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	30.401	Metres	Default elevation of receiver	16.877	Metres
FDF Flame Angle	22	Degrees	SFR Flame Angle	42	Degrees
FDF Flame Length	60.80	Metres	SFR Flame Height	33.755	Metres
FDF Intensity	124833	kW/m	SFR Intensity	97397	kW/m
FDF FROS	8.8502	kph	SFR FROS	8.8502	kph
FDF Flame transmissivity	0.8646	kW/m	SFR Flame transmissivity	0.8160	kW/m
FDF View Factor	0.5486		SFR View Factor	0.1956	
			Calculated SFR Head Width	27.453	Metres
			SFR fire run length	75	Metres
			Approx. SFR travel time	8:28	min/sec
FDF Radiant Heat	36.07	kW/m^2	**SFR Radiant Heat**	12.14	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Design Fire B

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire B (50m fire run) BAL 29

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	23	Metres	Target elevation of receiver	2	Metres
ffective slope	17	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	50	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	28.484	Metres	Default elevation of receiver	16.056	Metres
FDF Flame Angle	36	Degrees	SFR Flame Angle	23	Degrees
FDF Flame Length	56.97	Metres	SFR Flame Height	32.112	Metres
FDF Intensity	116510	kW/m	SFR Intensity	90903	kW/m
FDF FROS	8.2602	kph	SFR FROS	8.2602	kph
FDF Flame transmissivity	0.9052	kW/m	SFR Flame transmissivity	0.8706	kW/m
FDF View Factor	0.9999		SFR View Factor	0.4187	
			Calculated SFR Head Width	18.302	Metres
			SFR fire run length	50	Metres
			Approx. SFR travel time	6:03	min/sec
FDF Radiant Heat	68.82	kW/m^2	**SFR Radiant Heat**	27.72	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire B (50m fire run) BAL 19

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	27	Metres	Target elevation of receiver	2	Metres
ffective slope	17	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	50	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	28.484	Metres	Default elevation of receiver	16.056	Metres
FDF Flame Angle	19	Degrees	SFR Flame Angle	29	Degrees
FDF Flame Length	56.97	Metres	SFR Flame Height	32.112	Metres
FDF Intensity	116510	kW/m	SFR Intensity	90903	kW/m
FDF FROS	8.2602	kph	SFR FROS	8.2602	kph
FDF Flame transmissivity	0.9046	kW/m	SFR Flame transmissivity	0.8534	kW/m
FDF View Factor	0.9997		SFR View Factor	0.2870	
			Calculated SFR Head Width	18.302	Metres
			SFR fire run length	50	Metres
			Approx. SFR travel time	6:03	min/sec
FDF Radiant Heat	68.76	kW/m^2	**SFR Radiant Heat**	18.63	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire B (50m fire run) BAL 12.5

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	32	Metres	Target elevation of receiver	2	Metres
ffective slope	17	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	50	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	28.484	Metres	Default elevation of receiver	16.056	Metres
FDF Flame Angle	12	Degrees	SFR Flame Angle	35	Degrees
FDF Flame Length	56.97	Metres	SFR Flame Height	32.112	Metres
FDF Intensity	116510	kW/m	SFR Intensity	90903	kW/m
FDF FROS	8.2602	kph	SFR FROS	8.2602	kph
FDF Flame transmissivity	0.8869	kW/m	SFR Flame transmissivity	0.8345	kW/m
FDF View Factor	0.6781		SFR View Factor	0.1941	
			Calculated SFR Head Width	18.302	Metres
			SFR fire run length	50	Metres
			Approx. SFR travel time	6:03	min/sec
FDF Radiant Heat	45.73	kW/m^2	**SFR Radiant Heat**	12.32	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Design Fire C

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics: Design Fire C (70m fire run) BAL 29

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	16	Metres	Target elevation of receiver	2	Metres
ffective slope	5	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	70	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			Outputs - Developing Fire Run (DFR)		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	13.367	Metres	Default elevation of receiver	8.824	Metres
FDF Flame Angle	19	Degrees	SFR Flame Angle	40	Degrees
FDF Flame Length	26.73	Metres	SFR Flame Height	17.647	Metres
FDF Intensity	50906	kW/m	SFR Intensity	39718	kW/m
FDF FROS	3.6090	kph	SFR FROS	3.6090	kph
FDF Flame transmissivity	0.8902	kW/m	SFR Flame transmissivity	0.8668	kW/m
FDF View Factor	0.7025		SFR View Factor	0.4082	
			Calculated SFR Head Width	25.623	Metres
			SFR fire run length	70	Metres
			Approx. SFR travel time	19:23	min/sec
FDF Radiant Heat	47.55	kW/m^2	**SFR Radiant Heat**	26.91	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire C (70m fire run) BAL 19

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	20	Metres	Target elevation of receiver	2	Metres
ffective slope	5	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	70	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	13.367	Metres	Default elevation of receiver	8.824	Metres
FDF Flame Angle	36	Degrees	SFR Flame Angle	47	Degrees
FDF Flame Length	26.73	Metres	SFR Flame Height	17.647	Metres
FDF Intensity	50906	kW/m	SFR Intensity	39718	kW/m
FDF FROS	3.6090	kph	SFR FROS	3.6090	kph
FDF Flame transmissivity	0.8670	kW/m	SFR Flame transmissivity	0.8500	kW/m
FDF View Factor	0.5197		SFR View Factor	0.2905	
			Calculated SFR Head Width	25.623	Metres
			SFR fire run length	70	Metres
			Approx. SFR travel time	19:23	min/sec
FDF Radiant Heat	34.26	kW/m^2	**SFR Radiant Heat**	18.77	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation
m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run
K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics	Design Fire C (70m fire run) BAL 12.5

Common and bushfire behaviour contributor inputs:

Predominant vegetation	Sydney Coastal Dry Sclerophyll Forests - 21.3 & 27.3 - Medium - > 0.9m - < 1.4m				
Surface & Elevated Fuel Load	21.3	tph	Overall fuel load	27.3	tph
Average Canopy Height	20	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1090	Kelvin
Distance to vegetation	26	Metres	Target elevation of receiver	2	Metres
ffective slope	5	Degrees	Ambient temperature	308	Kelvin
Site slope	0	Degrees	SFR fire run length	70	Metres
FDF nominal head width	100	Metres			

Outputs - Fully Developed Fire (FDF)			**Outputs - Developing Fire Run (DFR)**		
Wind Speed	45	kph	Wind speed	30	kph
Default elevation of receiver	13.367	Metres	Default elevation of receiver	8.824	Metres
FDF Flame Angle	52	Degrees	SFR Flame Angle	54	Degrees
FDF Flame Length	26.73	Metres	SFR Flame Height	17.647	Metres
FDF Intensity	50906	kW/m	SFR Intensity	39718	kW/m
FDF FROS	3.6090	kph	SFR FROS	3.6090	kph
FDF Flame transmissivity	0.8377	kW/m	SFR Flame transmissivity	0.8287	kW/m
FDF View Factor	0.4123		SFR View Factor	0.1869	
			Calculated SFR Head Width	25.623	Metres
			SFR fire run length	70	Metres
			Approx. SFR travel time	19:23	min/sec
FDF Radiant Heat	26.26	kW/m^2	**SFR Radiant Heat**	11.77	kW/m^2

Input cells

Locked output cells

Glossary of abreviations/terms:

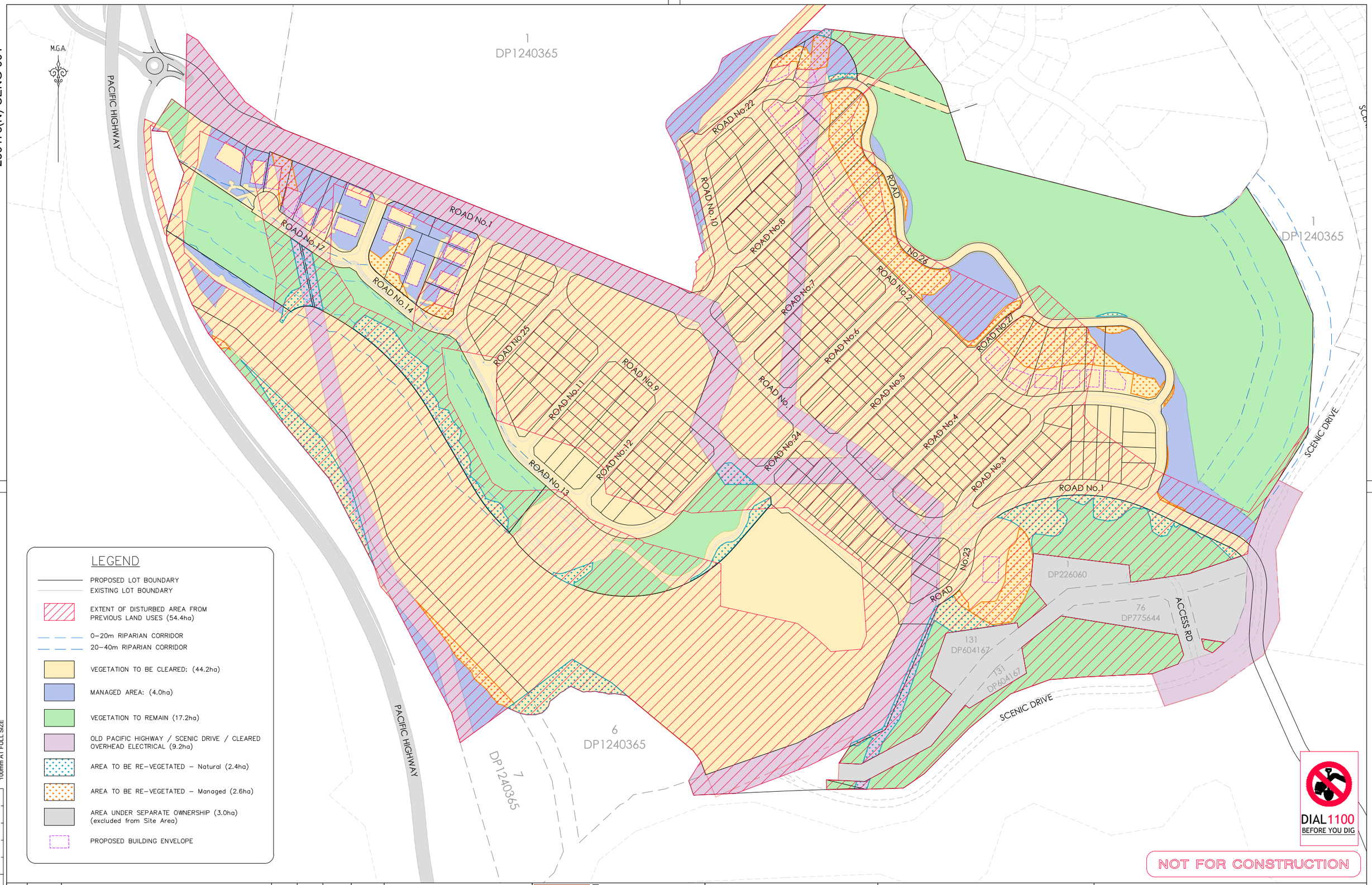
tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m2 = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV - Low Risk Vegetation
m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run
K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Vegetation Management Plan

A3

D09530927

239475(N)-CENG-004



LEGEND

- PROPOSED LOT BOUNDARY
- EXISTING LOT BOUNDARY
- EXTENT OF DISTURBED AREA FROM PREVIOUS LAND USES (54.4ha)
- 0–20m RIPARIAN CORRIDOR
- 20–40m RIPARIAN CORRIDOR
- VEGETATION TO BE CLEARED: (44.2ha)
- MANAGED AREA: (4.0ha)
- VEGETATION TO REMAIN (17.2ha)
- OLD PACIFIC HIGHWAY / SCENIC DRIVE / CLEARED OVERHEAD ELECTRICAL (9.2ha)
- AREA TO BE RE–VEGETATED – Natural (2.4ha)
- AREA TO BE RE–VEGETATED – Managed (2.6ha)
- AREA UNDER SEPARATE OWNERSHIP (3.0ha) (excluded from Site Area)
- PROPOSED BUILDING ENVELOPE

DIAL 1100 BEFORE YOU DIG

NOT FOR CONSTRUCTION

100mm AT FULL SIZE

REV.	DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED
A		NOT ISSUED				
B	16.08.19	ISSUED FOR INFORMATION	JD	JD	ND	LB
C	05.09.19	ISSUED FOR APPROVAL	JD	JD	ND	LB
D	01.10.19	ISSUED FOR APPROVAL	JD	JD	ND	LB
E	15.10.19	ISSUED FOR DA	JD	JD	ND	LB

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SCALES: A1 1:2000 — 0 50 100m — A3 1:4000

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Phone: (02) 4305 4300
Fax: (02) 4305 4399
email: coast@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: WAKEFIELD ASHURST

PROPERTY DESCRIPTION: LOTS 2,3,4,5,7 & 8 D.P.1240365, LOT 3 D.P.1090495 NORTHERN SECTOR, WALLARAH PENINSULA

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: CENTRAL PRECINCT

PLAN TITLE: VEGETATION MANAGEMENT PLAN

PROJECT No.	DISCIPLINE	NUMBER	REV.
239475(N)	CENG	004	E

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Building Code & Bushfire Hazard Solutions

(Pty. Limited) ABN 19 057 337 774
PO Box 124, Berowra NSW 2081
Telephone: (02) 9457 6530 Facsimile: (02) 9457 6532
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SILVER MEMBER
FPA AUSTRALIA Fire Protection Association Australia

The General Manager
Lake Macquarie City Council
Box 1906
HUNTER REGIONAL MAIL CENTRE NSW 2790

18th December 2020
Our Ref. 210623B
Council Ref: DA/1656/2020
RFS Ref: DA20191230001644-Original-1

Attn: Cameron Evans

Re: PROPOSED RESIDENTIAL SUBDIVISION
531 OLD PACIFIC HIGHWAY, PINNY BEACH NSW
ADDITIONAL INFORMATION

Dear Cameron,

The NSW Rural Fire Service (NSW RFS) issued a Request for Information (RFI) in relation to this active Development Application (Council Ref: DA/1656/2020) on 15th October 2020. In reviewing this RFI the NSW RFS has raised the following issues which must be addressed:

1. An increase in Asset Protection Zone (APZ) separation is required to the south west of proposed Lots 101 and 114-116 due to the slope being assessed as 5-10° downslope which requires a separation distance of 36 metres in accordance with Table A1.12.2 of Planning for Bush Fire Protection 2019.

2. Justification for the setback proposed for the building envelope within proposed Lot 501 should be provided considering the NSW RFS has measured a slope of 18° to the south east. The shielding provided by the proposed retaining wall directly to the west of the proposed APZ could be considered.

3. The proposed development has undertaken Short Fire Run (SFR) modelling to determine the necessary APZs to meet compliance with the requirement of a maximum of 29 kW/m2 of radiant heat for future dwellings. The justifications for the use of SFR modelling, and the parameters used, were not agreed to by the NSW RFS in a pre-DA meeting as is normal practice. The NSW RFS has some concerns about the use of SFR modelling for the lots within Stage 3 interfacing Stages 6a and 6b. Specifically:

a. SFR modelling should not be used for proposed Lots 301-306 as they are likely to be directly influenced by a fully developed fire moving in from the west.

b. SFR modelling should also not be used for proposed Lots 308, 313, 334-336, as they are exposed to fire runs greater than 150 metres (m).

c. SFR modelling can be used for the remainder of lots in Stage 3 along the interface with Stages 6a and 6b, however, minimum setbacks should be outside of the SFR modelled flame height/length. This is considered necessary in this instance due to the height of the SFR modelled flames, the likelihood of embers from the hazard to the west igniting multiple fires, the presence of nearby fire runs greater than 150m, the steep slopes involved and the resulting likelihood of canopy involvement.

4. The proposed emergency access arrangements for access to Scenic Drive are not supported in this situation, given the proposed public road(s) servicing the subdivision becomes, in effect, a single point for entry and exit to the site. The provision of a safe through access should form one of the main bush fire protection measures for the site considering the high bush fire risk and the number of lots proposed, and should not be restricted for use during a bush fire emergency. Uncertainty around the time it would take for Council or emergency services to open the proposed gate is seen as a serious risk for the effective use of the through access road during an emergency. The proposed measures would also burden these authorities with unnecessary additional responsibilities in the event of an emergency.

5. The proposed APZs on either side of the main access road are seen as insufficient given the reliance on this road for the safe evacuation of future residents. At a minimum, APZs should be provided to remove the possibility of direct flame attack. There does not seem to be any APZ proposed within Stage 5 to the south of the main road.

Building Code & Bushfire Hazard Solutions (BCBHS) has been engaged to undertake a review of the application and provide a response to the requested additional information. A representative of BCBHS has undertaken an inspection of the subject site and surrounding area.

Since the time this RFI was issued I have spoken with Mr Alastair Patton, Development Assessment and Planning Officer NSW Rural Fire Service on several occasions to ensure all concerns are addressed in this response. In addition a preliminary 'Additional Bushfire APZ Overlay' was issued to demonstrate the proposed approach to address the aforementioned items and in principle support (subject to further detail) received.

In accordance with due process we submit this information to Council in response to the above and request it be referred to the NSW RFS for their consideration.

Item 01 Response:

The Asset Protection Zone (APZ) to the southwest of proposed Lots 101 and 114-116 has been increased to 36 metres as requested.

The attached 'Overall Masterplan' and subsequent detailed stage plans prepared by ADW Johnson (ver. M, dated 15.12.20) and 'Vegetation Management Plan' prepared by ADW Johnson (rev. H, dated 16.12.20) depict the proposed modified APZs.

The modified APZs were determined from Table A1.12.2 of Planning for Bush Fire Protection 2019 (PBP), rather than the use of specialist Short Fire Run modelling.

Item 02 Response:

In response to this item the building footprint has been shifted in a northerly direction to facilitate the application of a 56 metre APZ to the south.

In addition a 24 metre APZ has been applied to the northeast.

The APZs were determined from Table A1.12.2 of PBP.

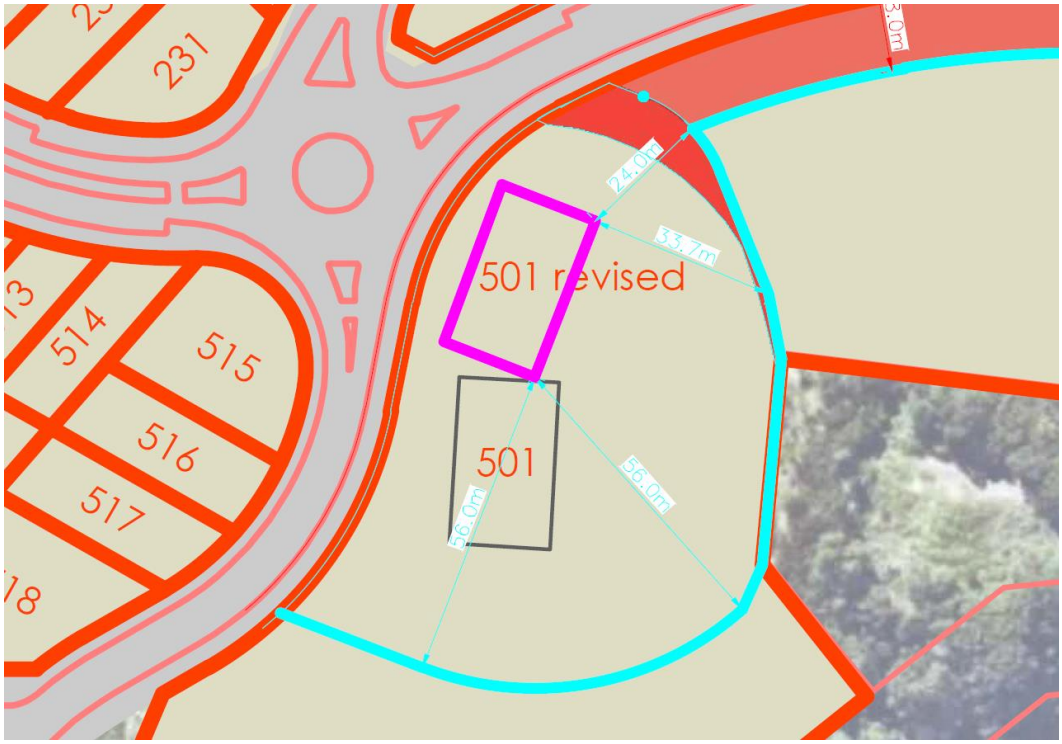

Figure 01: Extract from the 'Additional Bushfire APZ Overlay' showing the modified footprint (purple outline), previous footprint (black outline) and proposed APZ (blue outline)

Item 03 Response:

As part of this review process an additional justification to the treatment of the riparian corridor was identified, which will also present greater planning opportunities for the future dwelling applications.

An additional managed zone has been proposed within the riparian corridor adjacent Lots 301-308 which is the section identified as having steeper embankments. This additional management results in the width of the corridor constricting from 75 metres to 49 metres for this length, which will substantially alter the behaviour of a potential fire.

The riparian corridor in this area provides relatively steep embankments (15-20°), however with the additional management these embankments will provide a limited fire development period (generally less than 25m).

The most significant bushfire impact is considered to be a fully developed fire burning along the watercourse in a south-easterly direction, being influenced by the north-westerly winds associated with severe fire behaviour. This scenario attracts a Forest classification and 0 – 5 degree down slope which would result in a minimum required APZ of 29 metres as determined from Table A1.12.2 of PBP.

It is acknowledged that further southeast the riparian corridor widens to 60 - 70 metres however the topography in this area also reduces and the gradient along the watercourse remains at 0 – 5 degrees.

In response to this item in addition to the management area within the riparian zone a 29 metre APZ has been introduced along the entire length of the riparian corridor (excluding from the detention basins).

In acknowledging an effective slope of 0 – 5 degrees along the length of the riparian corridor this inclusion results in compliance with the Acceptable Solutions of Chapter 5 'Residential and Rural Residential Subdivisions' of PBP.

The attached 'Overall Masterplan' and subsequent detailed stage plans prepared by ADW Johnson (ver. M, dated 15.12.20) and 'Vegetation Management Plan' prepared by ADW Johnson (rev. H, dated 16.12.20) depict the proposed modified APZs.

In addition to the modified APZs it should be noted that to facilitate the construction of the proposed perimeter roads substantial retaining walls (2.6 - 5.6 metres) will be erected adjacent the riparian corridor (see attached Riparian Corridor Sections). These retaining walls will assist in partially shielding a fire burning within the corridor from the future dwellings.

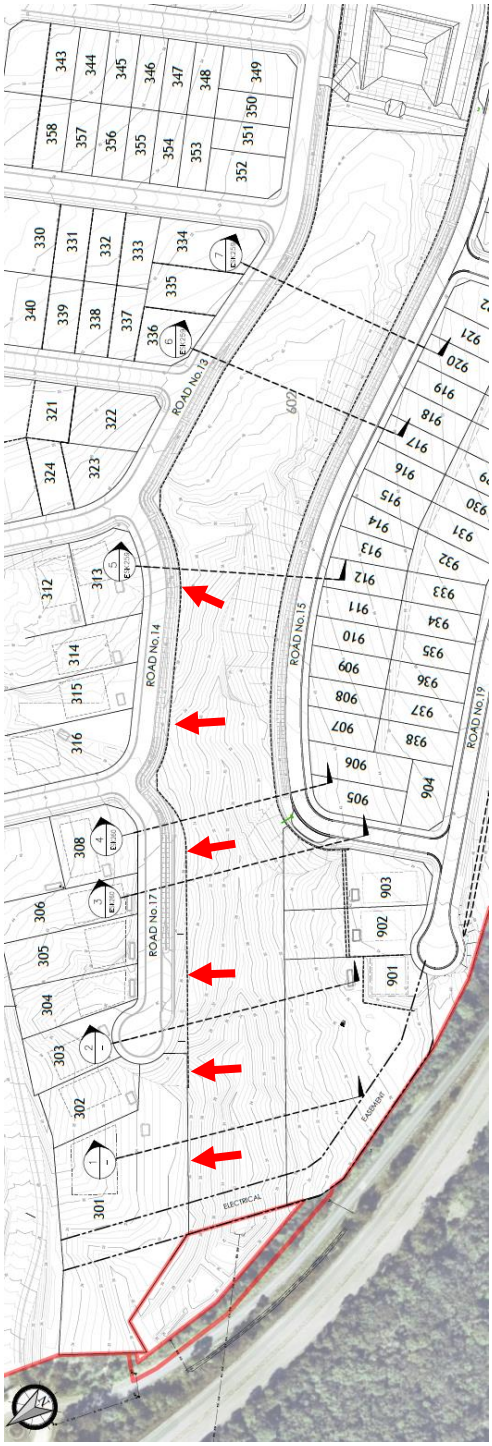

Figure 02: Extract from the Riparian Corridor Plans showing short fire run of steep embankment

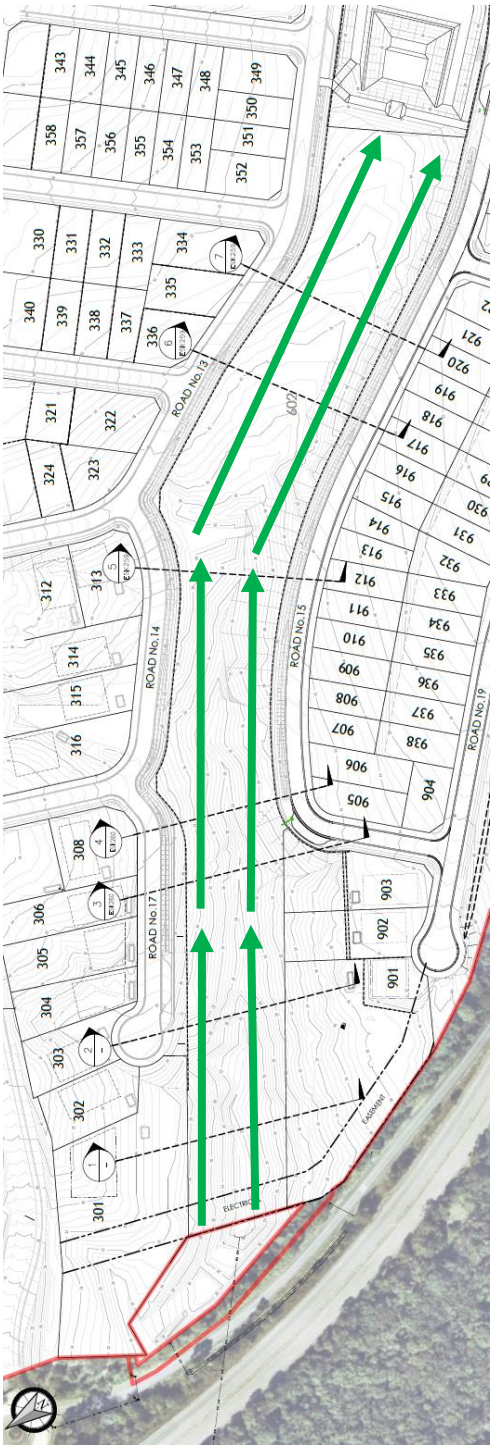

Figure 03: Extract from the Riparian Corridor Plan showing most significant fire run

Item 04 Response:

The applicant proposed a gated emergency access to Scenic Drive as a secondary access point to the Sector in line with the approved Masterplan (2717/2003/MP). The NSW RFS have required a secondary permanently and legally open egress option.

The Department of Planning, Industry and Environment (DPIE) through their Project Delivery Unit suggested the option of utilising the Old Pacific Highway as a single lane egress onto the Pacific Highway heading south as a suitable option to service the Northern Sector.

Transport for NSW (TfNSW) and the NSW RFS have endorsed this solution in principle. This solution has now been incorporated into the proposal on the understanding that this egress option will provide suitable secondary access to the whole of the Northern Sector (beyond this DA) provided that the internal layout provide two access points to any part of the sector. The applicant formally seeks acceptance from the NSW RFS regarding this.

The Staging has been amended to incorporate road 23 (previously part of DA505/2020) into this DA1656/2019 to facilitate access to the additional egress point. Both Road 23 and the egress will be provided as part of Stage 1 DA1656/2019. Road 1 from the second roundabout and the proposed gated emergency access to Scenic Drive will form part of Stage 2.

Item 05 Response:

It is understood that as the previous application effectively provided a single point of entry and exit the NSW RFS placed greater significance on the main access road. This resulted in the request to provide additional management adjacent the roadway to provide greater confidence that access would not be compromised.

In response to item 4 the application has now been modified to utilise the Old Pacific Highway as a single lane egress onto the Pacific Highway, providing a permanent alternate access option for future occupant evacuation.

Regardless in response to this item an 18 metre APZ has been provided on the southern side of the main road within Stage 5. The 18 metre APZ is consistent with the minimum required to locate the road outside the Flame Zone in accordance with Table A1.12.5.

It is noted that late evacuation, at the time flame impact could occur on any road, is actively discouraged by emergency services.

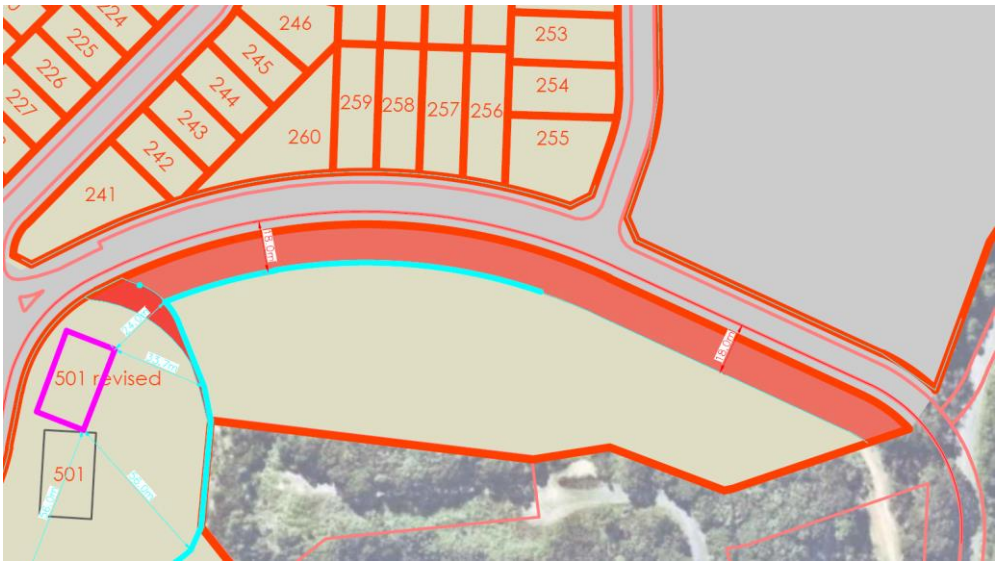

Figure 04: Extract from the 'Additional Bushfire APZ Overlay' showing the additional management area

In accordance with the bushfire safety measures contained in this statement, and consideration of the site specific bushfire risk assessment it is our opinion that when combined, they will provide a reasonable and satisfactory level of bushfire protection to the subject development and also address the concerns of the NSW Rural Fire Service.

I am available to meet either Council or the NSW Rural Fire Service should the need arise.

Should you have any enquiries regarding this project please contact me at our office.

Prepared by
Building Code & Bushfire Hazard Solutions P/L

Stuart McMonnies
Manager Bushfire Section
G. D. Design in Bushfire Prone Areas.
Certificate IV Fire Technology
Fire Protection Association of Australia BPAD – L3 Accredited Practitioner
Certification number – BPAD9400

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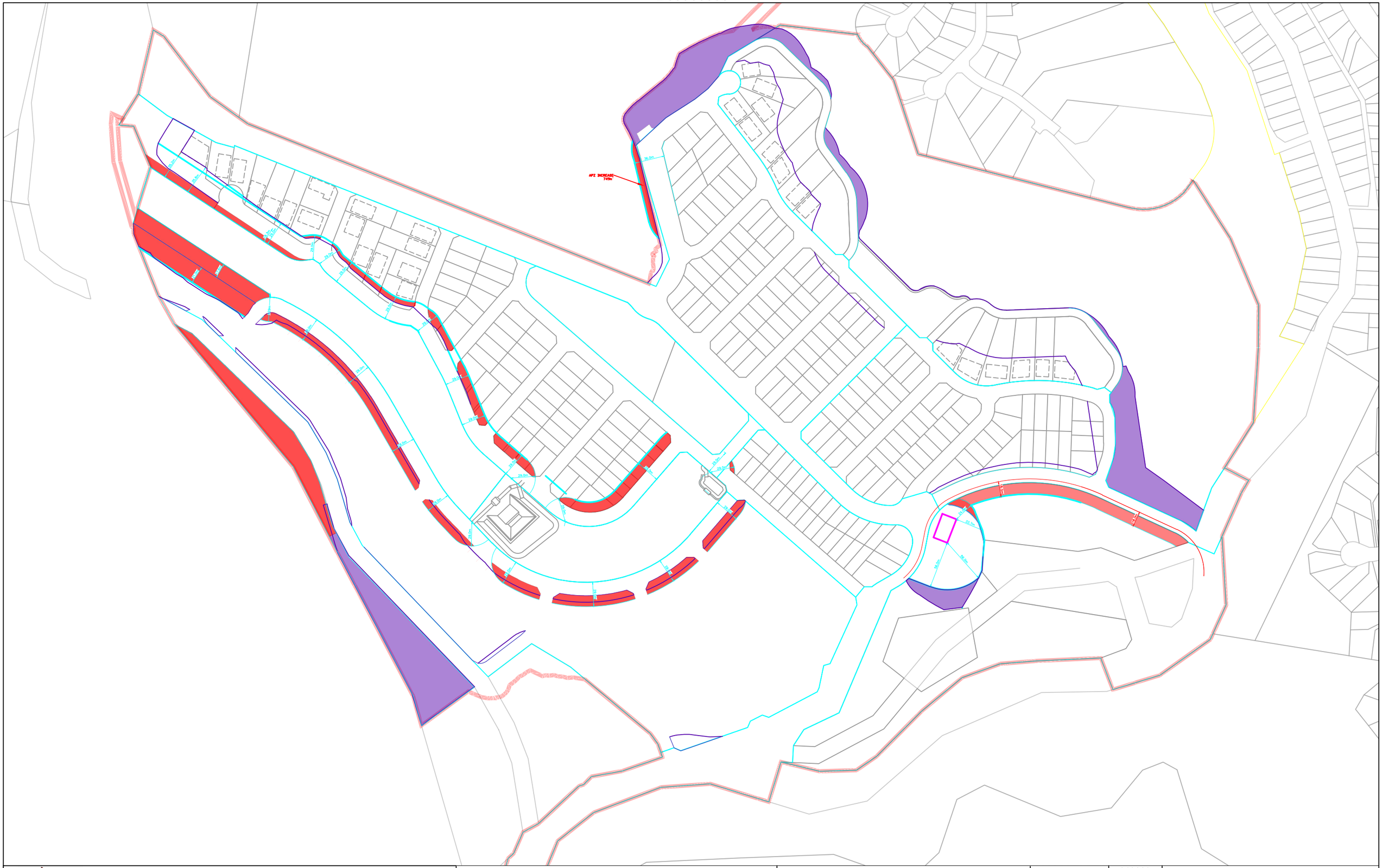

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www.bushfirehazardsolutions.com.au

SILVER MEMBER
Fire Protection Association Australia

LEGEND

APZ INCREASE

PREVIOUS APZ

NORTHERN DA1 BDYS ADDITIONAL BUSHFIRE APZ OVERLAY

REFERENCE NO.	210623	LOCATION: NORTH WALLARAH PENINSULAR			
ADDRESS	531 OLD PACIFIC HIGHWAY, PINNY BEACH NSW				
DATE.	01/12/2020	DRAWN BY	IT	SCALE: NTS	
REVISION	DA1	REVISION DATE	18/12/2020	MGA20C/56	
CLIENT	NORTHERN MANAGERS & CONSTRUCTION PTY LTD & WAKEFIELD ASHURST DEVELOPMENTS PTY LTD				

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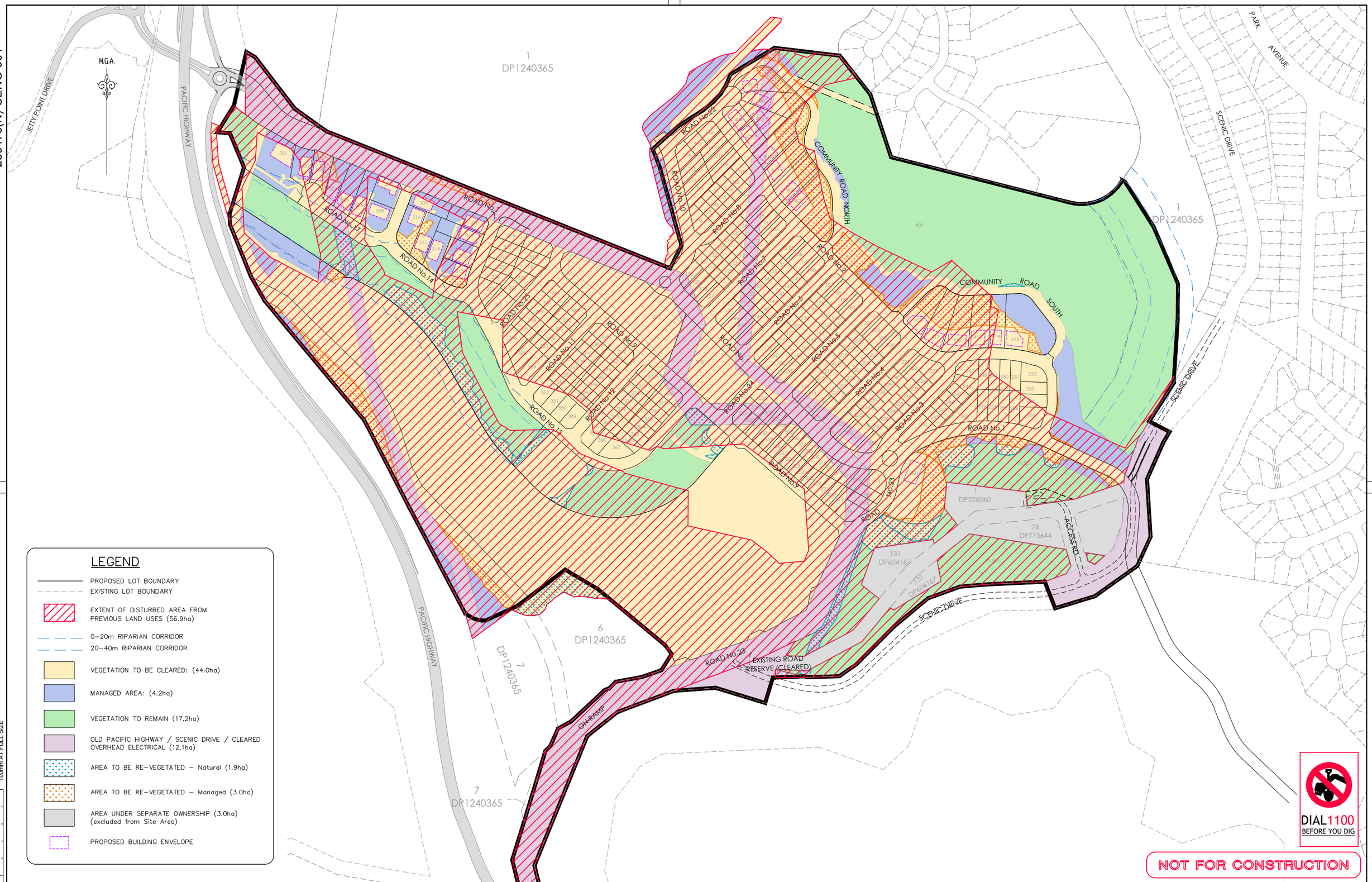

LEGEND

- PROPOSED LOT BOUNDARY
- EXISTING LOT BOUNDARY
- EXTENT OF DISTURBED AREA FROM PREVIOUS LAND USES (56.9ha)
- 0–20m RIPARIAN CORRIDOR
- 20–40m RIPARIAN CORRIDOR
- VEGETATION TO BE CLEARED: (44.0ha)
- MANAGED AREA: (4.2ha)
- VEGETATION TO REMAIN (17.2ha)
- OLD PACIFIC HIGHWAY / SCENIC DRIVE / CLEARED OVERHEAD ELECTRICAL (12.1ha)
- AREA TO BE RE-VEGETATED – Natural (1.9ha)
- AREA TO BE RE-VEGETATED – Managed (3.0ha)
- AREA UNDER SEPARATE OWNERSHIP (3.0ha) (excluded from Site Area)
- PROPOSED BUILDING ENVELOPE

DIAL1100 BEFORE YOU DIG

NOT FOR CONSTRUCTION

REV.	DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED
A		NOT ISSUED				
B	16.08.19	ISSUED FOR INFORMATION	JD	JD	ND	LB
C	05.09.19	ISSUED FOR APPROVAL	JD	JD	ND	LB
D	01.10.19	ISSUED FOR APPROVAL	JD	JD	ND	LB
E	15.10.19	ISSUED FOR DA	JD	JD	ND	LB
F	06.08.20	STAGE BDYS, VMP AMENDED	JD	JD	ND	LB
G	01.09.20	CLIENT AMENDMENTS	JD	JD	ND	LB
H	16.12.20	STAGING AMENDED	JD	JD	ND	LB

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SCALES: NOT TO SCALE

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Fax: (02) 4305 4399
email: coast@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: WAKEFIELD ASHURST

PROPERTY DESCRIPTION: LOTS 2,3,4,5,7 & 8 D.P.1240365, LOT 3 D.P.1090495 NORTHERN SECTOR, WALLARAH PENINSULA

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: CENTRAL PRECINCT

PLAN TITLE: VEGETATION MANAGEMENT PLAN

PROJECT No.	DISCIPLINE	NUMBER	REV.
239475(N)	CENG	004	H

100mm AT FULL SIZE

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NSW RURAL FIRE SERVICE

Lake Macquarie City Council
Box 1906
HUNTER REG MAIL CENTRE NSW 2310

Your reference: DA/1656/2019
Our reference: DA20191230001644-CL55-1

ATTENTION: Cameron Evans

Date: Friday 12 February 2021

Dear Sir/Madam,

Integrated Development Application
s100B – Subdivision – Torrens Title Subdivision
531 Old Pacific Highway Pinny Beach NSW 2281, 1//DP1240365

I refer to your correspondence dated 24/12/2020 seeking general terms of approval for the above Integrated Development Application.

The New South Wales Rural Fire Service (NSW RFS) has considered the information submitted. General Terms of Approval, under Division 4.8 of the *Environmental Planning and Assessment Act 1979*, and a Bush Fire Safety Authority, under section 100B of the *Rural Fires Act 1997*, are now issued subject to the following conditions:

Asset Protection Zones
Intent of measures: to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact. To achieve this, the following conditions shall apply:

1. At the issue of a subdivision certificate, and in perpetuity to ensure ongoing protection from the impact of bush fires, the areas designated as 'Vegetation to be cleared' and 'Managed area', with the exception of the areas designated 'Area to be revegetated - Natural', in the *Vegetation Management Plan* prepared by ADW Johnson (revision H, dated 16 December 2020) must be managed as an inner protection area (IPA) in accordance with the requirements of Appendix 4 of *Planning for Bush Fire Protection 2019*. Where this IPA is located on community title lots, a suitably worded instrument(s) must be created pursuant to section 88 of the *Conveyancing Act 1919* which requires each area to be continued to be managed as an IPA. When establishing and maintaining an IPA the following requirements apply:

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m;
- preference should be given to smooth barked and evergreen trees;
- large discontinuities or gaps in vegetation should be provided to slow down or break the progress of fire towards buildings;

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NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address
NSW Rural Fire Service
4 Murray Rose Ave
SYDNEY OLYMPIC PARK NSW 2127

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F (02) 8741 5550
www.rfs.nsw.gov.au

- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed

Access – Public Roads
Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area. To achieve this, the following conditions shall apply:

2. Access roads must comply with the following general requirements of Table 5.3b of *Planning for Bush Fire Protection 2019* and the following:

- subdivisions of three or more allotments have more than one access in and out of the development;
- traffic management devices are constructed to not prohibit access by emergency services vehicles;
- 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;
- all roads are through roads;
- dead end roads are not recommended, but if unavoidable, 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;
- where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;
- where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system;
- one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression;
- the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.
- hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;
- hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and
- there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.

3. Perimeter roads, including the proposed community title perimeter roads must comply with the general requirements of Table 5.3b of *Planning for Bush Fire Protection 2019* and the following:

- are two-way sealed roads;
- minimum 8m carriageway width kerb to kerb;
- parking is provided outside of the carriageway width;
- hydrants are located clear of parking areas;
- are through roads, and these are linked to the internal road system at an interval of no greater than 500m;
- curves of roads have a minimum inner radius of 6m;
- the maximum grade road is 15 degrees and average grade of not more than 10 degrees;
- the road crossfall does not exceed 3 degrees; and
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

4. Non-perimeter roads must comply with the general requirements of Table 5.3b of *Planning for Bush Fire Protection 2019* and the following:

- minimum 5.5m carriageway width kerb to kerb;

- parking is provided outside of the carriageway width;
- hydrants are located clear of parking areas;
- roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;
- curves of roads have a minimum inner radius of 6m;
- the road crossfall does not exceed 3 degrees; and
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

5. The proposed Old Pacific Highway egress option must be permanently and legally open at all times prior to the issue of a subdivision certificate.

Water and Utility Services
Intent of measures: 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:

6. The provision of water, electricity and gas must comply the following in accordance with Table 5.3c of *Planning for Bush Fire Protection 2019*:

- reticulated water is to be provided to the development where available;
- fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard *AS 2419.1:2005*;
- hydrants are and not located within any road carriageway;
- reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads;
- fire hydrant flows and pressures comply with the relevant clauses of *AS 2419.1:2005*;
- all above-ground water service pipes are metal, including and up to any taps;
- where practicable, electrical transmission lines are underground;
- where overhead, electrical transmission lines are proposed as follows:

1. lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and
2. no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

- reticulated or bottled gas is installed and maintained in accordance with *AS/NZS 1596:2014* and the requirements of relevant authorities, and metal piping is used;
- reticulated or bottled gas is installed and maintained in accordance with *AS/NZS 1596:2014* - The storage and handling of LP Gas, the requirements of relevant authorities, and metal piping is used;
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10 m and shielded on the hazard side;
- connections to and from gas cylinders are metal; polymer-sheathed flexible gas supply lines are not used; and
- above-ground gas service pipes are metal, including and up to any outlets.

General Advice – Consent Authority to Note

Development applications lodged on lots created within this subdivision may be subject to further assessment under the *Environmental Planning & Assessment Act 1979*.

For any queries regarding this correspondence, please contact Alastair Patton on 1300 NSW RFS.

Yours sincerely,

Kalpana Varghese
Team Leader, Dev. Assessment & Planning
Planning and Environment Services

NSW RURAL FIRE SERVICE

BUSH FIRE SAFETY AUTHORITY

Subdivision – Torrens Title Subdivision
531 Old Pacific Highway Pinny Beach NSW 2281, 1//DP1240365
RFS Reference: DA20191230001644-CL55-1
Your Reference: DA/1656/2019

This Bush Fire Safety Authority is issued on behalf of the Commissioner of the NSW Rural Fire Service under s100b of the Rural Fires Act (1997) subject to the attached General Terms of Approval.

This authority confirms that, subject to the General Terms of Approval being met, the proposed development will meet the NSW Rural Fire Service requirements for Bush Fire Safety under *s100b of the Rural Fires Act 1997.*

Kalpana Varghese
Team Leader, Dev. Assessment & Planning
Planning and Environment Services

Friday 12 February 2021