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Bushfire Assessment

Residential Subdivision

105-135 Twelfth Avenue &
50-56 Thirteenth Avenue
Austral

Thirteenth Avenue 230 P/L

13 August 2021

(Ref: 21095)

report by
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FPA AUSTRALIA (NO.BPAD18882)
BPAD LEVEL 3 ACCREDITED PRACTITIONER
ABN 28 607 444 833

Contents

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1 Introduction

Street or property name:	105-135 Twelfth Avenue & 50-56 Thirteenth Avenue		
Suburb, town or locality:	Austral	**Postcode:**	2179
Lot/DP no:	Lots 690, 691, 706, 707, 708 & 709 DP 2475		
Local Government Area:	Liverpool City Council		
Type of development:	Residential subdivision		

1.1 Background

Thirteenth Avenue 230 Pty Ltd commissioned Peterson Bushfire to prepare a Bushfire Assessment report for a proposed residential subdivision located on land identified as bushfire prone. This report presents the assessment and recommendations to ensure compliance with the relevant bushfire protection legislation and policy.

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

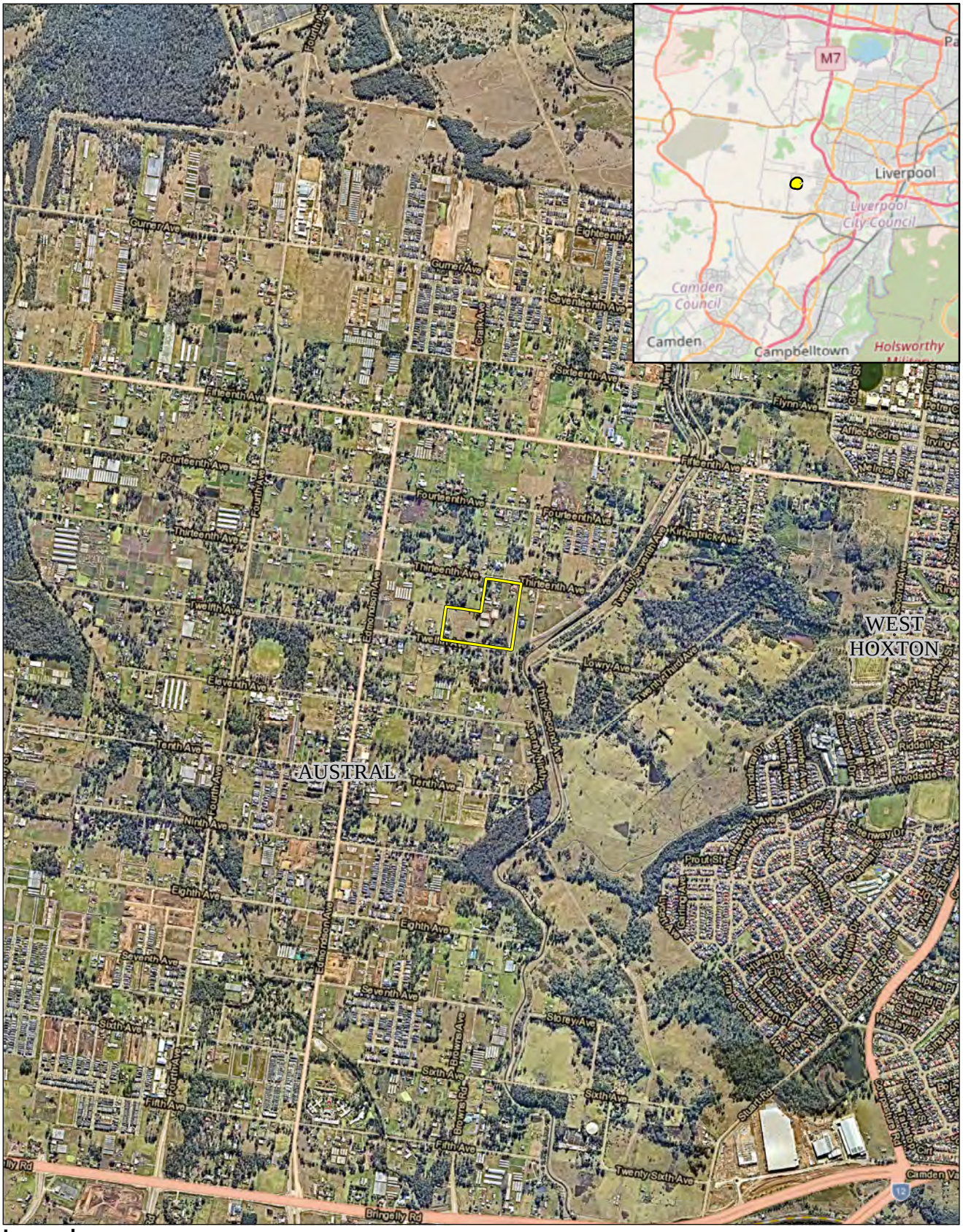
1.2 Location of subject land and development proposal

The subject land is located within the Austral and Leppington North Precinct of the South West Growth Centre at the eastern end Twelfth Avenue and Thirteenth Avenue as shown on Figure 1. Consisting of six lots and totalling an area of approximately 7.3 hectares, the subject land supports dwellings, sheds and cleared paddocks with scattered trees. The closest bushfire hazard is small remnants of woodland south of Twelfth Avenue and the potential for adjacent paddocks to the west to present a grassland hazard.

The proposal consists of the subdivision of the subject land into residential lots and public roads following the layout set by the Austral and Leppington North Precinct Indicative Layout Plan (ILP). The proposed plan of subdivision is included as Figure 2.

1.3 Assessment requirements

The subject land is identified as 'bushfire prone land' on the Liverpool Bushfire Prone Land Map (refer to Figure 3). Section 4.46 *Environmental Planning and Assessment Act 1979* requires a bushfire assessment of residential subdivision proposals on bushfire prone land following the process and methodology set out within Section 100B of the *Rural Fires Act 1997*, Clause 44 of the *Rural Fires Regulation 2013* and the NSW Rural Fire Service (RFS) document *Planning for Bush Fire Protection 2019* (referred to as 'PBP' throughout this report).



Legend

Subject Land

N

DKGIS

Date: 13/08/2021

0 250 500 1,000

Metres

Figure 1: The Location of the Subject Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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Legend

Site Plan

Future Development

Subject Land

Cadastre

N

DKGIS

Date: 13/08/2021

0 25 50 100

Metres

Figure 2: The Proposal

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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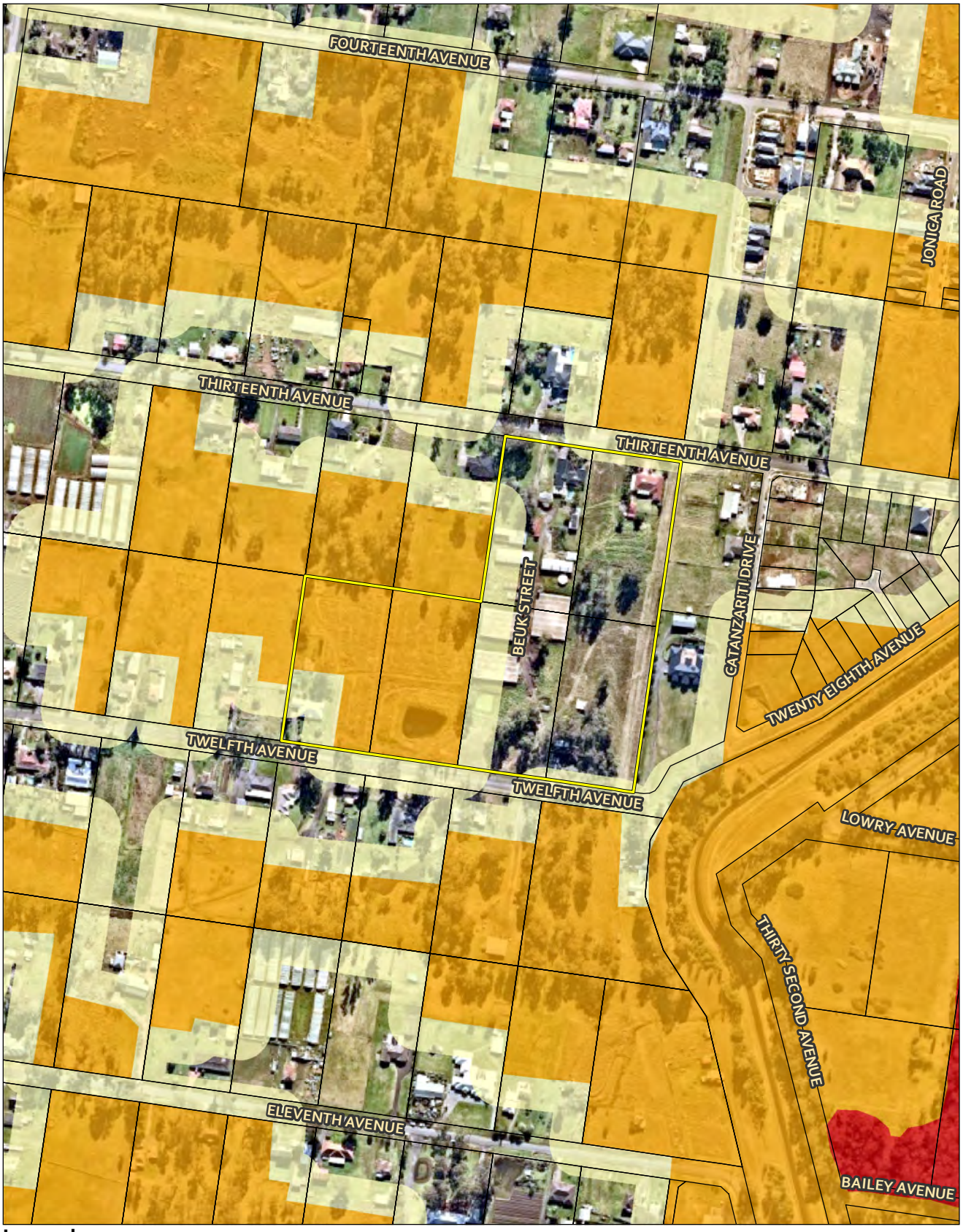

Legend

- Subject Land
- Cadastre

Bushfire Prone Land

- Vegetation Buffer
- Vegetation Category 1
- Vegetation Category 3

N

DKGIS

Date: 13/08/2021

0 25 50 100

Metres

Figure 3: Bushfire Prone Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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2 Bushfire hazard

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

2.1 Predominant vegetation

The vegetation within 140 m of the subject land has been assessed in accordance with the methodology specified within PBP. Figure 4 maps the current distribution of the identified hazards. A description of the hazards is provided below.

Low hazard woodland to the south

Patchy woodland remnants exist beyond Twelfth Avenue to the south of the subject land. Due to their small size (all less than 1 hectare) and separation between each other, they are classified as 'low hazard' vegetation. The remnants will eventually be cleared and developed in accordance with the Austral and Leppington North ILP.

Grassland to the west

The unmaintained portions of Lots 688 and 710 adjacent the western side of the subject land contain unmanaged grassland. Similarly, properties on the northern side of Thirteenth Avenue are unmanaged. These properties currently and historically have been underutilised allowing grass growth subject to periodic grazing only.

Low threat to the west

Within Lot 688 adjacent at the western end of the subject land is a small patch of woodland vegetation forming a size of less than 5,000 m^2 in area (refer to Figure 4). As this patch is less than 1 hectare in size and greater than 100 m from Category 1 hazards (such as forest and woodland), it is classified as 'low threat vegetation – exclusion' as per Section A1.10 of PBP. As such, the patch of vegetation is not considered a bushfire hazard for the purpose of this assessment.

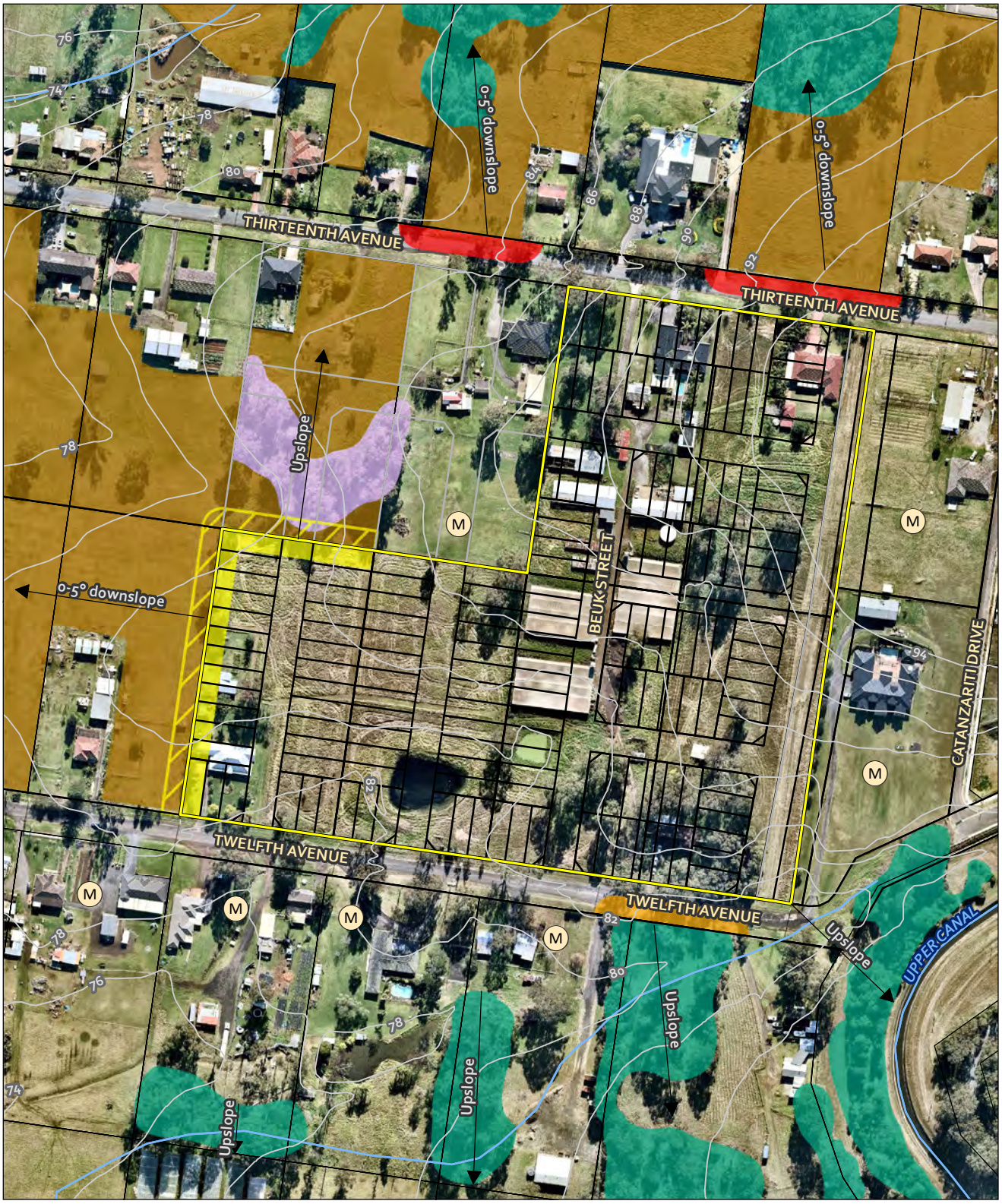
Managed lands surrounding

The remaining surrounding lands present an intensive land use that allows a 'managed land' classification. The properties identified on Figure 4 as 'managed land' support development and regular management of grass by mowing.

2.2 Effective slope

The ‘effective slope’ influencing fire behaviour has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the slope that would most influence fire behaviour where the hazard occurs within 100 m of the subject land. The slope was determined using a 2 m contour layer as shown on Figure 4.

The slope underneath the identified hazards fall into the PBP slope class of either ‘upslope/flat’ or ‘downslope 0-5 degrees’ as indicted on Figure 4.



Legend

- Watercourse
- Site Plan
- Future Development
- Subject Land
- Cadastre

Vegetation Formation

- Grassland
- Low Hazard
- Low Threat

Asset Protection Zone

- Asset Protection Zone - 10m - Option A
- Asset Protection Zone - 10m - Option B
- Asset Protection Zone - 11m
- Asset Protection Zone - 12m

N

DKGIS

Date: 13/08/2021

0 25 50 100

Metres

Figure 4: Bushfire Hazard Analysis and Asset Protection Zone

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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3 Bushfire protection measures

PBP requires the assessment of a suite of bushfire protection measures that in total provide an adequate level of protection for residential subdivision. The measures required to be assessed are listed in Table 1 below and are discussed in detail in the remainder of this section.

Table 1: PBP bushfire protection measures

Measures	Considerations
Asset Protection Zones (APZ)	Location and dimension of APZ building setbacks from vegetation including prescriptions of vegetation management within the APZ.
Access	Assessment to include access and egress, perimeter access and design standards of public roads.
Water supply and other utilities	List requirements for reticulated water supply and hydrant provisions, and any static water supplies for fire-fighting.

3.1 Asset Protection Zones (APZ)

Using the vegetation and slope information presented in Section 2 and mapped on Figure 4, Asset Protection Zones (APZ) suitable for residential subdivision have been calculated. The APZ determination is listed in Table 2 below and APZs are mapped on Figure 4.

Table 2: APZ determination

Location[1]	Vegetation[2]	Slope[3]	APZ[4]	How will the APZ be accommodated
North	Grassland	Downslope 0-5˚	12 m	Thirteenth Avenue road reserve
East	Managed	Not required	Not required	Managed properties
South	Low hazard	Upslope/ Flat	11 m	Twelfth Avenue road reserve
West Lot 688	Grassland	Upslope/ Flat	10 m	Within Lot 688 via 88b easement until Lot 688 is developed
West Lot 710	Grassland	Downslope 0-5˚	10 m	Within Lot 710 via 88b easement until Lot 710 is developed

[1] Direction of assessment from subject land. Refer to Figure 4.

[2] Predominant vegetation classification over 140 m from subject land.

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

[4] APZ required by Table A1.12.2 of Planning for Bush Fire Protection 2019 or otherwise to satisfy the performance requirement by alternate solution.

Two APZs are required:

1. A 10 m APZ is required into Lot 688. It is proposed to place the APZ within adjoining Lot 688 via an 88b easement until such time that the hazard on Lot 688 has been removed as part of subdivision construction. Should an easement not be successfully negotiated prior to the release of Subdivision Certificate, then the 10 m APZ will be placed wholly within the subject land with any impacted lots to be released as part of Stage 2.

2. A 10 m APZ is required into Lot 710. It is proposed to place the APZ within adjoining Lot 710 via an 88b easement until such time that the hazard on Lot 710 has been removed as part of subdivision construction. Should an easement not be successfully negotiated prior to the release of Subdivision Certificate, then the 10 m APZ will be placed wholly within the subject land.

   An alternate solution has been relied upon to reduce the minimum APZ from 12 m to 10 m whilst satisfying the performance requirement of PBP Table 5.3a (*potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m^2*). The model NBC Bushfire Attack Assessor V4.1 (modelling report is included at Appendix A) was used to determine the radiant heat flux based on the following:

   - The installation of a 1.8 m high non-combustible, solid-panel fence along the eastern boundary to provide the role of a radiant heat shield; and
   - Specific vegetation slope of 3 degrees downslope.

   Table 3 on the following page summarises the modelling results and how the available separation to the hazard achieves a radiant heat flux of no more than 29 kW/m^2 at the building envelope.

Table 3: APZ model summary and results

Model requirement	Input
FDI *(Determined by PBP)*	100
Effective slope under hazard *(determined by 2 m contours)*	3°
Site slope between structure and hazard *(determined by projected site gradient)*	0° (level yard post-construction)
APZ *(Provided within Lot 710 or within the subject land)*	10 m
Vegetation formation *(Determined by site assessment)*	Grassland
Overall fuel load *(Allocated to vegetation formation as per PBP)*	6 t/ha
Surface fuel load *(Allocated to vegetation formation as per PBP)*	6 t/ha
Flame temperature *(Determined by PBP for residential development)*	1090 K
Elevation of receiver *(Determined by model)*	Calculated peak
Shield height *(as proposed)*	1.8 m (minimum)
Shield width *(as proposed)*	100 m (maximum)
Output	
Radiant heat flux *(Determined by model)*	27.3 kW/m^2
Flame length *(Determined by model)*	9.57 m

3.2 Vegetation management

Earthworks and construction of the subdivision will ensure the subject land complies with the performance objectives of an Inner Protection Area (IPA) as described by Section A4.1.1 of PBP. Maintenance of APZs, proposed lots and landscaping across the subdivision, such as street trees, are to achieve the principles listed in Section A4.1.1 of PBP.

3.3 Access

3.3.1 Alternate access and egress

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

The subject land is set within a predetermined road layout of the Austral and Leppington North Precinct ILP which provides a logical public road layout that will ensure alternate access or access no longer than 200 m to the nearest through road.

The subdivision layout satisfies PBP access objectives in relation to access and egress.

3.3.2 Perimeter access

Access to the perimeter of the temporary grassland hazard to the west is not required due to the low risk presented by the adjoining paddocks and the temporary nature of the hazard. Twelfth Avenue will provide perimeter access to the low hazard remnants to the south until they are removed for development.

The subdivision layout satisfies PBP access objectives in relation to perimeter access.

3.3.3 Design and construction standards

The proposed roads have been designed in accordance with the Liverpool Growth Centre Precincts Development Control Plan (DPE 2016) DCP which also complies with the PBP Acceptable Solutions for the design and construction of public roads in bushfire prone areas (refer to PBP Table 5.3b).

Temporary turning circles will be provided at the end of no-through roads in accordance with Section 3.3.6 (5) of the DCP.

The road typology complies with the PBP Acceptable Solutions (Table 5.3b of PBP) for the design and construction of internal roads in bushfire prone areas.

3.4 Water supply and utilities

3.4.1 Water supply

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

3.4.2 Electricity supply

Electricity will be provided below ground, therefore complying with PBP.

3.4.3 Gas supply

Installation of LP gas is not proposed at the subdivision stage.

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4 Conclusion and recommendations

4.1 Summary

The proposal consists of a residential subdivision in the Austral Leppington North Precinct of the South West Growth Centre. The only hazard adjoining the subject land consists of unmanaged paddocks to the west. A variety of methods will be used to accommodate the APZ, including an option for an 88b easement on adjoining property and within the development site.

The proposed roads comply with the Liverpool Growth Centre Precincts Development Control Plan which also achieve compliance with PBP.

4.2 Conclusion

This report presents an assessment of a residential subdivision at 105-135 Twelfth Avenue and 50-56 Thirteenth Avenue, Austral. The assessment demonstrates that the proposal, together with the recommendations (see below), complies with s100B *Rural Fires Act 1997*, Clause 44 of the *Rural Fires Regulation 2013* and *Planning for Bush Fire Protection 2019*.

4.3 Recommendations

The recommendations made within this assessment are required to achieve compliance with the legislation stated above. The recommendations made are repeated below:

1. A 10 m APZ is required into Lot 688. The APZ is to be placed within adjoining Lot 688 via an 88b easement until such time that the hazard on Lot 688 has been removed as part of subdivision construction. Should an easement not be successfully negotiated prior to the release of Subdivision Certificate, then the 10 m APZ will be placed wholly within the subject land with any impacted lots to be released as part of Stage 2.

2. A 10 m APZ is required into Lot 710. The APZ is to be placed within adjoining Lot 710 via an 88b easement until such time that the hazard on Lot 710 has been removed as part of subdivision construction. Should an easement not be successfully negotiated prior to the release of Subdivision Certificate, then the 10 m APZ will be placed wholly within the subject land.

3. A 1.8 m high non-combustible, solid-panel fence is to be installed along the boundary with Lots 688 and 710 to provide the role of a radiant heat shield until the grassland hazard is removed on both Lots 688 and 710.

4. APZs are to be established and maintained to achieve the principles listed in Section A4.1.1 of PBP.

5. All proposed lots and landscaping across the subdivision, such as street trees, are to be maintained to achieve the principles listed in Section A4.1.1 of PBP.

6. The subdivision will require fire hydrants to be installed to comply with AS 2419.1 – *2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419).

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

Appendix A – Model report

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NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 12/08/2021 **Assessment Date:** 11/08/2021

Site Street Address: 105-135 Twelfth Avenue and 50-56 Thirteenth Avenue, Austral

Assessor: David Peterson; Peterson Bushfire

Local Government Area: Liverpool **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: West

Vegetation Information

Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	3 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	6	**Overall Fuel Load(t/ha):**	6
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	0 Degrees	**Site Slope Type:**	Level
Elevation of Receiver(m):	4.18	**APZ/Separation(m):**	10

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Radiant Heat Shielding Inputs

Shield Height(m):	1.8	**Shield Width(m):**	100

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg)	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	130

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	4.18
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	64439
Radiant Heat(kW/m2):	27.3	**Flame Angle (degrees):**	61
Flame Length(m):	9.57	**Maximum View Factor:**	0.411
Shielded View Factor:	0.066	**Inner Protection Area(m):**	10
Rate Of Spread (km/h):	20.79	**Outer Protection Area(m):**	0
Transmissivity:	0.873		

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