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ECOLOGY | OFFSETS | BUSHFIRE | ARBORICULTURE

Bushfire Threat Assessment

Proposed Residential Rural Subdivision
53 Macquarie Street, Coopernook, NSW

Prepared for: Tony Fish
Midcoast Town Planning

AEP Ref: 3191
Revision: 01
September 2023

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Document Control

Document Name	Bushfire Threat Assessment for a Residential Subdivision, located at 53 Macquarie St, Coopernook, NSW
Project Number	3191
Client Name	Midcoast Town Planning Pty Ltd c/o Tony Fish
AEP Project Team	Kara Dunn, Oscar Anderson, Natalie Black

Revision

Revision	Date	Author	Reviewed	Approved
00	31/08/2023	Oscar Anderson	Natalie Black	Natalie Black
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Distribution

Revision	Date	Name	Organisation
00	31/08/2023	Tony Fish	Midcoast Town Planning
01	17/09/2023	Tony Fish	Midcoast Town Planning

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1.0 Introduction

A Residential Subdivision is proposed within land identified as 53 Macquarie St, Coopernook, NSW (the Subject Site). At the request Midcoast Planning (the client), Anderson Environment & Planning (AEP) have undertaken the necessary investigations to inform the production of a Bushfire Threat Assessment (BTA) report addressing the proposed development.

This report is specifically intended to assess the bushfire protection measures required by the NSW Rural Fire Service's "Planning for Bushfire Protection 2019" (The PBP) and the construction requirements of the proposed development in accordance with the provisions of the Building Code of Australia – Volume 2, Edition 2010 and Australian Standard 3959-2021 (AS 3959) – "Construction of buildings in bushfire-prone areas".

The proposal will involve the subdivision for residential purposes, Council has required a Bushfire Threat Assessment be undertaken to enable the development to proceed. It is noted that the Subject Site is not mapped Bushfire Prone Lands.

For the purposes of referencing, this document should be referred to as:

Anderson Environment & Planning (2023). Bushfire Threat Assessment for Proposed Residential Infill Development at 53 Macquarie St, Coopernook, NSW. Unpublished report for Tony Fish, August 2023.

2.0 Site Particulars

The proposed residential infill development is described as follows.

Table 1 – Site Particulars

Item	Comments
Client	Tony Fish – Midcoast Town Planning
Address	53 Macquarie St, Coopernook, NSW.
Title(s)	Lot 1 DP32272, Lot 9 DP32272, Lot 101 DP 1256572 & Lot 102 DP1256572
Study Area	The study area consists of agricultural enterprises and cultivation grazing lands, remnant native vegetation exists in patches within this area. The Manning River traverses through his landscape.
Subject Site	17.64ha
LGA	Mid-Coast Council
Zoning	RU5: Village, RU1: Primary Production
Current Land Use	The Subject Site comprises four lots. Lot 102/1256572 contains a home and associated infrastructure, managed gardens and planted natives and exotics with a managed understory. The remaining three lots contain primarily cleared land used for pasture and agistment.
Surrounding Land Use	Surrounding land use includes residential development to the east of the site, cleared pasture for cattle with scattered native and exotic canopy trees to the north and west, and some cleared paddocks with Wet Sclerophyll Forest to the south and south west of the Subject Site.

Figure 1 depicts the extent of the Subject Site overlain on an aerial photograph of the locality.

3.0 Proposed Development

The proposed Residential Subdivision for 98 Lots and the construction of civil services including, water, power and sewer.

Figure 2 depicts the plan of proposed development within the Subject Site.

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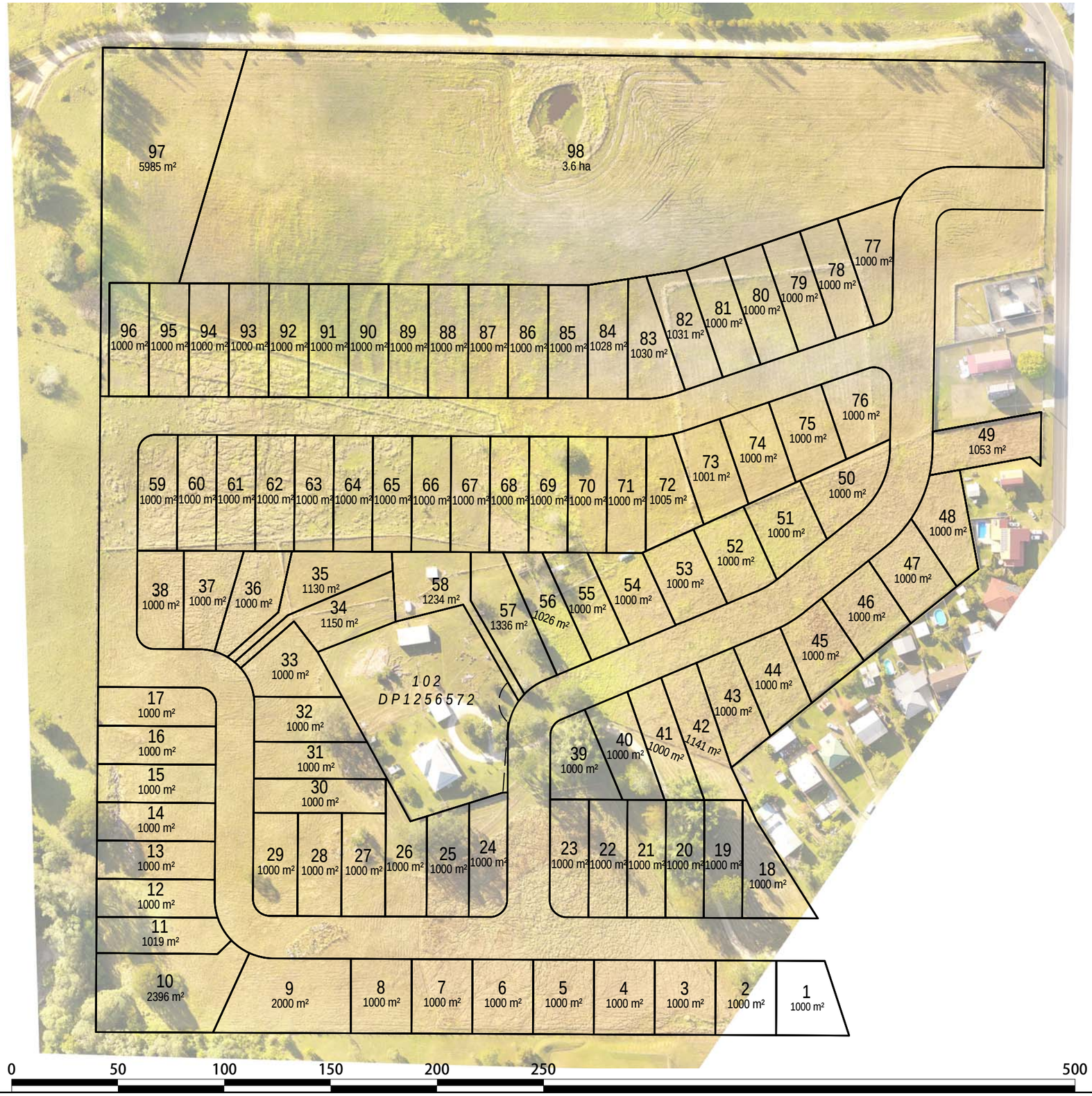
Figure 1 - Site Location

Date: March 2023

Location: 53 Macquarie Street, Coopernook, NSW

Client: PDA Planning

AEP Ref: 3191



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PROJECT -
COOPERNOOK SUBN
CLIENT -
Coopernook Projects Pty Ltd

PLAN OF PROPOSED LOT LAYOUT
53 MACQUARIE STREET, COOPERNOOK

SCALE 1:2000
DATUM - AHD
DATE 09/08/2023

JOB No. 4150
DWG No. 001

AMENDMENTS	DATE	BY	AMENDMENTS	DATE	BY
LOT 39-42, 56-57 MINOR AMENDS	09.08.23	FC			

4.0 Bushfire Hazard Assessment

4.1 Bushfire Prone Land Mapping

Examination of the NSW Planning Portal (2021) Bushfire Prone Land Mapping confirmed that the Subject Site is not mapped Bushfire Prone Land. Council has requested this assessment. As best practiced Appendix 1 of the PBP has been used to undertake an assessment.

Appendix 1 of the PBP provides the steps required to determine the level of bushfire hazard that applies to the Subject Site. Factors influencing the hazard level include:

- The formation of vegetation surrounding the Subject Site (as defined by Keith 2004);
- The distance between vegetation and the Subject Site (or proposed buildings therein);
- The effective slope for each patch of vegetation; and
- The Fire Danger Index (FDI) of the council area within which the development occurs.

These factors together provide an indication of the level of threat posed to the development from any vegetation retained within the Subject Site and surrounding vegetation in the event of a bushfire, and the required mitigation measures to be taken in the form of Asset Protection Zones (APZs) and building construction standards. These measures are detailed further in **Section 5** below.

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Figure 3 - Bushfire Prone Land Mapping

Date: March 2023

Location: 53 Macquarie Street, Coopernook, NSW

Client: PDA Planning

AEP Ref: 3191

4.2 Vegetation and Slope Analysis

The Subject Site and surrounds occur within the Greater Hunter Region, with existing vegetation subsequently classified with a Fire Danger Index (FDI) of 100 as per NSW Rural Fire Service (2017) NSW Local Government Areas FDI.

Vegetation communities present within the 140m surrounding the development and slope assessment within 100m from hazard vegetation are shown in **Table 2** and **Figure 4.**

Table 2 – Hazard Vegetation and Slope Assessment

Aspect	Hazard Vegetation (140m)	Slope (100m)	Asset Protection Zone (m)
North	Cleared / Managed and Grassland	Flat / Upslope	10m
North East	Cleared / Managed and Grassland	Flat / Upslope	10m
East	Cleared / Managed	Flat / Upslope	0m
South East	Cleared / Managed and Forest Wetland	Flat / Upslope	10m
South	Cleared / Managed and Forest	Downslope >5-10	36m
South West	Forest	Downslope >5-10	36m
West	Grassland	Flat / Upslope	10m
North West	Grassland	Flat / Upslope	10m

Appendix A contains photos showing the vegetation types within the 140m vegetation assessment buffer around the Subject Site.

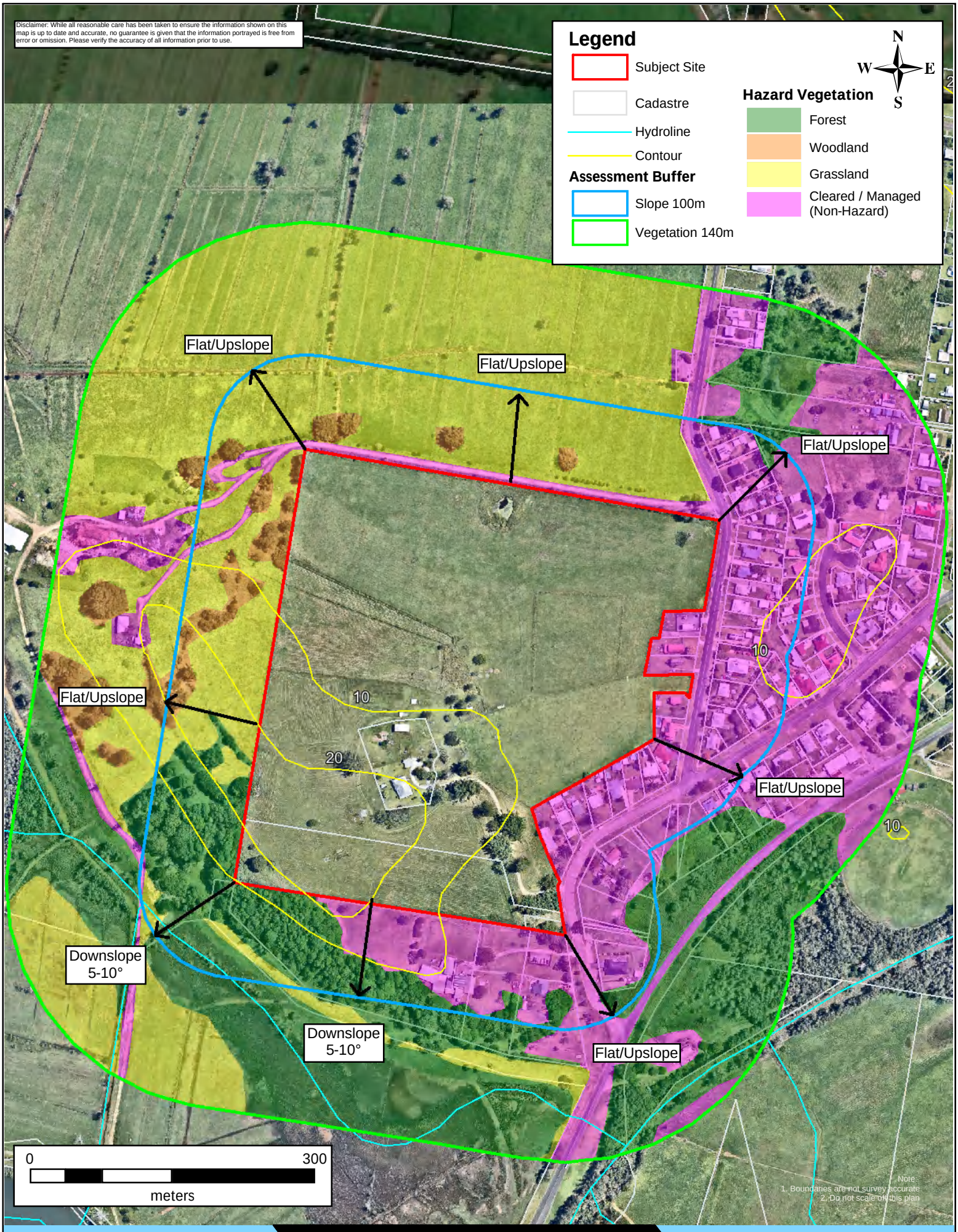

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Figure 4 - Vegetation and Slope Assessment

Date: March 2023

Location: 53 Macquarie Street, Coopernook, NSW

Client: PDA Planning

AEP Ref: 3191

4.3 PBP Performance Criteria Assessment – Infill Development

The PBP, 2019 refer to residential and rural subdivision is defined as the division of land into two or more parts that, after the division, would be adapted for separate occupation, use or disposition. The definition of the term subdivision in the EP&A Act also includes boundary adjustments. A BFSA is required from the NSW RFS for subdivision on BFPL under RF Act. This development is not on BRPL however Council are requiring an assessment, to ensure best practice section 5.3 of the PBP has been used to assess the proposal (refer to **Table 3**).

Table 3 – Performance Criteria Measures for Infill Development

Performance Criteria	Acceptable Solutions	Assessments
Assets Protection Zones		
Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 for all lots with the exception of Lots 9 and 10.
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.	APZs are managed in accordance with the requirements of Appendix 4.
The APZs is provided in perpetuity.	APZs are wholly within the boundaries of the development site	APZs are wholly within the boundaries of the development site
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees.	APZs are located on lands with a slope less than 18 degrees.
Landscape		
Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Landscaping is in accordance with Appendix 4.	Landscaping should be planted in accordance with Appendix 4.
	Fencing is constructed in accordance with section 7.6.	Fencing should be constructed in accordance with section 7.6.

Performance Criteria	Acceptable Solutions	Assessments
Access (General Requirements)		
Firefighting vehicles are provided with safe, all-weather access to structures.	Property access roads are two-wheel drive, all-weather roads.	Property access roads are two-wheel drive, all-weather roads.
	Perimeter roads are provided for residential subdivisions of three or more allotments.	Perimeter roads are not provided.
	Subdivisions of three or more allotments have more than one access in and out of the development.	The subdivision has two accesses.
	Traffic management devices are constructed to not prohibit access by emergency services vehicles.	Traffic management devices should be as 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.	Maximum grades for sealed roads should 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.	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.	Not applicable
	Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.	Where kerb and guttering should be 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	Not Applicable

Performance Criteria	Acceptable Solutions	Assessments
	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.	Not Applicable
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.	The capacity of perimeter and non-perimeter road surfaces and any bridges/causeways should be sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/ causeways are to clearly indicate load rating.
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.	Hydrants should be 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 2419.1:2021 - Fire hydrant installations System design, installation and commissioning.	Hydrants should be provided in accordance with the relevant clauses of AS 2419.1:2021 - Fire hydrant installations System design, installation and commissioning.
	There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	Not applicable
Perimeter Roads		
Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational	Are two-way sealed roads.	All roads are two-way sealed roads.
	Minimum 8m carriageway width kerb to kerb.	Minimum 8m carriageway width kerb to kerb.
	Parking is provided outside of the carriageway width.	Parking should be provided outside of the carriageway width.
	Hydrants are located clear of parking areas.	Hydrants should be located clear of parking areas.

Performance Criteria	Acceptable Solutions	Assessments
environment for emergency service personnel during Firefighting and emergency management on the interface.	Are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	All through roads 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.	Curves of roads should have a minimum inner radius of 6m.
	The maximum grade road is 15 degrees and average grade of not more than 10 degrees.	The maximum grade of the road should be 15 degrees and average grade of not more than 10 degrees.
	The road crossfall does not exceed 3 degrees.	The road crossfall should not exceed 3 degrees.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, should be provided.
Non-Perimeter Roads		
Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	Minimum 5.5m carriageway width kerb to kerb.	Minimum 5.5m carriageway width kerb to kerb should be provided.
	Parking is provided outside of the carriageway width.	Parking should be provided outside of the carriageway width.
	Hydrants are located clear of parking areas.	Hydrants should be 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.	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.	Curves of the roads should have a minimum inner radius of 6m.
	The road crossfall does not exceed 3 degrees.	The road crossfall should not exceed 3 degrees.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	A minimum vertical clearance should be 4m to any overhanging obstructions, including tree branches, is provided.
Property Access		
Firefighting vehicles can access the dwelling and exit the property safely	There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most	All lots comply with unobstructed access requirements.

Performance Criteria	Acceptable Solutions	Assessments
	distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.	
In circumstances where this cannot occur, the following requirements apply:	Minimum 4m carriageway width.	Minimum 4m carriageway width should be provided.
	In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay.	All access roads are though grasslands or managed lands.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches.	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches should be provided.
	Provide a suitable turning area in accordance with Appendix 3.	Not Applicable.
	Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress.	Curves should have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress.
	The minimum distance between inner and outer curves is 6m.	The minimum distance between inner and outer curves should be 6m.
	The crossfall is not more than 10 degrees.	The crossfall should be no more than 10 degrees.
	Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.	Maximum grades for sealed roads should not exceed 15 degrees and not more than 10 degrees for unsealed roads.
	A development comprising more than three dwellings has access by dedication of a road and not by right of way.	Provided in the layout.
Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide,		Not applicable

Performance Criteria	Acceptable Solutions	Assessments
extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.		
Water Services		
Adequate water supplies is provided for firefighting purposes	Reticulated water is to be provided to the development where available.	Reticulated water is provided to the development where available.
	A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed.	Not Applicable.
	Static water supplies shall comply with Table 5.3d.	Not Applicable.
Water supplies are located at regular intervals; and the water supply is accessible and reliable for firefighting operations.	Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2021.	Fire hydrant, spacing, design and sizing should comply with the relevant clauses of Australian Standard AS 2419.1:2021.
	Hydrants are not located within any road carriageway.	Hydrants should not be located within any road carriageway.
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	Reticulated water supply to urban subdivisions should a ring main system for areas with perimeter roads.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2021.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2021.
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps.	All above-ground water service pipes are metal, including and up to any taps.
	Above-ground water storage tanks shall be of concrete or metal.	Above-ground water storage tanks shall be of concrete or metal.
Electricity Services		
Location of electricity services limits the possibility of ignition	Where practicable, electrical transmission lines are underground.	Where practicable, electrical transmission lines are underground.

Performance Criteria	Acceptable Solutions	Assessments
of surrounding bush land or the fabric of buildings.	Where overhead, electrical transmission lines are proposed as follows: lines are installed with short pole spacing of 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 ISSC3 Guideline for Managing Vegetation Near Power Lines.	Where overhead, electrical transmission lines are proposed as follows: lines are installed with short pole spacing of 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 ISSC3 Guideline for Managing Vegetation Near Power Lines.
Gas Services		
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	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.	Reticulated or bottled gas is to be 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 10m and shielded on the hazard side.	All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side.
	Connections to and from gas cylinders are metal.	Connections to and from gas cylinders are metal.
	Polymer-sheathed flexible gas supply lines are not used.	Polymer-sheathed flexible gas supply lines are not used.
	Above-ground gas service pipes are metal, including and up to any outlets.	Above-ground gas service pipes are metal, including and up to any outlets.
Water Tanks		
Residential lots (<1,000m2)	5,000L/lot	Not Applicable
Rural-residential lots (1,000-10,000m2)	10,000L/lot	Not Applicable
Large rural/lifestyle lots (>10,000m2)	20,000L/lot	Not Applicable

Performance Criteria	Acceptable Solutions	Assessments
Multi-dwelling housing (including dual occupancies)	5,000L/dwelling	Not Applicable

5.0 Bushfire Hazard Determination

5.1 Construction Standards – AS 3959-2021

As outlined above, the identification of proximate hazards post development has resulted in the need for an APZ, and hence consideration of related construction standards. APZs are not wholly achievable in the proposed development. Therefore, the proposed development must conform to the construction standards as detailed further in this section.

The Australian Standard 3959-2021 Construction of buildings in bushfire prone areas, details six (6) levels of construction standards that are required for buildings, depending upon the expected impact of a bushfire from adjacent areas. These Bushfire Attack Levels (BALs) are measured from the edge of the hazard and incorporate vegetation type and slopes (see above) to determine the relevant distance for each BAL rating (and associated construction standard).

The relationship between the expected impact of a bushfire and the BAL rating is provided in **Table 4** below.

Table 4 – BAL Construction Standard

Bushfire Attack Level	Maximum radiant heat impact (kW/m^2)	Level of construction standard under AS 3959-2021
Low		No special construction requirements
12.5	≤12.5	BAL – 12.5
19	12.6 to 19.0	BAL – 19
29	19.1 to 29	BAL - 29
40	29 to 40	BAL – 40
Flame Zone	≥40	BAL – FZ (Not deemed to satisfy provisions)

The BAL construction standards that apply to the study area are presented in **Table 5**

Table 5 – Hazard Vegetation and Slope Assessment

Aspect	Hazard Vegetation (140m)	Slope (100m)	≤12.5	19	29	40	Flame Zone
North	Cleared / Managed and Grassland	Flat / Upslope	20 -< 50	14 -< 20	10 -< 14	7 - <10	<7
North East	Cleared / Managed and Grassland	Flat / Upslope	20 -< 50	14 -< 20	10 -< 14	7 - <10	<7
East	Cleared / Managed	Flat / Upslope	Not applicable / developed land				
South East	Cleared / Managed and Forest Wetland	Flat / Upslope	40 -< 100	29 -< 40	20 -< 29	15 -< 20	< 15

Aspect	Hazard Vegetation (140m)	Slope (100m)	≤12.5	19	29	40	Flame Zone
South	Cleared / Managed and Forest	Downslope >5-10	57 -< 100	43 -< 57	31 -< 43	24 -< 31	< 24
South West	Forest	Downslope >5-10	57 -< 100	43 -< 57	31 -< 43	24 -< 31	< 24
West	Grassland	Flat / Upslope	20 -< 50	14 -< 20	10 -< 14	7 - <10	<7
North West	Grassland	Flat / Upslope	20 -< 50	14 -< 20	10 -< 14	7 - <10	<7

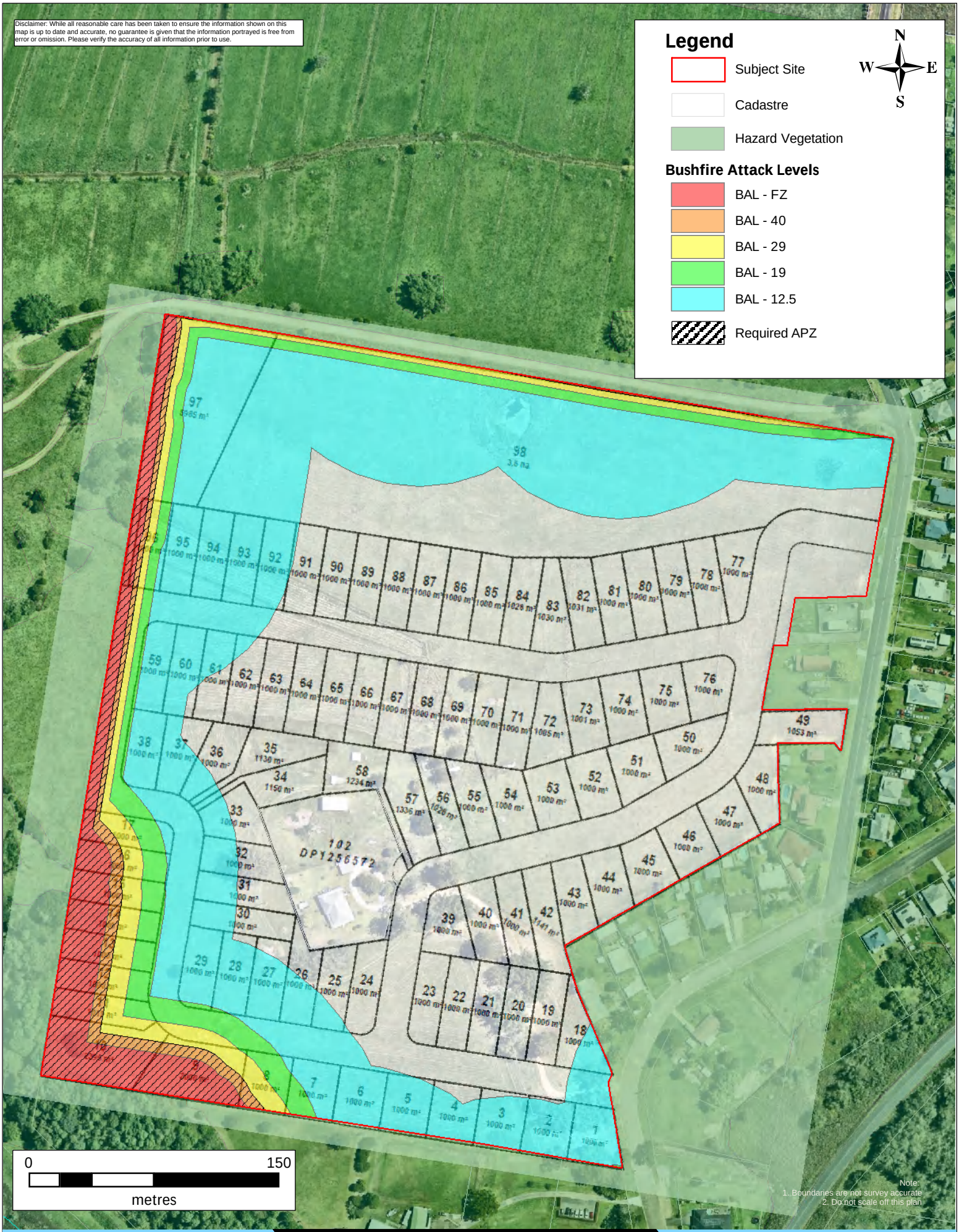

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Figure 5 - Required BALs and APZ

Date: Aug 2023

Location: 53 Macquarie Street, Coopernook, NSW

Client: Midcoast Planning

AEP Ref: 3191

6.0 Other Considerations

The following analysis applied to the Subject Site in reference to environmental features present.

Table 6 – Other Site Constraints

Item	Comments
Riparian Corridors	No hydrolines or riparian corridors are present on site.
State Environmental Planning Policy (Resilience and Hazards) 2021	No mapped Coastal Wetlands or Littoral Rainforests within the Study Area.
State Environmental Planning Policy (Biodiversity Conservation) 2021	No areas relating to State Environmental Planning Policy are mapped within the Study Area.
Areas of geological interest	No areas of geological interest are present on site.
Environmental protection zones or steep lands (>18◦)	No slope greater than 5-10 degrees, exists within the Study Area.
Land slip or flood prone areas	No mapped Land Slip or Flood Prone Areas within the Study Area.
National Parks estate or various other reserves	No reserves mapped within the Study Area
Threatened species matters	77 Threaten species (flora and fauna) are listed within 5km radius of the site
Aboriginal Heritage	None known

7.0 Conclusion

Investigations undertaken for this Bushfire Threat Assessment report have revealed that the proposed Residential Subdivision will be affected by hazard vegetation to the west and south of the Subject Site.

The proposal has non compliance with the PBP, however as the Subject Site is not mapped BFPL the PBP was a guidance tool for the assessment. AEP understands that the development will be serviced by the existing reticulated water supply and street hydrant access in accordance with AS 2419.1–2021.

The proposed development is located within an existing residential area and utilises existing public roads for access and defendable space. It is considered that the proposed access and egress arrangements are appropriate, and no issues have been identified with evacuation.

When applied, these measures may provide protection to life and property within the proposed development in the event of a bushfire. However, it can never be guaranteed that the site, residents and property therein will not at some stage be affected by a bushfire event.

8.0 References

Council LEP / DCP

Parsons Brinckerhoff (2013). *Lower Hunter Vegetation Mapping.*

NSW Government (1979). *Environmental Planning & Assessment Act 1979*. NSW Government. Sydney.

NSW Government (2021). *Planning Portal*. www.planningportal.nsw.gov.au. Accessed April 2022.

NSW Rural Fire Service (2019). *Planning for Bushfire Protection - November 2019*. NSW RFS, November 2019.

DPIE (2021). *Threatened Species, Populations and Ecological Communities website*. (https://www.environment.nsw.gov.au/threatenedSpeciesApp/)

NSW Government (1997). *Rural Fires Act 1997*. NSW Government. Sydney.

NSW Government (2008). *Rural Fires Act Regulation 2008*. NSW Government. Sydney

Standards Australia (2021). *AS-3959 Construction of Buildings in Bushfire-Prone Areas*. Council of Standards Australia, September 2021.

Standards Australia (2021). *AS-2419.1 Fire Hydrant System Design, Installation and Commissioning*. Council of Standards Australia, 2021.

Appendix A – Study Area Photos

Above: Looking east - Residential managed urban gardens and grasslands; below: Looking north-east - residential managed urban gardens and grasslands

Above: Looking north-west – woodland; below: Looking west – woodland

Above: Looking south-east - residential managed urban gardens; below: Looking south - residential managed grassland

Above and below: Looking southwest - Forest