

BUSHFIRE ASSESSMENT REPORT

Proposed Residential Subdivision 101-109 Elizabeth Street, Narrandera

Prepared for Planningmatters Development Services



Bushfire Planning Australia

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BPAD-26202

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Reference: 2277 Narrandera

Version: FINAL – November 2022

Disclaimer and Limitation

This report is prepared solely for the Planningmatters Development Services (the 'Client') for the specific purposes of only for which it is supplied (the 'Purpose'). This report is not for the benefit of any other person; either directly or indirectly and is strictly limited to the purpose and the facts and matters stated in it and will not be used for any other application.

This report is based on the site conditions surveyed at the time the document was prepared. The assessment of the bushfire threat made in this report is made in good faith based on the information available to Bushfire Planning Australia at the time.

The recommendations contained in this report are considered to be minimum standards and they do not guarantee that a building or assets will not be damaged in a bushfire. In the making of these comments and recommendations it should be understood that the focus of this document is to minimise the threat and impact of a bushfire.

Finally, the implementation of the adopted measures and recommendations within this report will contribute to the amelioration of the potential impact of any bushfire upon the development, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

Document Status: 2277 - Residential Subdivision

Version	Status	Purpose	Author	Review Date
1	Draft	Draft for Review	Katrina Mukevski	14 October 2022
2	Draft	Draft for Client Review	Stuart Greville	21 November 2022
3	Draft	Final for Submission	Stuart Greville	21 November 2022

Certification

As the author of this Bushfire Threat Assessment (BAR), I certify this BAR provides the detailed information required by the NSW Rural Fire Service under Clause 45 of the Rural Fires Regulation 2022 and Appendix 2 of Planning for Bushfire Protection 2019 for the purposes of an application for a bush fire safety authority under section 100B(4) of the Rural Fires Act 1997.



Stuart Greville

Accredited Bushfire Practitioner

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Date: 21 November 2022



In signing the above, I declare the report is true and accurate to the best of my knowledge at the time of issue.



Executive Summary

Bushfire Planning Australia (BPA) has been engaged by Planningmatters Development Services (the 'Client') to undertake a Bushfire Assessment Report (BAR) for the proposed residential subdivision located at 101-109 Elizabeth Street, Narrandera (the 'subject site'); legally known as Lot 2 & 3 DP1275374. The site was formerly used by several NSW Government agencies including State Forests. Following the previous land use vacating, all structures and buildings have been removed. The site is currently cleared and devoid of any mature vegetation.

The proponent seeks development consent to create 10 new residential allotments. Each lot will be accessible from a new cul-de-sac less than 100m long and 8m wide.

The landscape, vegetation and topographic studies show that this site is subject to a low bushfire threat greater than 100m south of the site and separated by Lake Drive and Murrumbidgee River. The nearest hazard is consistent with a *forested wetland* vegetation, namely *Inland Riverine Forest* as described in the NSW Rural Fire Service document Planning for Bushfire Protection 2019 (PBP 2019). The property to the north is no longer regularly used and evidence of ongoing maintenance; including weed and regrowth management was observed. A small cemetery (< 1,800m²) adjoins the southern boundary of the site and whilst the surface vegetation (grass) was observed to be overgrown, the cemetery is not considered a hazard due to the small area and also the expectation a land use with historical and cultural significance would be remain unmanaged and neglected in perpetuity.

The BAR concludes that the hazard identified can be successfully mitigated by applying the requirements of PBP 2019, including the provision of a reliable water supply.

Measures that are applied to create compliance with PBP 2019 would reduce the vulnerability of the future buildings and occupants. Construction measures can increase the likelihood of assets to withstand most bushfires. A good access and egress strategy can also reduce the vulnerability of the development by enabling occupants to move away from a bushfire as it approaches. In this instance the

The following key recommendations have been designed to enable the proposed development to maintain an acceptable level of protection from the residual risk of a bushfire that may occur in the existing vegetation, in accordance with *Planning for Bush Fire Protection 2019*:

1. The entire site shall be managed as an Inner Protection Area (IPA) as outlined within Appendix 4 of PBP 2019 and the RFS document Standards for asset protection zones;
2. The provision of water, electricity and gas must comply with the requirements of Table 5.3c of PBP 2019;
3. All future dwellings to be constructed on the proposed lots shall have due regard to the specific considerations given in the National Construction Code: Building Code of Australia (BCA) which makes specific reference to Australian Standard AS3959-2018 Construction of buildings in bushfire prone areas (AS3959-2018) and the NASH Standard Steel Framed Construction in Bushfire Prone Areas (BAL-LOW);
4. All new lots are to be connected to a reliable water supply network and that suitable fire hydrants are located throughout the development site that are clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure shall comply with AS2419.1 2005 and section 5.3.3 of PBP 2019; and
5. Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site.

This assessment has been made based on the bushfire hazards observed in and around the site at the time of inspection and production (November 2022) and demonstrates the development has satisfied the aims and objectives of Planning for Bushfire Protection 2019.

Finally, should the above recommendations be implemented, the existing bushfire risk should be suitably mitigated to offer an acceptable level of protection to life and property for those persons and assets occupying the site, but they do not and cannot guarantee that the area will not be affected by bushfire at some time and that property and life damage/loss will not occur.





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Appendix A: Plan of Proposed Residential Subdivision

Appendix B: AHIMS Search Results

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Terms and Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419-2005	Australian Standard – Fire Hydrant Installations
AS3959-2018	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BAR	Bushfire Assessment Report
BCA	Building Code of Australia
BC Act	NSW Biodiversity Act 2016
BMP	Bush Fire Management Plan
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPL	Bush Fire Prone Land
BPLM	Bush Fire Prone Land Map
BPM	Bush Fire Protection Measures
DoE	Commonwealth Department of the Environment
DPI Water	NSW Department of Primary Industries – Water
EPA Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FDI	Fire Danger Index
FMP	Fuel Management Plan
ha	hectare
IPA	Inner Protection Area
LGA	Local Government Area
NSC	Narrandera Shire Council
OPA	Outer Protection Area
OEH	NSW Office of Environment and Heritage
PBP 2019	Planning for Bushfire Protection 2019
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation
RFS	NSW Rural Fire Service
TSC Act	NSW Threatened Species Conservation Act 1995 (as repealed)

1. Introduction

Bushfire Planning Australia (BPA) has been appointed by Planningmatters Development Services (the 'Client') to undertake a Bushfire Assessment Report (BAR) for the proposed residential subdivision located at 101-109 Elizabeth Street, Narrandera (the 'subject site'); legally known as Lot 2 & 3 DP1275374.

The assessment aims to provide a bushfire risk assessment for Stage 1 which considers and assesses the bushfire hazard and associated potential bushfire threat relevant to the proposed development on a landscape scale. The assessment outlines the minimum mitigative measures which would be required in accordance with the BAR, provisions of the New South Wales Rural Fire Service (RFS) publication *Planning for Bushfire Protection 2019* (PBP 2019) and the *Rural Fires Regulation 2013*.

1.1. Aims and Objectives

This BAR aims to assess the bushfire threat and recommends a series of bushfire protection measures that aim to minimise the risk of adverse impact of bush fires on life, property and the environment.

This assessment has been undertaken in accordance with Appendix 2 of *Planning for Bushfire Protection 2019* and clause 44 of the *Rural Fires Regulation 2013*. This assessment also addresses the aim and objectives of PBP 2019, being:

- Afford buildings and their occupants protection from exposure to a bushfire;
- Provide for a defendable space to be located around buildings;
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- Ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- Provide for ongoing management and maintenance of bushfire protection measures (BPMs); and
- Ensure that utility services are adequate to meet the needs of firefighters.

2. Site Description

Table 1: Site Description

Address	101-109 Elizabeth Street, Narrandera
Title	Lot 2 & 3 DP1275374
LGA	Narrandera Shire Council
Subject Site	1 ha
Land Use Zone	RU5 Village & RE1 Public Recreation (Figure 1)
Bushfire Prone Land	Vegetation Category 1 and Vegetation Category 3 (Figure 3)
Context	The site is irregular in shape and is located north of the Murrumbidgee River and Lake Drive. There are a couple of buildings on site and there is minimal vegetation present. The site is surrounded by neighbouring properties and a small cemetery located to the south.
Topography	Mostly flat with no more than 5° slope to the south-east of the site
Fire Danger Index	FFDI 80



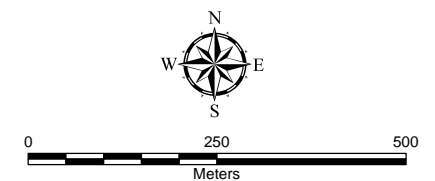
Figure 1: Land Use Zone Map (Narrandera Local Environment Plan 2013)

Figure 2 Site Location



- Subject Site
- 100m Buffer
- 140m Buffer

SOURCE:
Base Map © Department of Customer Service 2020

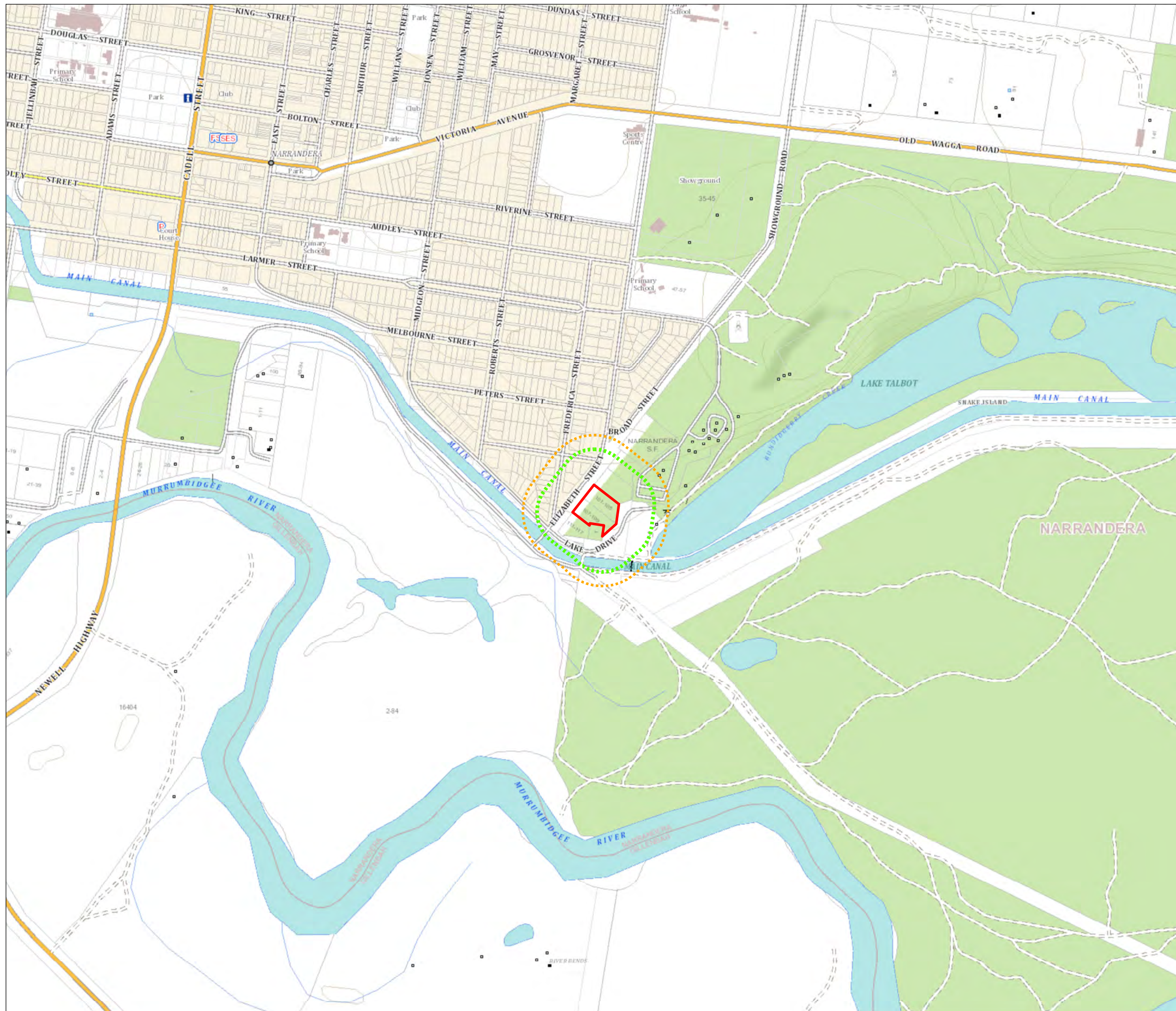


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File:2277-Narrandera-Fig1-SiteLocation-220928 Date: 28/09/2022

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2.1. Bushfire Prone Land

Bushfire activity is prevalent in landscapes that carry fuel and the two predominant bushfire types are grassland and forest fires. Factors such as topographic characteristics and quantity of fuel loads influence the intensity and spread of fire. The scale of a bushfire hazard is tailored to the characteristics of the hazard, the size and characteristics of the affected population, types of land use exposed to bushfire, predicted development growth pressures and other factors affecting bushfire risk.

Figure 3 demonstrates that the majority of the site is mapped as bushfire prone land Vegetation Buffer. There is however an isolate section of Vegetation Category 1 bushfire prone land that is mapped in the middle of the development site. Additionally, narrow corridors of Vegetation Category 1 exist along the south-western and south-eastern site boundaries that also extend beyond 100m from the site and are identified as the primary bushfire hazard.

Vegetation Buffer and non-bushfire prone land also exists to the north within 140m of the site whilst Vegetation Category 1 transitions to Vegetation Buffer and Vegetation Category 2 bushfire prone land to the south within 140m of the site.

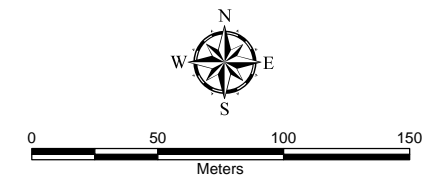


Figure 3 NSW Bush Fire Prone Land



- Subject Site
 - 140m Buffer
 - 100m Buffer
- Bushfire Prone Land**
- Vegetation Category 1
 - Vegetation Category 2
 - Buffer

SOURCE:
Cadastral Boundary: NSW Department of Finance,
Services and Innovation 2022
Aerial photo: Maxar 2021
NSW Bush Fire Prone Land: NSW Rural Fire Service
2021



A3 Scale: 1:3,000

File:2277-Narrandera-Fig2-BFPL-220928 Date: 28/09/2022

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2.2. Fire History

There is no visual evidence of bushfires at the site itself and the surrounding area.

2.3. Proposed Development

The proposed development seeks development consent for a residential subdivision that will create 10 residential allotments and associated ancillary services.

A newly constructed cul-de-sac will provide direct access to each of the proposed lots and enable ingress and egress for firefighting services and occupants in an emergency. Additionally, a new 3m wide concrete path will extend from the end of the cul-de-sac to the southern site boundary dedicated for emergency purposes only.

The plan of subdivision is contained in **Appendix A** and shown in **Figure 4**.

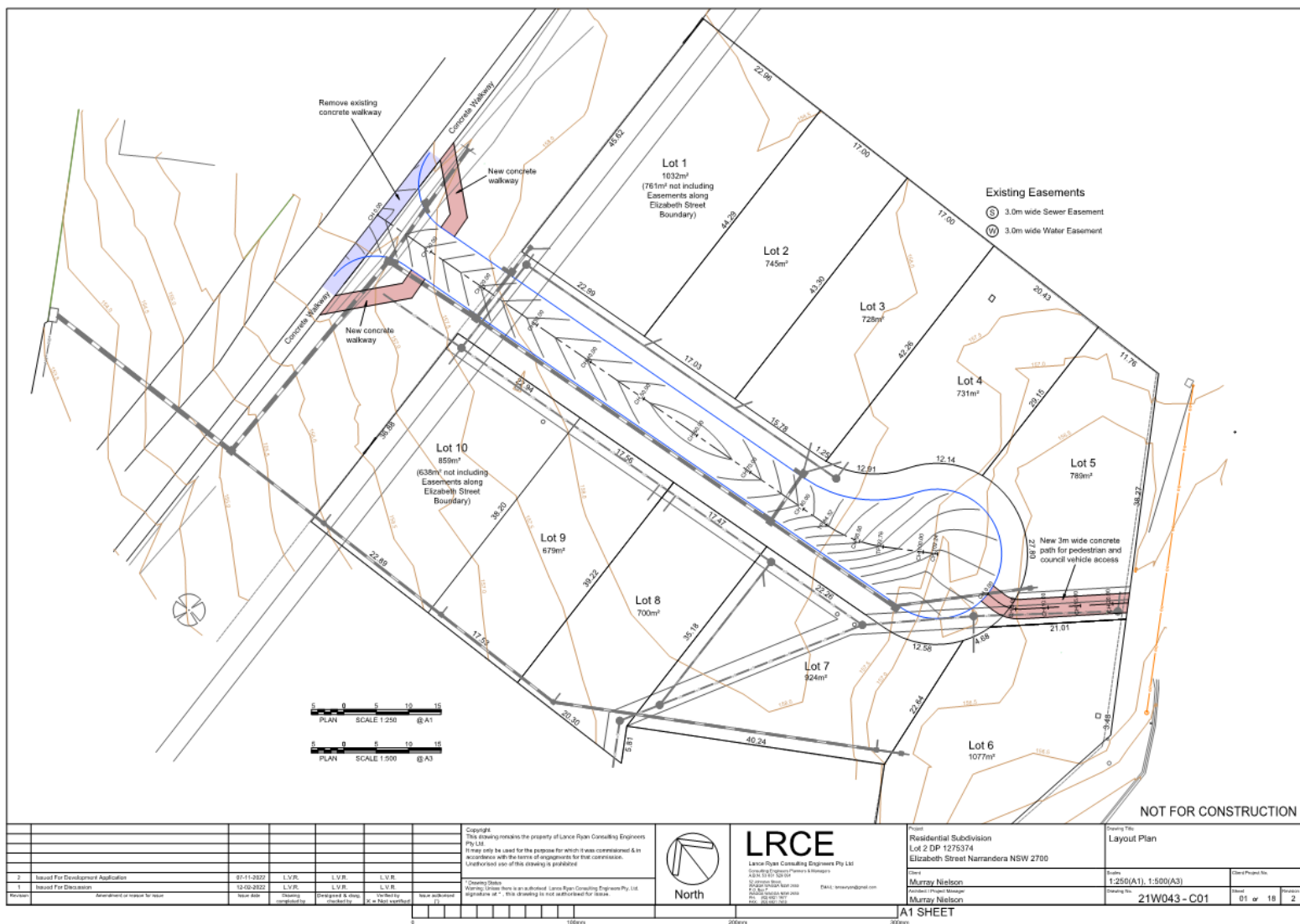


Figure 4: Plan of Proposed Subdivision

3. Bushfire Hazard Assessment

The Bushfire Assessment Report provides an assessment of the proposed development and subdivision against the requirements of section 100B of the *Rural Fires Act 1997* and *Planning for Bush Fire Protection 2019* (PBP) and can be used in an application for a Bush Fire Safety Authority.

The Bushfire Hazard Assessment is conducted on a more localised scale, assessing vegetation categories out to a distance of 140 metres and slope to a distance of 100m, in accordance with the Site Assessment Methodology within Appendix 1 of PBP. This establishes a more localised risk context for the development and specific bush fire protection measures required for the subdivision of the land to occur.

The bushfire hazard assessment involves quantitative and qualitative assessments of the site. The quantitative assessment includes a detailed site inspection to record and review vegetation communities, slope and aspect both within and surrounding the site. The qualitative assessment will be based on the known bushfire behaviour of the subject land.

3.1. Vegetation Assessment

Vegetation classification over the site and surrounding area has been carried out as follows:

- ❑ Aerial Photograph Interpretation to map the vegetation classification and extent (NearMap historical series);
- ❑ Review of Eastern NSW State Vegetation Type, Department of Planning, Industry and Environment 2021 (**Figure 5**); and
- ❑ Ground and aerial site inspection on 2 October 2022 by Stuart Greville (BPA).





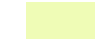

A desktop study of the site was initially undertaken prior to field investigations. In accordance with PBP 2019, an assessment of the vegetation over a distance of 100m in all directions from the site was undertaken.

Vegetation that may be considered a bushfire hazard was identified in all directions from the development footprint. The vegetation classification is based on Appendix 1 of PBP 2019; per Keith (2004). The unmanaged fuel loads detailed in the *Comprehensive Vegetation Fuel Loads* published by the RFS in March 2019 have been adopted for the purpose of assessing the bushfire hazard. The findings of the site inspection were compared to the Keith Vegetation Formations mapping provided by the NSW RFS. The inconsistencies between the mapping sources were quantified during the site inspection.

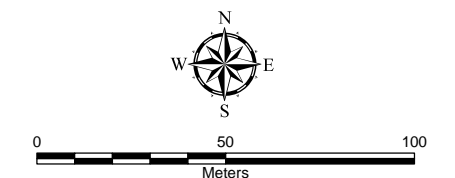
Figure 5

NSW State Vegetation Type (Class)



-  Subject Site
 -  140m Buffer
 -  100m Buffer
- Vegetation Class**
-  Inland Riverine Forests
 -  Inland Rocky Hill Woodlands
 -  Not native vegetation

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2022
Aerial photo: Maxar 2021
Vegetation: © State Government of NSW and Department of Planning and Environment 2022



A3 Scale: 1:2,000

File:2277-Narrandera-Fig3-Vegetation-SV-Class-220928 Date: 28/09/2022

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Plate 1: Subject site looking south west



Plate 2: Look north over Bundidgerry Creek

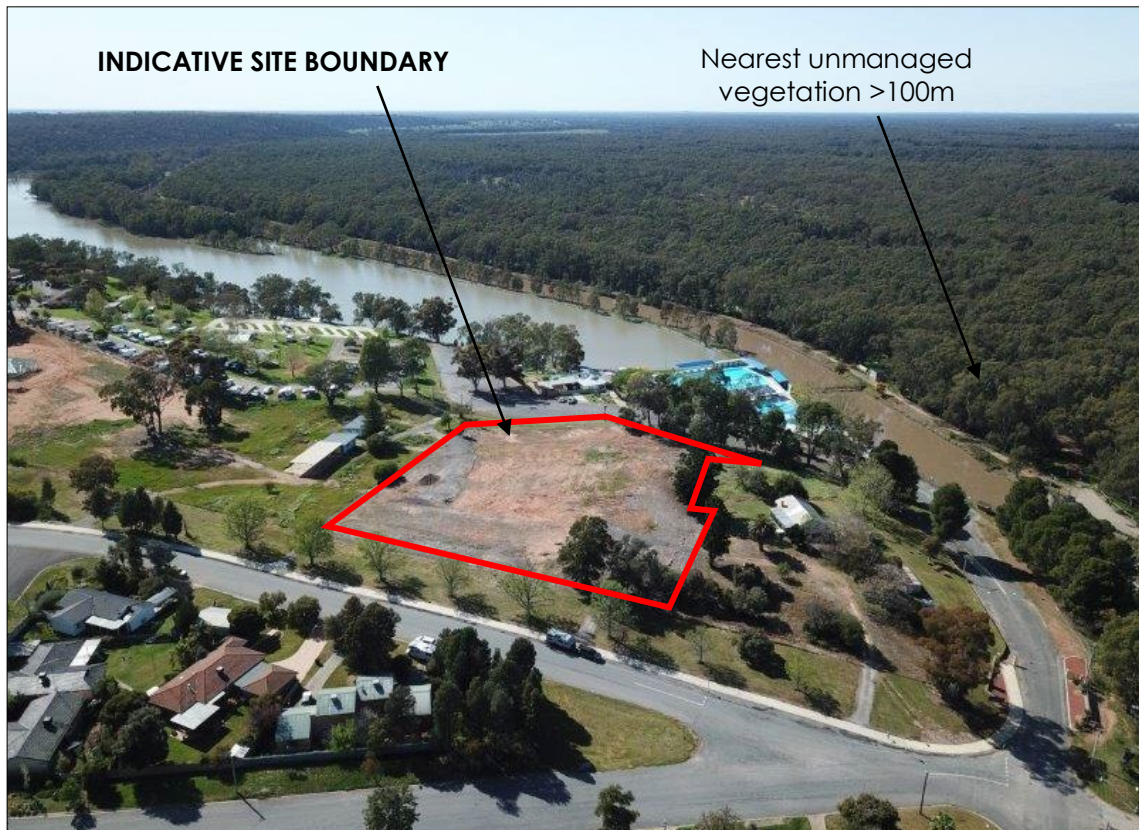


Plate 3: Looking across Elizabeth Street towards caravan park and public pool



Plate 4: Looking south towards nearest unmanaged bushfire hazard



Plate 5: Looking west over public swimming pool

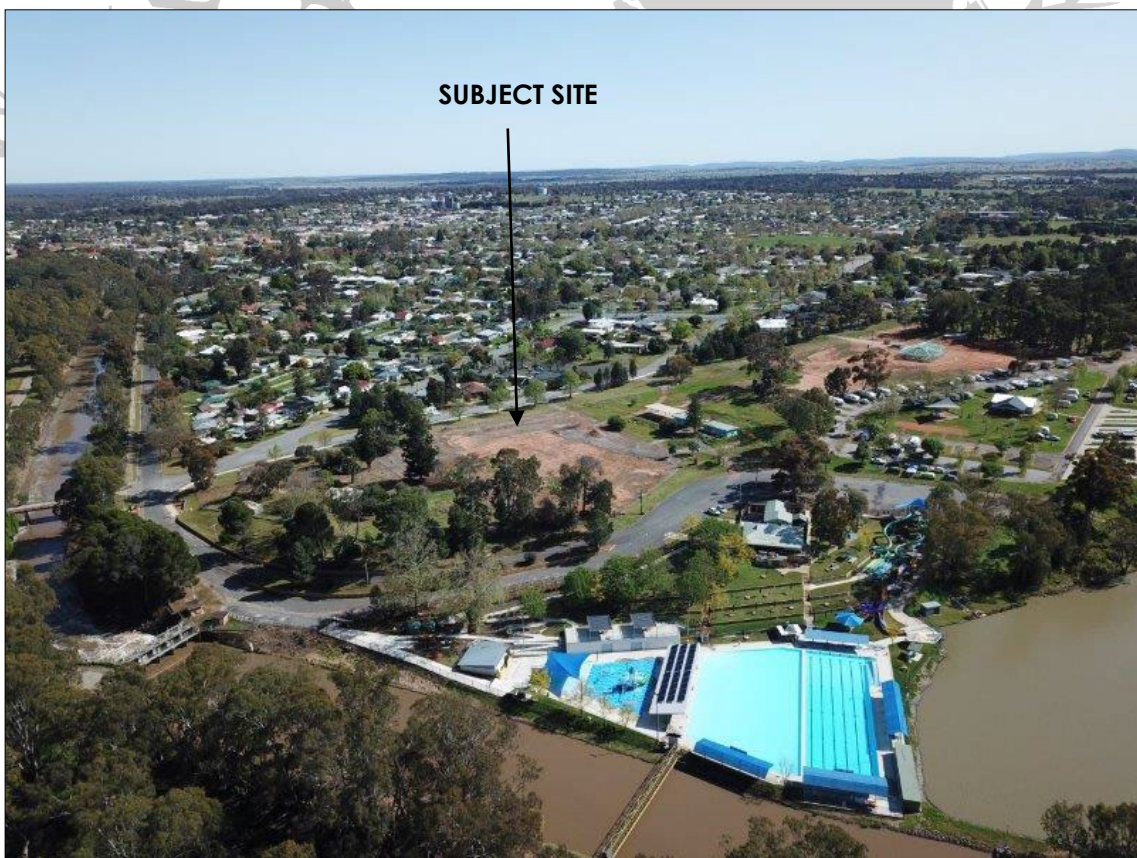


Plate 6: North west across pool and Bundidgerry Creek



Plate 7: Eastern boundary of site looking across public car park towards caravan park



Plate 8: Heritage listed original Narrandera Cemetery to the south of the site



Plate 9: Bundidgerry Creek and irrigation channel



Plate 10: State government land north of the site (Former Forests NSW)

3.2. Slope Assessment

Assessment of the effective slope impacting the site was undertaken using LiDAR point cloud data including DEM (NSW LPI) and results from field investigations carried out on the 2 October 2022.

An assessment of the slope over a distance of 140m in the hazard direction from the site boundary was undertaken. The effective slope was then calculated under the classified vegetation where there was a fire run greater than 50m. The topography of the site has been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site.

Figures were produced that demonstrate the slope within 140m of the site from the subject site in several formats, including:

- ❑ Digital Elevation Model - **Figure 6**; and
- ❑ Slope analysis in gradients of 5 degrees - **Figure 7**.









Figure 6

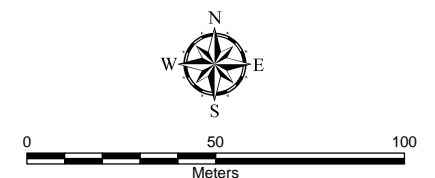
Digital Elevation Model



BUSHFIRE
PLANNING
AUSTRALIA

-  Subject Site
-  140m Buffer
-  100m Buffer
-  Contour (5m)
-  Contour (1m)
- Elevation (AHD)**
-  High : 178m
Low : 139m

SOURCE:
Cadastral Boundary: NSW Department of Finance,
Services and Innovation 2022
Surface analysis based on NARRANDERA 1 metre
Resolution LiDAR © Department Finance, Services
and Innovation 2020



A3 Scale: 1:2,000

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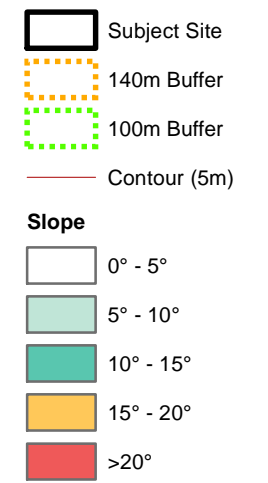
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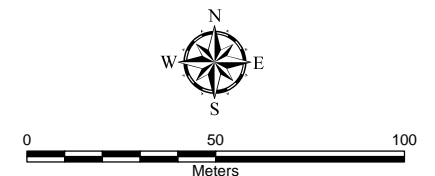
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Figure 7

Slope Analysis: LiDAR



SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2022
Aerial photo: Maxar 2021
Surface analysis based on NARRANDERA 1 metre Resolution LiDAR © Department Finance, Services and Innovation 2020



A3 Scale: 1:2,000

File:2277-Narrandera-Fig5-SlopeLiDAR-220928 Date: 28/09/2022

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3.3. Results

Field investigations conducted on 2 October 2022 followed 7 transects to the north, east, south and west of the site as illustrated in **Figure 8**. Using the site assessment methodology in PBP 2019, **Table 2** summarises vegetation classifications identified on site as per *Ocean Shores to Desert Dunes* - David Keith (2004) and vegetation formations as per PBP 2019.

It was confirmed during the field inspection, there is no bushfire hazard on site or within 100m of the site as all lands are managed or were observed to be a low threat and therefore deemed excluded for assessment in accordance with PBP.

The original Narrandera Cemetery to the south of the site is a locally listed heritage item under the Narrandera Local Environmental Plan 2013. The Cemetery has an area of ~1,800m² and is recognised as being within the grounds of the Forestry Commission. During the site inspection it was observed the landscaping was overgrown and much greater than 100mm in height. Although the Cemetery is within 20m of the site, it has been classified as a low-hazard due as the Cemetery is listed in the Narrandera Shire Council Plan of Management (as Site No. 19). The PoM reveals the Cemetery was previously maintained by Forests NSW, however Council is the responsible land manager. The PoM states the grounds of the cemetery need mowing and snipping.

The adjoining property to the north was formerly operated by NSW Forests as a nursery and base of operations. It directly adjoins a Special Fire Protection Purpose (Lake Talbert Caravan Park) which continues to operate with the knowledge the land managers of the former Forests NSW site continue to manage the vegetation and weeds growing across the site. Although the majority of the site was occupied by buildings or other non-permeable surfaces (car parks, gardens, paths etc), considerable weed regrowth was observed throughout the site. Under cl. 63 of the *Rural Fires Act 1997*, a public authority is required to take any practicable steps to prevent the occurrence of bushfires on or from any land under its control or management. In this instance the existing caravan park would be exposed to a bushfire risk if the responsible land manager of the former Forests NSW did not take any practicable steps to remove the potentially bushfire hazardous vegetation; being the overgrown grass.

The remaining land within 100m of the site is contained within road reserves, managed residential properties and the local swimming pool; all classified as low or no threat and excluded from the bushfire hazard assessment.

The closest and primary bushfire hazard is located greater than 100m to the south of the site, separated by Lake Drive and the Bundidgerry Creek and irrigation channel, and is identified as a *Forested Wetland*, namely *Inland Riverine Forest*.

The results of hazard assessment are detailed in **Table 2** and shown in **Figure 8**.

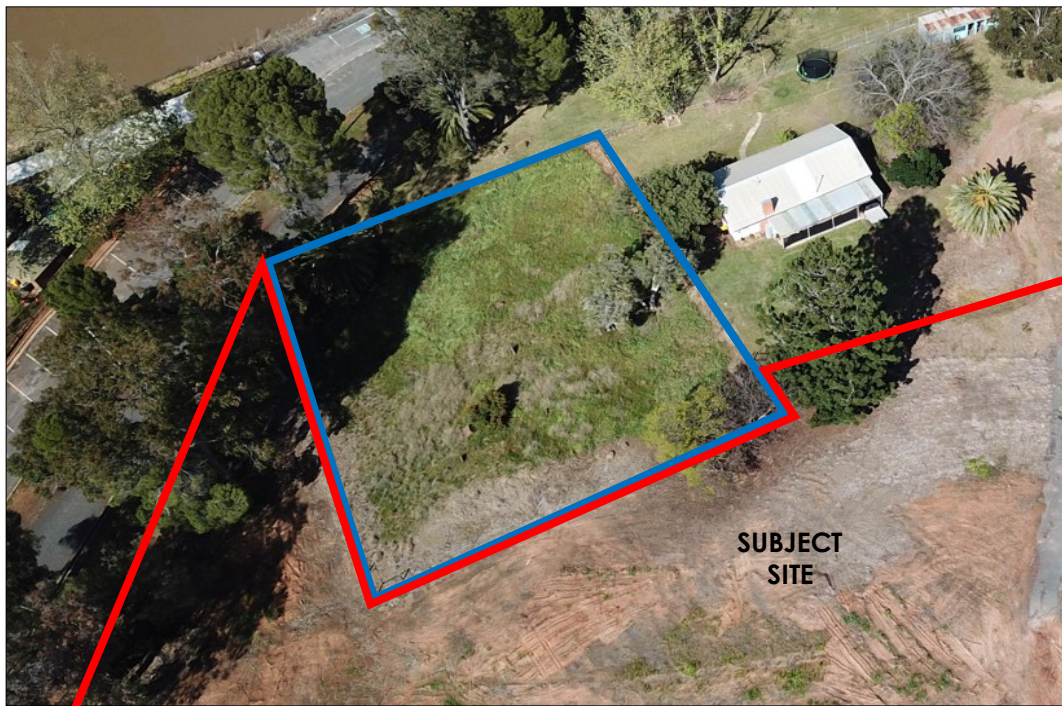


Plate 11: Original Narrandera Cemetery (LEP Heritage Listed Item)



Plate 12: Former Forests NSW/ Forest Commission Nursery and Depot

Table 2: Slope and Vegetation Assessment Results

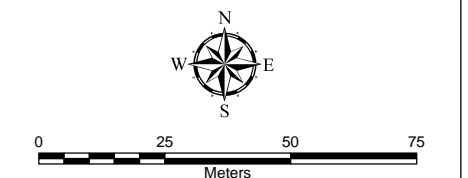
Transect	Vegetation Description	Vegetation Classification (PBP 2019)	Slope
T1 North-east	Neighbouring property north of the site (owned and managed by a public authority)	<i>Excluded</i>	-3.1° Upslope
T2 East	Managed land from the eastern site boundary to the existing caravan park (SFPP)	<i>Excluded</i>	-1.5° Upslope
T3 South-east	Lake Drive and carpark	<i>Excluded</i>	2.3° Downslope
T4 South	Most southern point of the site to the edge of the primary bushfire hazard	<i>Excluded</i>	2.5° Downslope
T5 South	Cemetery located south of site towards Lake Drive	<i>Excluded</i>	3.5° Downslope
T6 South-west	Neighbouring property	<i>Excluded</i>	5.2° Downslope
T7 West	Managed minimal vegetation to Elizabeth Street, west of the site	<i>Excluded</i>	2.5° Downslope
>100m	Primary bushfire hazard identified as Forested wetland greater than 100m south of the subject site and separated by Lake Drive and Murrumbidgee River	Forested Wetland (Inland Riverine Forest)	N/A

Figure 8 Slope & Vegetation Assessment



- Subject Site
 - 140m Buffer
 - 100m Buffer
 - New Lots
 - New Kerb Lip
 - New Concrete Path
 - Contour (5m)
 - Contour (1m)
 - RL
 - Downslope transect
 - Upslope transect
 - Caravan Park SFPP
- Vegetation Class**
- Inland Riverine Forests
 - Not native vegetation

SOURCE:
 Cadastral Boundary: NSW Department of Finance, Services and Innovation 2022
 Aerial photo: Maxar 2021
 Surface analysis based on NARRANDERA 1 metre Resolution LiDAR © Department Finance, Services and Innovation 2020



File:2277-Narrandera-Fig6-SlopeVeg-221110 Date: 10/11/2022

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3.4. Significant Environmental Features

The recommended bushfire protection measures have been designed to avoid any unacceptable impacts on a significant environmental feature.

3.5. Threatened Species, populations or ecological communities

The area of the site to be affected by the proposed development has been identified to avoid impact on any threatened species, population or EEC. All bushfire mitigation measures; including APZs will consider the existing and potential biodiversity values to avoid impact where possible

3.6. Aboriginal Objects

A search of the AHIMS database (results contained in **Appendix B**) revealed there are no Aboriginal sites or places recorded near the site.



4. Bushfire Risk and Mitigation

4.1. Asset Protection Zones

An APZ is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property. The required width of the APZ varies with slope and the type of hazard. An APZ can consist of both an inner protection area (IPA) and an outer protection area (OPA). In this instance the entire APZ and the balance of the development site shall be managed as an IPA.

4.1.1. Determining the Appropriate Setbacks

To achieve compliance with the performance criteria for APZs (Table 5.3a), the Acceptable Solutions outlined in Table A1.12.3 of PBP 2019 may be adopted as a deemed-to-satisfy solution.

As the site lies within the Narrandera Shire Council LGA, it is assessed under a FDI rating of 80. To ensure the APZs achieve the intent of Section 5.3.1 of PBP 2019, the APZs have been determined to ensure all lots are able to accommodate a dwelling that will not be exposed to radiant heat levels exceeding 29kW/m².

Refer to **Table 3** and **Figure 10** for the recommended APZs.

Table 3: Required and Recommended Asset Protection Zones

Transect	Vegetation Classification (PBP 2019)	Slope Class	PBP 2019 FDI 80 Table A1.12.3
T1 North-east	<i>Excluded</i>	-3.1° Upslope	N/A
T2 East	<i>Excluded</i>	-1.5° Upslope	N/A
T3 South-east	<i>Excluded</i>	2.3° Downslope	N/A
T4 South	<i>Excluded</i>	2.5° Downslope	N/A
T5 South	<i>Excluded</i>	3.5° Downslope	N/A
T6 South-west	<i>Excluded</i>	5.2° Downslope	N/A
T7 West	<i>Excluded</i>	2.5° Downslope	N/A
>100m	<i>Forested Wetland (Inland Riverine Forest)</i>	N/A	>22m

4.2. Landscaping and Vegetation Management

In APZs and IPAs, the design and management of the landscaped areas in the vicinity of buildings have the potential to improve the chances of survival of people and buildings. Reduction of fuel does not require the removal of all vegetation. Trees and plants can provide some bushfire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns.

Generally landscaping in and around a bushfire hazard should consider the following:

- ❑ Priority given to retaining species that have a low flammability;
- ❑ Priority given to retaining species which do not drop much litter in the bushfire season and which do not drop litter that persists as ground fuel in the bush fire season;
- ❑ Priority given to retaining smooth barked species over stringy bark; and
- ❑ Create discontinuous or gaps in the vegetation to slow down or break the progress of fire towards the dwellings.

Landscaping within APZs and IPAs should give due regard to fire retardant plants and ensure that fuel loads do not accumulate as a result of the selected plant varieties.

The principles of landscaping for bushfire protection aim to:

- ❑ Prevent flame impingement on dwellings;
- ❑ Provide a defensible space for property protection;
- ❑ Reduce fire spread;
- ❑ Deflect and filter embers;
- ❑ Provide shelter from radiant heat; and
- ❑ Reduce wind speed.

Avoiding understorey planting and regular trimming of the lower limbs of trees also assists in reducing fire penetration into the canopy. Rainforests species such as *Syzygium* and figs are preferred to species with high fine fuel and/or oil content.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage ground fire to spread up to, and then through the crown of trees.

Consideration should be given to vegetation fuel loads present on site with particular attention to APZs.

Careful thought must be given to the type and physical location of any proposed site landscaping. Inappropriately selected and positioned vegetation has the potential to 'replace' any previously removed fuel load.

Bearing in mind the desired aesthetic and environment sought by site landscaping, some basic principles have been recommended to help minimise the chance of such works contributing to the potential hazard on site.

Specific requirements for the management of vegetation and landscaping around vulnerable developments and within the APZ the following conditions apply:

- ❑ Within 10m of a building, flammable objects such as plants, mulches and fences must not be located close to vulnerable parts of the building such as windows, decks and eaves;
- ❑ Trees must not overhang the roofline of the building, touch walls or any other elements of a building;
- ❑ Grass should be no more than 100mm in height. All leaves and vegetation debris are to be removed at regular intervals (rake leaves and twigs from grass every week during the fire season);

- ❑ Establish lawn substitutes including non-flammable ground covers such as decorative stone or gravel;
- ❑ Plants greater than 100m in height at maturity must not be placed directly in front of a window or other glass features;
- ❑ Tree canopy separation of 2 metres and overall canopy cover no more than 15% at maturity;
- ❑ Preference should be given to smooth barked and evergreen trees;
- ❑ Shrubs should not be located under trees;
- ❑ Shrubs should not form more than 10% ground cover; and
- ❑ Provide a reliable and sufficient water supply and installation of sprinkler systems to create a well-watered landscape.

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a suitable balance between visual and safety concerns be considered.

It is reiterated again that it is essential that any landscaped areas and surrounds are subject to ongoing fuel management and reduction to ensure that fine fuels do not build up.

4.3. Access

In the unlikely event of a serious bushfire, it will be essential to ensure that adequate ingress / egress and the provision of defensible space are afforded in the subdivision layout. All dwellings must have direct access to a public road. Section 5.3.2 of PBP 2019 requires a development to provide safe operational access to structures and water supply for emergency services while residents are seeking to evacuate.

Access will continue to be provided from Elizabeth Street. A 8m wide road (cul-de-sac) will be constructed to provide direct access to each lot. Additionally a 3m wide road will be constructed at the end of the cul-de-sac through to the southern site boundary and dedicated to emergency services and council maintenance access.

It is considered the proposed road network provides safe, all-weather two-way through roads and safe operational access for emergency service personnel and evacuation purposes; complying with the relevant provisions contained in Section 5.3.2 of PBP.

Refer to **Appendix A** for the development plans indicating the proposed access arrangements.

4.4. Services - water, electricity and gas

4.4.1. Water

Fire hydrant spacing, sizing and pressure should comply with AS 2419.1 - 2005. Hydrants are not to be located within any road carriageway.

All sites within the proposed development will be connected to the internal reticulated water supply.

4.4.2. Electricity

All electricity services will be located underground.

4.4.3. Gas

Any reticulated or bottled gas should be installed and maintained according to the requirements of the relevant authorities and AS 1592-2002. It is expected that the location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.

4.5. Construction Standards: Bushfire Attack Level

All buildings must satisfy the Performance Requirements of the National Construction Code: Building Code of Australia (BCA). Part 2.3 of Volume 2 of the BCA applies to dwellings located within designated bushfire areas, which are defined as:

Land which has been designated under a power in legislation as being subject, or likely to be subject to, bushfires.

Accordingly, all forthcoming habitable buildings must satisfy the requirements of Part 3.7.4 of the BCA. The *Deemed-to-Satisfy* (DTS) provision of the BCA can only be achieved if dwellings in bushfire prone areas are constructed in accordance with Australian Standard AS3959-2018 *Construction of buildings in bushfire prone areas*. Alternatively, the DTS provisions can also be achieved if the habitable building is constructed in accordance with the NASH Standard 'Steel Framed Construction in Bushfire Areas'.

Building design and the materials used for construction of future dwellings should be chosen based on the information contained within AS3959-2018, and accordingly the designer/architect should be made aware of this recommendation.

The determinations of the appropriate bushfire attack level (BAL) is based on the maximum potential radiant heat exposure. BALs are based upon parameters such as weather modelling, fire-line intensity, flame length calculations, as well as vegetation and fuel load analysis. The determination of the BAL is derived by assessing the:

- Relevant FDI = 80;
- Flame temperature = 1090K;
- Slope = flat;
- Vegetation classification = Low threat/ Excluded;
- Building location.

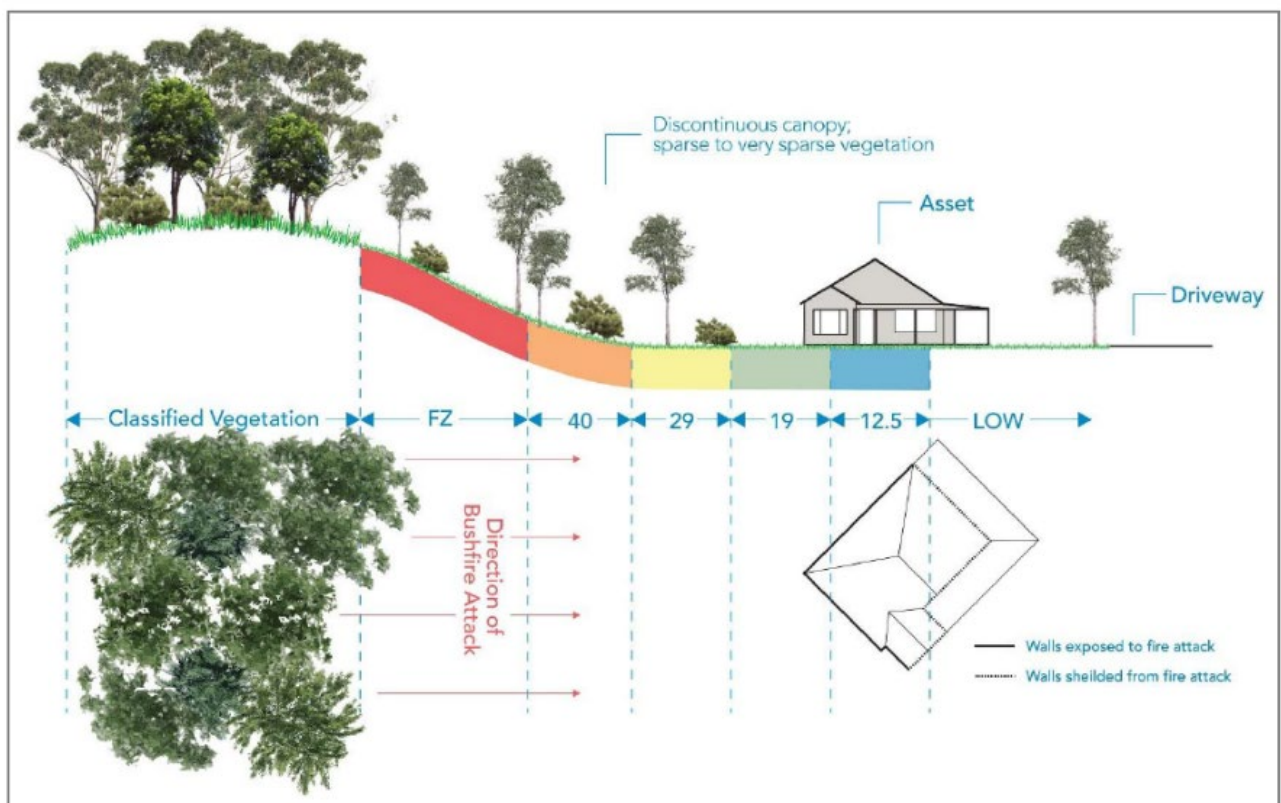


Figure 9: Bushfire Attack Level

The BALs for each transect have been provided in **Table 4**. To demonstrate the BAL ratings, **Figure 10** has been prepared in accordance with the methodology to prepare a Subdivision BAL Plan in accordance with PBP 2019 Table A1.12.6.

Table 4: Required BALs

Transect	Vegetation Classification (PBP 2019)	Slope	APZ (PBP 2019 A1.12.3)	Distance from Hazard	Bushfire Attack Level (BAL)
T1 - T7	<i>Excluded</i>	Various	>22m	>100m	BAL-LOW
>100m	<i>Forested Wetlands (Inland Riverine Forest)</i>	N/A	>100m	0m-<6m	BAL-FZ
				6m-<8m	BAL-40
				8m-<12m	BAL-29
				12m-<18m	BAL-19
				18m-<100m	BAL-12.5
				>100m	BAL-LOW



4.6. Emergency Services

There is a NSW Fire & Rescue Station located at 23 Twynam Street, Narrandera approximately 2km or 4 minutes drive away from the site. This station would be the first responders with support from a second Fire Service station located at Grong Grong (21.9kms or 17mins) if required.

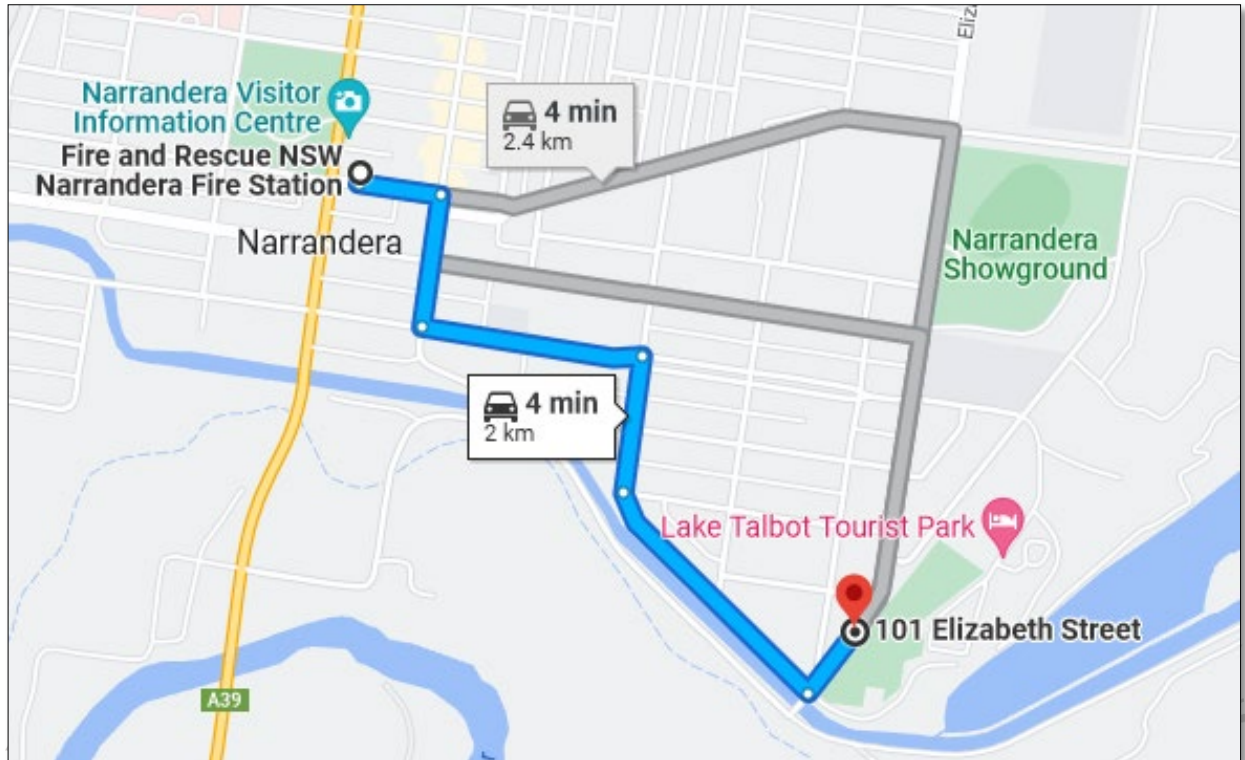


Figure 10: NSW Fire & Rescue - Narrandera

5. Conclusion and Recommendations

Bushfire Planning Australia has been engaged by Planningmatters Development Services to undertake a Bushfire Assessment Report for the proposed residential subdivision located at 101-109 Elizabeth Street, Narrandera; on land formerly operated by Forest NSW/ Forestry Commission as a nursery and works depot.

The landscape, vegetation and topographic studies show that this site is subject to a low bushfire threat greater than 100m south of the site and separated by Lake Drive and Bundidgerry Creek. The hazard is consistent with a *forested wetland* vegetation, namely *Inland Riverine Forest* as described in the NSW Rural Fire Service document *Planning for Bushfire Protection 2019* (PBP 2019). The BAR concludes that the hazard identified can be successfully mitigated by applying the requirements of PBP 2019, such as access to a reliable reticulated water supply and landscape management.

The following key recommendations have been designed to enable the proposed development to maintain an acceptable level of protection from the residual risk of a bushfire that may occur in the existing vegetation, in accordance with *Planning for Bush Fire Protection 2019*:

1. The entire site shall be managed as an Inner Protection Area (IPA) as outlined within Appendix 4 of PBP 2019 and the RFS document Standards for asset protection zones;
2. The provision of electricity and gas must comply with the requirements of Table 5.3c of PBP 2019;
3. All future dwellings to be constructed on the proposed lots shall have due regard to the specific considerations given in the National Construction Code: Building Code of Australia (BCA) which makes specific reference to Australian Standard AS3959-2018 Construction of buildings in bushfire prone areas (AS3959-2018) and the NASH Standard Steel Framed Construction in Bushfire Prone Areas (BAL-LOW);
4. All new lots are to be connected to a reliable water supply network and that suitable fire hydrants are located throughout the development site that are clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure shall comply with AS2419.1 2005 and section 5.3.3 of PBP 2019; and
5. Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site.

Finally, should the above recommendations be implemented, the existing bushfire risk should be suitably mitigated to offer an acceptable level of protection to life and property for those persons and assets occupying the site but they do not and cannot guarantee that the area will not be affected by bushfire at some time and that property and life damage/loss will not occur.

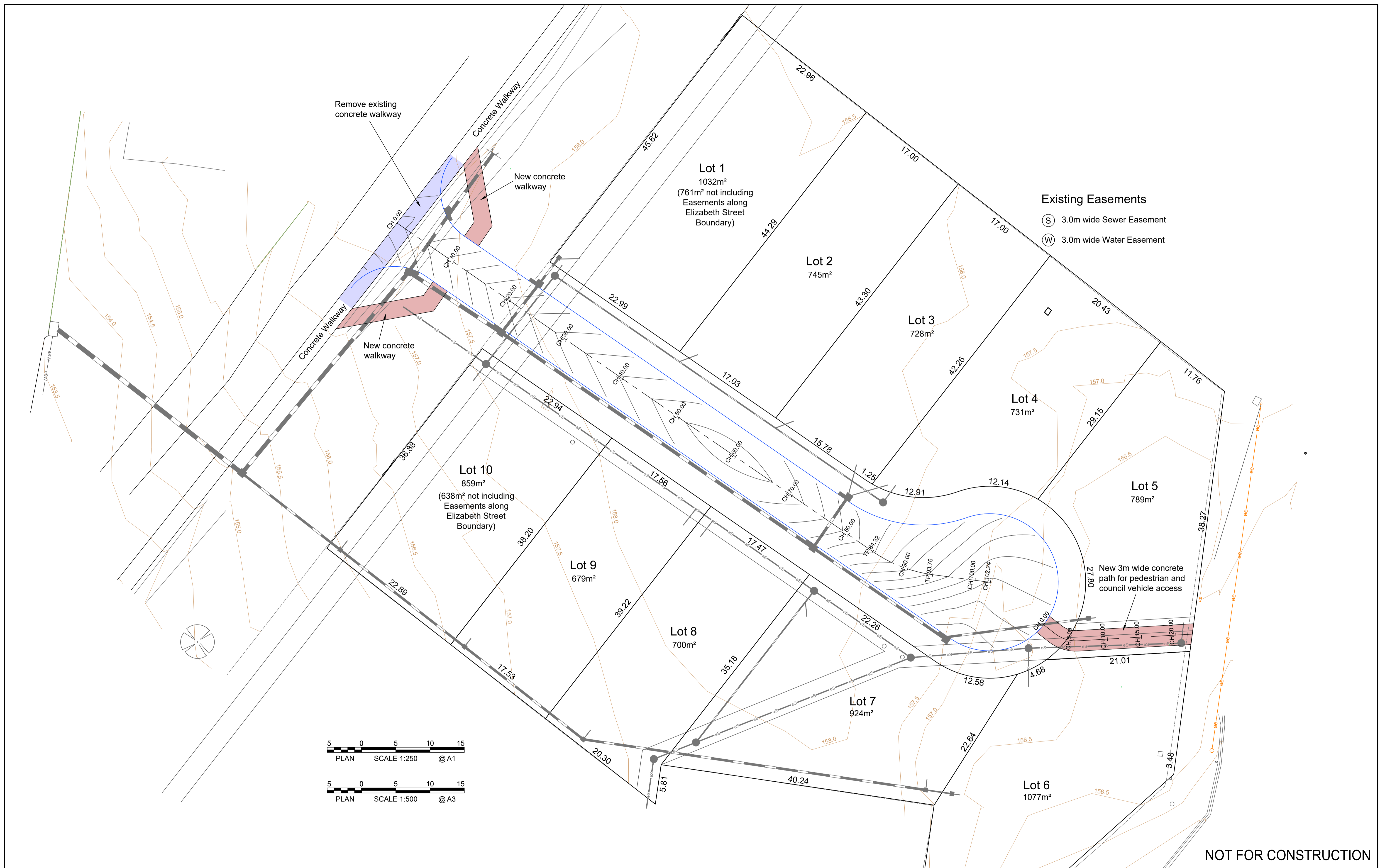
6. References

- ❑ NSW Rural Fire Service (2005). *Standards for Asset Protection Zones*. NSW Rural Fire Service.
- ❑ NSW Rural Fire Service (2019). *Planning for Bushfire Protection – A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners*.
- ❑ Ramsay, GC and Dawkins, D (1993). *Building in Bushfire-prone Areas – Information and Advice*. CSIRO and Standards Australia.
- ❑ Rural Fires and Environmental Assessment Legislation Amendment Act 2002.
- ❑ Standards Australia (2018). AS 3959 – 2018: Construction of Buildings in Bushfire-prone Areas.



Appendix A: Plan of Proposed Residential Subdivision





Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by	Issue authorised (*)
2	Issued For Development Application	07-11-2022	L.V.R.	L.V.R.	L.V.R.	
1	Issued For Discussion	12-02-2022	L.V.R.	L.V.R.	L.V.R.	

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* Drawing Status
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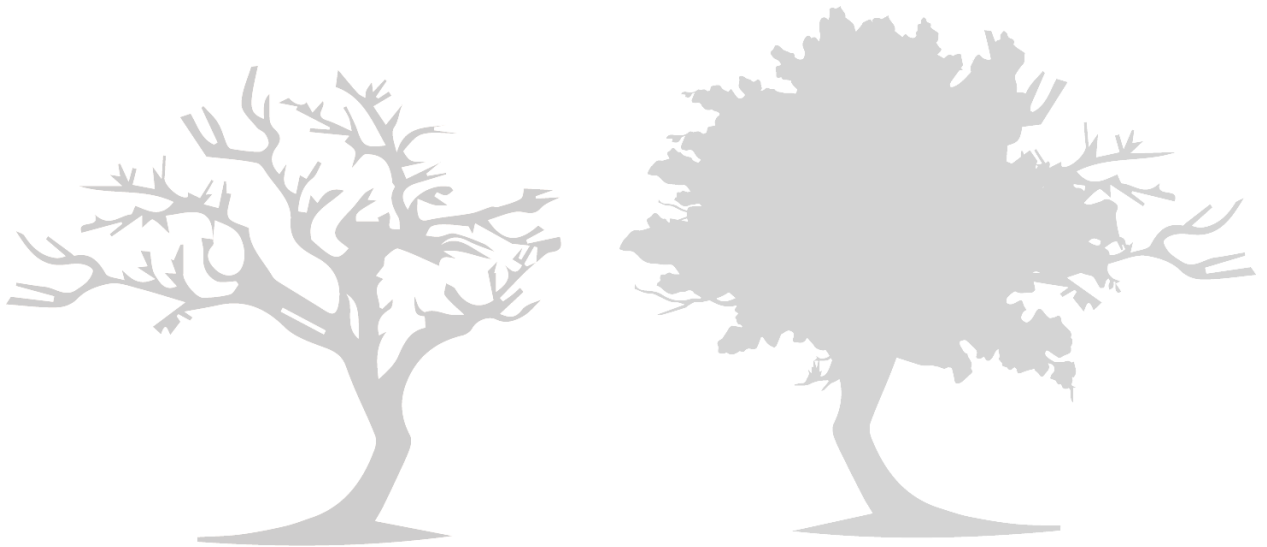
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Project
Residential Subdivision
Lot 2 DP 1275374
Elizabeth Street Narrandera NSW 2700

Client
Murray Nielson
Architect / Project Manager
Murray Nielson

Drawing Title Layout Plan		Client Project No.
Scales 1:250(A1), 1:500(A3)		Sheet
Drawing No. 21W043 - C01		Revision 01 of 18 2

Appendix B: AHIMS Search Results



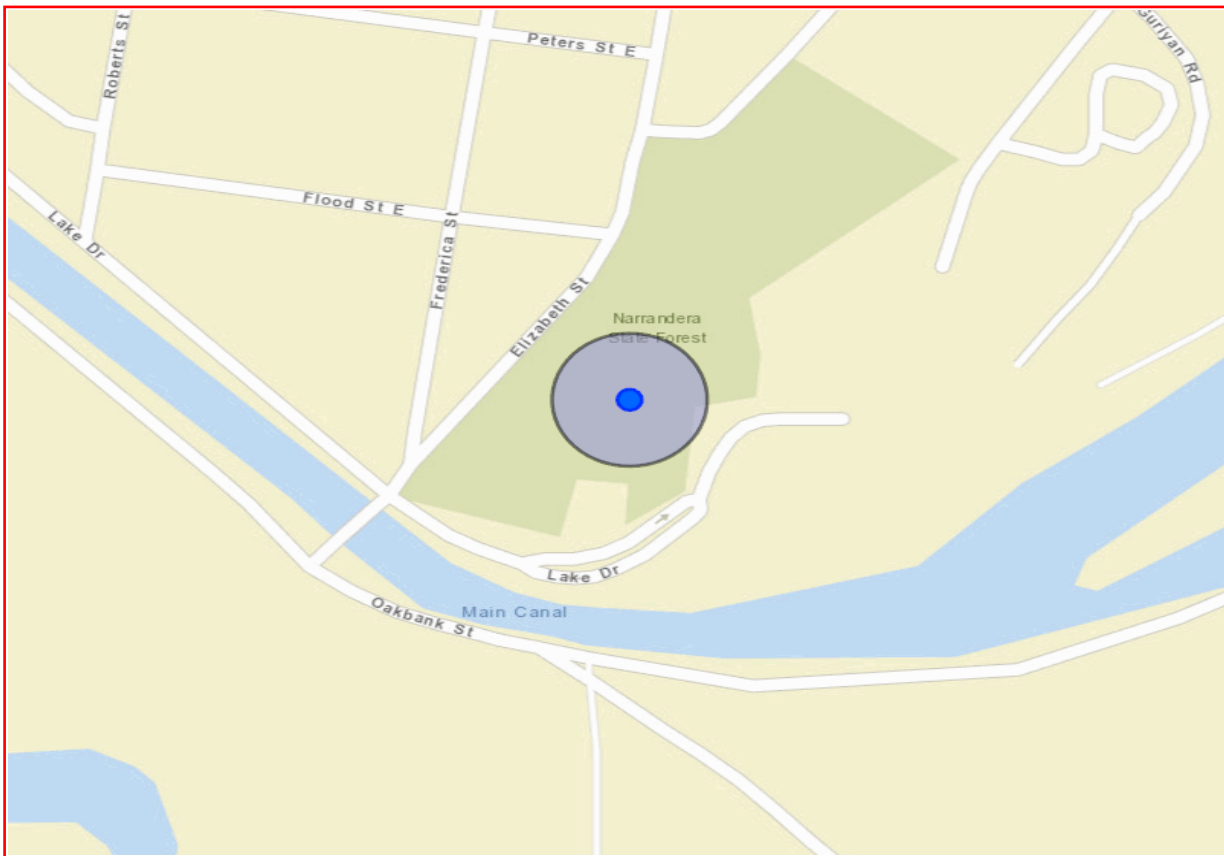
Katrina Greville
21 Costata Crescent
Adamstown New South Wales 2289
Attention: Katrina Greville
Email: klmukevski@bigpond.com

Date: 14 October 2022

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Address : 101-105 ELIZABETH STREET
NARRANDERA 2700 with a Buffer of 50 meters, conducted by Katrina Greville on 14 October 2022.**

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Appendix C: Planning for Bushfire Protection 2019 Compliance Table



Table 1: Aims and Objectives of Planning for Bushfire Protection 2019

Objectives	Satisfied	Comment
<ul style="list-style-type: none"> ➤ Afford buildings and their occupants protection from exposure to a bush fire 	<p>✓</p>	<p>All lots within the proposed development are located >100m from the nearest bushfire hazard.</p>
<ul style="list-style-type: none"> ➤ Provide for a defensible space to be located around buildings 	<p>✓</p>	<p>Defensible space by way of roads, car parks and managed land is provided between all new lots and the bushfire hazard to ensure radiant heat levels are below critical limits (29kW/m²).</p>
<ul style="list-style-type: none"> ➤ Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent the likely fire spread to buildings 	<p>✓</p>	<p>All proposed lots are located >100m from the nearest bushfire hazard. All land and properties within 100m of the site have been assessed as low threat/excluded.</p>
<ul style="list-style-type: none"> ➤ Ensure that safe operational access and egress for emergency service personnel and residents is available 	<p>✓</p>	<p>Public road access will be provided from Elizabeth Street to the west. The site is not located on a bushland interface and both the eastern and western boundaries are defined by public roads and a carpark. A narrow service road is able to provide emergency egress/ access to Lake Drive along the eastern boundary.</p>
<ul style="list-style-type: none"> ➤ Provide for ongoing management and maintenance of BPMs 	<p>✓</p>	<p>All owners will be responsible for the management and maintenance of the private property.</p>
<ul style="list-style-type: none"> ➤ Ensure that utility services are adequate to meet the needs of firefighters 	<p>✓</p>	<p>The development includes all essential utility services to meet the needs of firefighters; including a reliable water supply.</p>

Table 2: Performance Criteria and Acceptable Solutions for residential subdivisions (Chapter 5 PBP 2019)

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
5.3.1 ASSET PROTECTION ZONES Table 5.3a To provide sufficient space and maintain reduced fuel loads, so as to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with a building.	Potential building footprints must 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 A1.12.3 based on the FFDI.	✓	All proposed lots may be exposed to a maximum potential radiant heat level no greater than 29kW/m ² .
	APZs are managed and maintained to prevent the spread of a fire towards the building.	The APZ is managed in accordance with the requirements of Appendix 4	✓	All new landowners will be required to manage their respective lot as an IPA.
	The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	✓	There are no exceptional circumstances that would require an APZ to be located external to the development site.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	The APZ is not located on lands with a slope exceeding 18°	✓	The maximum slope of the site is 5° or less.
LANDSCAPING	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 APZ standards (see Appendix 4). Fencing is constructed in accordance with section 7.6.	✓	All new landscaping has considered the requirements of APZs per Appendix 4. All new fencing will be colorbond or similar non-combustible material.
5.3.2 ACCESS (General Requirements) Table 5.3b To provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area.	Fire fighters are provided with safe all weather access to structures	Property access roads are two-wheel drive, all-weather roads	✓	Public road access will be provided from Elizabeth Street to the west. Restricted access for council and emergency services is provided to the east via a small service lane. All new roads will be constructed in accordance with Council engineering specifications and satisfy the Acceptable Solutions in Table 5.3b.
		Perimeter roads are provided for residential subdivisions of three or more allotments	✓	
		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	✓	

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
		emergency services vehicles.		
		Access roads must provide suitable turning areas in accordance with Appendix 3.	✓	
ACCESS ROAD CAPACITY	The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	✓	
ACCESS TO WATER	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.	✓	All proposed lots are able to be connected to a reticulated water supply.
		Hydrants are provided in accordance with AS2419.1:2005	✓	
		There is suitable access for Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	✓	
PERIMETER ROADS	Perimeter access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while occupants are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	There are two-way sealed roads.	✓	No new perimeter roads are required as part of the proposal.
		8m carriageway width kerb to kerb.	✓	
		Hydrants are to be located clear of parking areas.	✓	
		There 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° and average grade is 10°.	✓	
		The road crossfall does not exceed 3°.	✓	

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment	
			✓ - Acceptable Solution AS - Alternative Solution		
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and	✓		
NON-PERIMETER ROADS	Non-perimeter access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while occupants are evacuating.	Minimum 5.5m width kerb to kerb.	✓	A 8m wide paved carriageway will be provided allowing for an 5.5m wide unobstructed path of travel and on-street parking outside the carriageway.	
		Parking is provided outside of the carriageway.	✓		
		Hydrants are to be located clear of parking areas.	✓		
		There 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.	✓		All roads; including non-perimeter roads will be constructed in accordance with PBP 2019.
		The maximum grade road is 15° and average grade is 10°.	✓		
		The road crossfall does not exceed 3°.	✓		
A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and	✓				
5.3.3 SERVICES Table 5.3c	Adequate water supplies is provided for firefighting purposes	Reticulated water is to be provided to the development, where available	✓	A reticulated water supply is provided.	
		A static water supply is provided where no reticulated water is available	N/A		
		Static water supplies shall comply with Table 5.3d	N/A		
WATER	Water supplies are located at regular intervals	Fire hydrant spacing, design and sizing comply with AS2419.1:2005;	✓	A reticulated water supply is provided.	
		Hydrants are not located within any road carriageway;	✓		

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
	The water supply is accessible and reliable for firefighting operations	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	✓	A reticulated water supply is provided.
	Flows and pressures are appropriate	Fire hydrant flows and pressures comply with AS2419.1:2005.	✓	
	The integrity of the water supply is maintained	All above ground water service pipes are metal, including and up to any taps.	Able to comply	
ELECTRICITY	Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	✓	The proposed new lots will be connected to the existing underground electricity service.
		Where overhead electrical transmission lines are proposed as follows: → lines are installed with short pole spacing (30 metres), 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 specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines	N/A	
GAS	Location 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 1596:2014 and the requirements of relevant authorities, metal piping is to be used.	✓	Any new gas connections will be underground and will be unlikely to create an additional hazard risk to surrounding bushland.
		All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side;		



Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
		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.		