Strategic Bush Fire Study

Planning Proposal

Redmond Place, Orange

Prepared for:
Landcom

July 2024

Integrated Consulting
Planning | Bushfire | Surveying

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Disclaimer

This report is prepared solely for Landcom (the 'client') and any future landowners (or their delegated representatives) of the subject lot(s) and is not for the benefit of any other person and may not be relied upon by any other person.

Executive Summary

Table 1: Executive Summary

Item	Response
Street Address	Redmond Place, Orange
Real Property Description	Lot 1 DP 153167, Lot 6 DP 1031236, and Lot 200 DP 1288388.
Local Government Area	Orange City
Proposed Development	Planning Proposal to facilitate urban residential land uses.
Planning for Bushfire Protection (PBP) Classification of Development	Chapter 4 Strategic Planning and Chapter 5 Residential Subdivision.
Compliance with PBP	Acceptable Solutions Yes ☒ No ☐ Performance Solution[1] Yes ☒ No ☐
Notes: 1 Conforming with the relevant specifications and requirements of 'Planning for Bush Fire Protection' can be achieved by both Acceptable Solutions and Performance Solutions.	

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1 Introduction

1.1 Purpose

This Strategic Bush Fire Study (SBFS) has been prepared to support a Planning Proposal (PP) for rezoning to facilitate future residential development of the site being Lot 1 DP 153167, Lot 6 DP 1031236, and Lot 200 DP 1288388, Redmond Place, Orange.

The PP will be lodged with the Department of Planning, Housing and Infrastructure (DHPI) for consideration and as part of this process consultation will be required with the NSW Rural Fire Service. Consequentially this report has been prepared in accordance with *Planning for Bush Fire Protection (2019)* to provide sufficient information for the approval authorities.

1.2 The Proposal

Landcom and Orange City Council have signed a Project Delivery Agreement for the purposes of delivering the Redmond Place project. The site is owned by Orange City Council and Landcom is taking the lead in preparing a planning proposal to amend the *Orange Local Environmental Plan 2011* (LEP) to rezone the Site for residential uses.

The key objectives of the project are:

- Supply – increase the supply of land to facilitate housing
- Diversity – promote housing diversity
- Affordability – increase the supply of land for affordable housing by delivering at least 20% of all residential dwellings for affordable housing
- Sustainability – develop a climate resilient, healthy and inclusive place, at the forefront of environmental and social sustainability.

The staging strategy for this site is to be determined and will need to take into consideration infrastructure availability, delivery timing, placemaking, and entry point to the area from Bathurst Road.

The urban design approach for the project focuses on socio-economic activation, innovative sustainability solutions and urban vibrancy through place-making. The master plan for the future new community of Redmond Place will be based on a landscape-led approach to urban design, informed by the unique qualities of the site and Connecting with Country principles. A thorough community and stakeholder engagement process, including community workshops, a Walk on Country and indigenous stakeholder interviews, will also inform the urban design process.

The planning proposal is to amend *Orange Local Environmental Plan 2011* to rezone the site to facilitate delivery of a residential precinct in accordance with a prepared Masterplan.

The objectives of the Masterplan are to:

- increase the supply of land to facilitate housing through the creation of lots to support a sustainable, innovative and affordable community.
- promote housing diversity through supporting a diverse mix of product, including houses and townhouses.
- increase the supply of land for affordable housing by delivering at least 20% of all residential dwellings for affordable housing managed by a community housing provider.
- develop a climate resilient, healthy and inclusive place, at the forefront of environmental and social sustainability.

The masterplan as shown in **Appendix A**.

1.3 The Site

1.3.1 Location

This PP applies to the following land:

Table 2: Planning Proposal Land

Lot/DP	Street Address
Lot 1 DP 153167	154 Lone Pine Avenue, Orange
Lot 6 DP 1031236	3 Redmond Place, Orange
Lot 200 DP 1288388	5255 Mitchell Highway, Orange

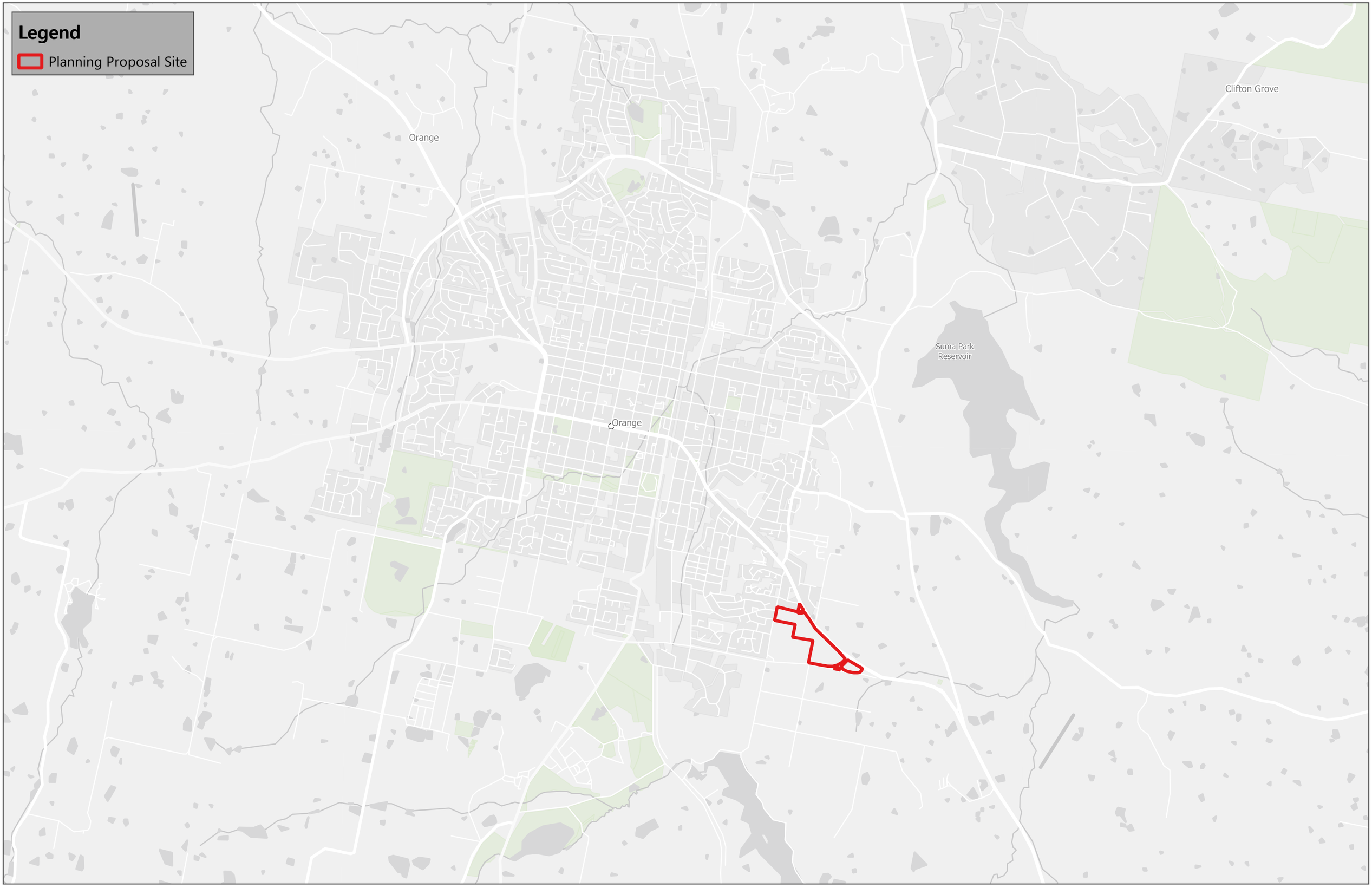
As shown in **Figure 1** and **Figure 2**, the site is located on the eastern entrance to Orange on the Bathurst Road (formerly Mitchell Highway). It is located between Bathurst Road, Southern Feeder Road/Dairy Creek Road, and Lone Pine Avenue.

1.3.2 Site Details

Lot 1 has an area of 10 acres 0 roods and 16 ½ perches by title diagram (converts to 4.0885ha) and has been largely cleared. It contains grassland vegetation.

Lot 6 has an area of 2.283ha by title diagram. It contains the old rescue helicopter hangar and heliport. It has been largely cleared, however, contains areas of garden vegetation around the buildings on site.

Lot 200 has a total area of 17.84ha by title diagram. It has been largely cleared, however, contains some remnant trees within the paddocks, and landscape planting along the interface with the Bathurst Road including a continuous row of poplar trees along the existing fence line, offset rows of trees, and some garden bed areas around the old shelter building opposite the intersection with Perc Griffith Way.



Source: NSW Spatial Services
Ref: 23074

Figure 1: Site Location

Legend

Planning Proposal Site

Adina Crescent

Redmond Place

Gateway Crescent

Perc Griffith Way

Leumeah Road

Lone Pine Avenue

Kurim Avenue

Mitchell Highway

Dairy Creek Road

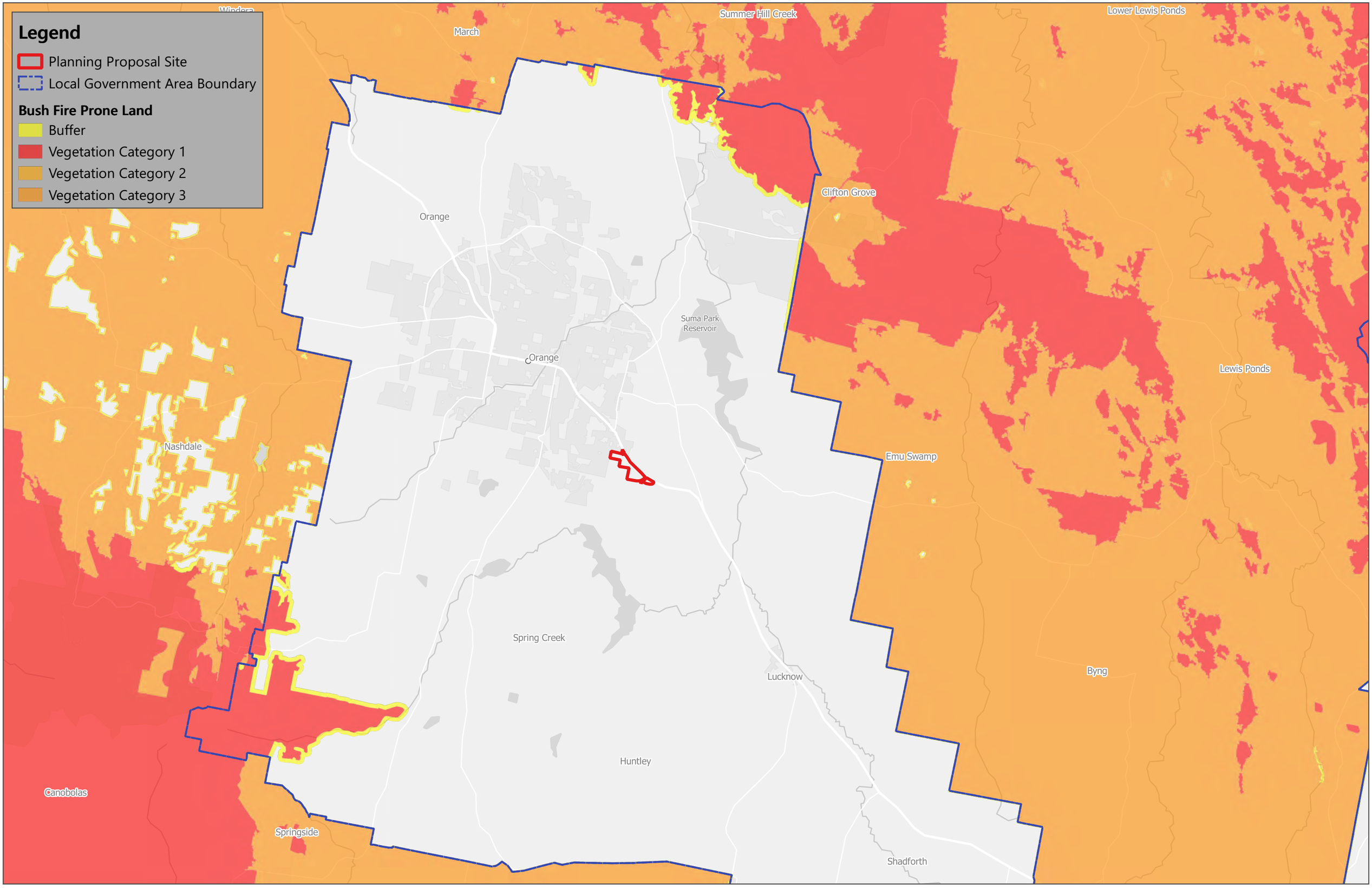
Calton Road

0 200 400 m

1:3,500 @ A3

Source: NearMap; NSW Spatial Services
Ref: 23074

Figure 2: Site Aerial



Source: NSW Spatial Services; NSW Rural Fire Service
Ref: 23074

Figure 3: Bush Fire Prone Land Map

1.4 Legislative Framework

1.4.1 Bush Fire Prone Land

The site is currently not designated as bush fire prone land in accordance with Section 10.3 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) as shown in **Figure 3**. Council has commenced review of its Bush Fire Prone Lands Map in accordance with the NSW Rural Fire Service's *Guide for Bush Fire Prone Land Mapping* to include Category 3 vegetation. The site is identified as Bush Fire Prone Land under the draft map.

Despite not being mapped as bushfire prone, the vegetation on the site and surrounds does constitute vegetation that would comprise a bushfire hazard. Therefore, to ensure the future development is designed in consideration of the bush fire risk, bushfire has been considered as part of the PP.

1.4.2 Local Planning Directions

Local Planning Direction 4.3 – Planning for Bushfire Protection (LPD 4.3) is applicable:

> *when a relevant planning authority prepares a PP that will affect, or is in proximity to land mapped as bushfire prone land.*

As outlined above, the site is being considered as bushfire prone as a precautionary measure.

Where LPD 4.3 is applicable, the relevant planning authority must do the following:

(1) *In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 3.34 of the Act, and prior to undertaking community consultation in satisfaction of clause 4, Schedule 1 to the EP&A Act, and take into account any comments so made.*

(2) *A planning proposal must:*

- (a) *have regard to Planning for Bushfire Protection 2019,*
- (b) *introduce controls that avoid placing inappropriate developments in hazardous areas, and*
- (c) *ensure that bushfire hazard reduction is not prohibited within the Asset Protection Zone (APZ).*

(3) *A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:*

- (a) *provide an Asset Protection Zone (APZ) incorporating at a minimum:*
  - i. *an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and*
  - ii. *an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,*
- (b) *for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with,*
- (c) *contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,*
- (d) *contain provisions for adequate water supply for firefighting purposes,*
- (e) *minimise the perimeter of the area of land interfacing the hazard which may be developed,*
- (f) *introduce controls on the placement of combustible materials in the Inner Protection Area.*

A PP can only be inconsistent with the above in the following circumstance:

> *A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Planning Secretary (or an officer of the Department nominated by the Secretary) that the council*

> *has obtained written advice from the Commissioner of the NSW Rural Fire Service to the effect that, notwithstanding the non- compliance, the NSW Rural Fire Service does not object to the progression of the planning proposal.*

As outlined in **Section 3**, the PP will:

- Provide a perimeter road within an APZ sized to comply with PBP 2019;
- Will enable two way roads within the development area linking to the perimeter roads;
- Provide for water supply adequate for fire fighting purposes; and
- Minimises the perimeter of the land adjoining the hazard as best as possible/practiable.

1.4.3 Planning for Bush Fire Protection

Planning for Bush Fire Protection 2019 (PBP 2019) applies to all development on bush fire prone land. Section 4 of PBP applies to the Strategic Planning stage of development of land. PBP identifies that:

> *In a bush fire context, strategic planning needs to ensure that future land uses are in appropriate locations to minimise the risk to life and property from bush fire attack. Services and infrastructure that facilitate effective suppression of bush fires also need to be provided for at the earliest stages of planning (NSW Rural Fire Service 2019)p. 34.*

PBP identifies that at a strategic stage, the following broad principles should be applied:

- *ensuring land is suitable for development in the context of bush fire risk;*
- *ensuring new development on BFPL will comply with PBP;*
- *minimising reliance on performance-based solutions;*
- *providing infrastructure associated with emergency evacuation and firefighting operations; and*
- *facilitating appropriate ongoing land management practices (NSW Rural Fire Service 2019)p. 34.*

This SBFS has been prepared to demonstrate that the future development of the site will be consistent with these principles.

A SBFS is to include consideration of the issues outlined in Table 4.2.1 of PBP, which includes:

- Bush Fire Landscape Assessment
- Land Use Assessment
- Access and Egress
- Emergency Services
- Infrastructure
- Adjoining Land

These issues have been addressed in **Section 2** of this report.

PBP 2019 requires that once these strategic issues have been addressed, an assessment of whether the proposal can comply with the relevant performance criteria within Chapters 5-7 of PBP is to be carried out. If the strategic issues cannot be resolved, then the proposal cannot comply with PBP. This has been addressed in **Section 3** of this report.

2 Bush Fire Issues

2.1 Introduction

This section of the report addresses the Bush Fire Issues as outlined in Table 4.2.1 of PBP.

2.2 Bush Fire Landscape Assessment

2.2.1 Bush Fire Hazard

2.2.1.1 Bushfire Behaviour

The main factors influencing bushfire behaviour are:

- Fuel (vegetation)
    - Type of fuel
    - Size and quantity
    - Arrangement
    - Moisture content
- Weather
    - Air temperature
    - Relative humidity
    - Wind speed and direction
    - Atmospheric stability
- Topography
    - Slope (upslope v downslope)
    - Aspect

Each of these is discussed below in relation to the site and its surrounds.

Fuel (Vegetation Formations)

A Landscape consideration of vegetation (from the State Vegetation Mapping) is provided in **Figure 4**. It can be seen that the land to the north and west of the site is urban. There are scattered areas of woodland and forest, with the predominant area being grassland (not mapped on the SVTM).

The vegetation within the site and within 140m of the site (the assessment area) has been classified in accordance with *Ocean Shores to Desert Dunes* (Keith 2004) as required by A1.2 of PBP. The vegetation classification has been based on the State Vegetation Mapping (NSW Government n.d.) and ground truthing.

The classified vegetation within the assessment area has been mapped and is shown on **Figure 5**. Photographs of the classified vegetation from the site inspection are provided in the following plates for each of the assessment plots. A post development vegetation classification plan has also been provided in **Figure 6**.

Providing any proposed landscaping within the open space areas is:

- Maintained in a managed state at all times; or
- Provided within a maximum area of less than 2,500m² and located more than 20m from any future dwellings and more than 20m from any other areas of classified vegetation; or
- A strip of vegetation less than 20m wide (measured perpendicular to the elevation exposed to the strip of vegetation) and not within 20m of any future dwelling and more than 20m from any other areas of classified vegetation or other strip of the same vegetation,

then, it can be classified as an exemption pursuant to section A1.10 of PBP. It is assumed that the landscaping of the site will achieve these requirements from the preliminary information provided. Thus Plot 1a will become an exclusion.

Legend

- Planning Proposal Site Merged
- 1km buffer
- 2km buffer

Vegetation Formations

- Dry Sclerophyll Forests (Shrub/grass sub-formation)
- Dry Sclerophyll Forests (Shrubby sub-formation)
- Forested Wetlands
- Grassy Woodlands
- Not classified
- Wet Sclerophyll Forests (Grassy sub-formation)

0 1,000 2,000 m

1: 20,000 @ A3

Source: MetroMap; NSW Spatial Services; SEED

Ref: 23074

Figure 4: Landscape Vegetation Considerations

Plot 1	
Vegetation Description	Unmanaged grassland with scattered remnant trees. Grassland is grazed in varying degrees.
Existing Classification	Grassland
Post Development Classification	APZ/Grassland

Plate 1: Plot 1

Plate 2: Plot 1

Plate 3: Plot 1

Plate 4: Plot 1

Plate 5: Plot 1

Plate 6: Plot 1

Plot 1	
Vegetation Description	Unmanaged grassland with scattered remnant trees. Grassland is grazed in varying degrees.
Existing Classification	Grassland
Post Development Classification	APZ/Grassland

Plate 7: Plot 1

Plate 8: Plot 1

Plate 9: Plot 1

Plate 10: Plot 1

Plate 11: Plot 1

Plate 12: Plot 1

Plot 1	
Vegetation Description	Unmanaged grassland with scattered remnant trees. Grassland is grazed in varying degrees.
Existing Classification	Grassland
Post Development Classification	APZ/Grassland

Plate 13: Plot 1

Plate 14: Plot 1

Plate 15: Plot 1

Plate 16: Plot 1

Plate 17: Plot 1

Plate 18: Plot 1

Plot 1	
Vegetation Description	Unmanaged grassland with scattered remnant trees. Grassland is grazed in varying degrees.
Existing Classification	Grassland
Post Development Classification	APZ/Grassland

Plate 19: Plot 1

Plate 20: Plot 1

Plot 2	
Vegetation Description	Managed vegetation around existing rescue helicopter shed.
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions/APZ

Plate 21: Plot 2

Plate 22: Plot 2

Plot 2	
Vegetation Description	Managed vegetation around existing rescue helicopter shed.
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions/APZ

Plate 23: Plot 2

Plate 24: Plot 2

Plot 3	
Vegetation Description	Managed open space area along southwestern side of Bathurst Road forming part of subject site. Consists of mown lawn, rows of trees (not changing bushfire risk/classification) and managed garden beds.
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions/APZ

Plate 25: Plot 3

Plate 26: Plot 3

Plot 3	
Vegetation Description	Managed open space area along southwestern side of Bathurst Road forming part of subject site. Consists of mown lawn, rows of trees (not changing bushfire risk/classification) and managed garden beds.
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions/APZ

Plate 27: Plot 3

Plate 28: Plot 3

Plate 29: Plot 3

Plot 4	
Vegetation Description	Non-vegetated areas and managed vegetation within bulky goods development north of the site.
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 30: Plot 4

Plate 31: Plot 4

Plate 32: Plot 4

Plate 33: Plot 4

Plate 34: Plot 4

Plate 35: Plot 4

Plot 5	
Vegetation Description	Hard sealed roads within assessment area
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 36: Plot 5

Plate 37: Plot 5

Plate 38: Plot 5

Plate 39: Plot 5

Plate 40: Plot 5

Plate 41: Plot 5

Plot 5	
Vegetation Description	Hard sealed roads within assessment area
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 42: Plot 5

Plate 43: Plot 5

Plate 44: Plot 5

Plot 6	
Vegetation Description	Non-vegetated areas and managed vegetation within bulky goods development northeast of the site.
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 45: Plot 6

Plate 46: Plot 6

Plate 47: Plot 6

Plate 48: Plot 6

Plot 7	
Vegetation Description	Unmanaged grassland within vacant lot of bulky goods area
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 49: Plot 7

Plate 50: Plot 7

Plot 8	
Vegetation Description	Non-vegetated areas and managed vegetation within residential subdivision development west of the site.
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 51: Plot 8

Plate 52: Plot 8

Plot 9	
Vegetation Description	Non-vegetated areas and managed vegetation adjacent to the south west of the site
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 53: Plot 9

Plate 54: Plot 9

Plot 10	
Vegetation Description	Unmanaged grassland to the southwest of the site. Partially grazed areas and some remnant trees.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 55: Plot 10

Plate 56: Plot 10

Plot 10	
Vegetation Description	Unmanaged grassland to the southwest of the site. Partially grazed areas and some remnant trees.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 57: Plot 10

Plate 58: Plot 10

Plot 11	
Vegetation Description	Pocket of existing trees, some deciduous, with semi managed understorey. Contiguous row of pines along road boundary fence. Composition such not to warrant forest classification.
Existing Classification	Woodland
Post Development Classification	Woodland

Plate 59: Plot 11

Plate 60: Plot 11

Plot 11	
Vegetation Description	Pocket of existing trees, some deciduous, with semi managed understorey. Contiguous row of pines along road boundary fence. Composition such not to warrant forest classification.
Existing Classification	Woodland
Post Development Classification	Woodland

Plate 61: Plot 11

Plot 12	
Vegetation Description	Non-vegetated areas and managed vegetation around existing dwelling adjacent to the south west of the site
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 62: Plot 12

Plate 63: Plot 12

Plot 13	
Vegetation Description	Unmanaged grassland to the south of the site. Partially grazed areas and some remnant trees.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 64: Plot 13

Plate 65: Plot 13

Plot 14	
Vegetation Description	Non-vegetated areas and managed vegetation around existing dwelling to the south of the site
Existing Classification	A1.10 Low threat vegetation – exclusions
Post Development Classification	A1.10 Low threat vegetation – exclusions

Plate 66: Plot 14

Plate 67: Plot 14

Plot 15	
Vegetation Description	Unmanaged grassland to the south of the site. Partially grazed areas and some remnant trees. Trees are typically provided as scattered paddock trees or windbreaks.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 68: Plot 15

Plate 69: Plot 15

Plot 16	
Vegetation Description	Unmanaged grassland to the south of the site. Partially grazed areas and some remnant trees. Trees are typically provided as scattered paddock trees or windbreaks.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 70: Plot 16

Plate 71: Plot 16

Plot 17	
Vegetation Description	Unmanaged grassland to the east of the site. Partially grazed areas and some remnant trees. Trees are typically provided as scattered paddock trees or windbreaks.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 72: Plot 17

Plate 73: Plot 17

Plate 74: Plot 17

Plate 75: Plot 17

Plot 18	
Vegetation Description	Fenced OSD pond with grass vegetation
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 76: Plot 18

Plate 77: Plot 18

Plot 19	
Vegetation Description	Roadside swale area with grouping of trees and tall grassy vegetation. Most akin to Forest vegetation
Existing Classification	Forest
Post Development Classification	Forest

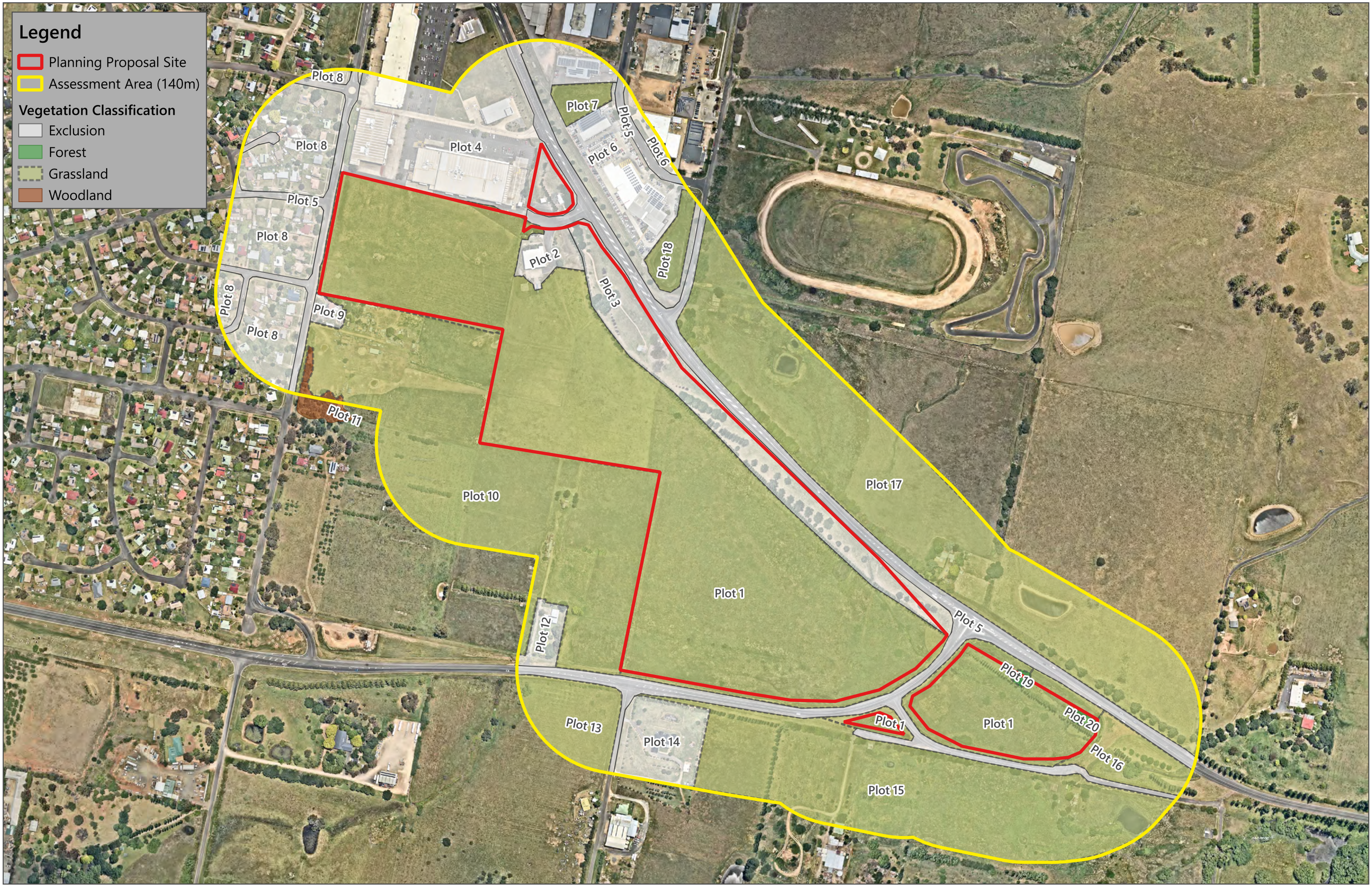
Plate 78: Plot 19

Plate 79: Plot 19

Plot 20	
Vegetation Description	Roadside swale area with grouping of trees and tall grassy vegetation. Most akin to Forest vegetation
Existing Classification	Forest
Post Development Classification	Forest

Plate 80: Plot 20

Plate 81: Plot 20



Source: NearMap; DCS Spatial Services
Ref: 23074

Figure 5: Pre Development Vegetation Classification Plan

Legend

Planning Proposal Site

Assessment Area (140m)

Vegetation Classification

Exclusion

Forest

Grassland

Woodland

Plot 8

Plot 8

Plot 4

Plot 7

Plot 5

Plot 6

Plot 6

Plot 5

Plot 8

Plot 8

Plot 2

Plot 18

Plot 3

Plot 8

Plot 9

Plot 8

Plot 11

Plot 10

Plot 17

Plot 1a

Plot 12

Plot 5

Plot 19

Plot 20

Plot 1c

Plot 1b

Plot 16

Plot 13

Plot 14

Plot 15

0 140 280 m

1:4,500 @ A3

Source: NearMap; DCS Spatial Services

Ref: 23074

Figure 6: Post Development Vegetation Classification Plan

Weather

Weather has the ability to influence a bushfire in terms of its size, intensity, speed and predictability. It influences bushfire fuels (vegetation) in terms of available fuel and its flammability (dryness). Low humidity causes fuels to dry out and become more flammable. Wind causes fires to spread across the landscape along the ground and also through the spread of embers (Bureau of Meterology 2019).

Fire Danger Index (FDI) is defined as:

> *The chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long and short term drought effects (Standards Australia 2018).*

In determining bushfire behaviour, FDI is used for the weather inputs. In *Australian Standard AS3959:2018 Construction of buildings in bushfire-prone areas* (AS3959) the Forest Fire Danger Index (FFDI) calculated from the McArthur Mk5 model is used and the Grassland Fire Danger Index (GFDI) from the McArthur Mk4 model is used.

The site is located within the Orange City Local Government Area (LGA) which is located within the Central Ranges RFS Fire Weather District (No. 10). In Table 2.1 of AS3959 and (NSW Rural Fire Service 2017), the site is located in a FDI 80 area. The RFS identifies that the FDI rating is based on an assumed 1:50 year event (NSW Rural Fire Service 2006).

(Douglas 2017) has undertaken a comparative design FFDI based on a variety of methods considering weather inputs from 1972 to 2009. For Fire Weather District No. 10, the 1:50 year recurrence FFDI was determined as 83. This is fairly consistent with the AS3959 and PBP FDI of 80.

Topography

Both slope and aspect impact on bushfire behaviour. The topography for the assessment area is shown in **Figure 6**. The slope within the site and immediate surrounds is fairly flat with slopes predominately of <5 degrees. There are a few isolated areas within the southeastern extent of the study area which are within the >5 to 10 degree range.

The land generally slopes from the northwest to southeast. To determine the effective slope, 2m contour data has been sourced from the NSW Elevation Data Service (NSW Government n.d.). The contour data was verified by ground truthing during the site inspection. It can be seen from **Figure 7** that the site is predominantly exposed to an effective slope of Downslope of 1 to 2 degrees.

Westerly and northerly aspects are typically considered to have a greater exposure to bushfire risk due to:

- greater solar exposure and thus dryer vegetation, and
- northerly/westerly winds being the predominant wind direction during the bushfire season.

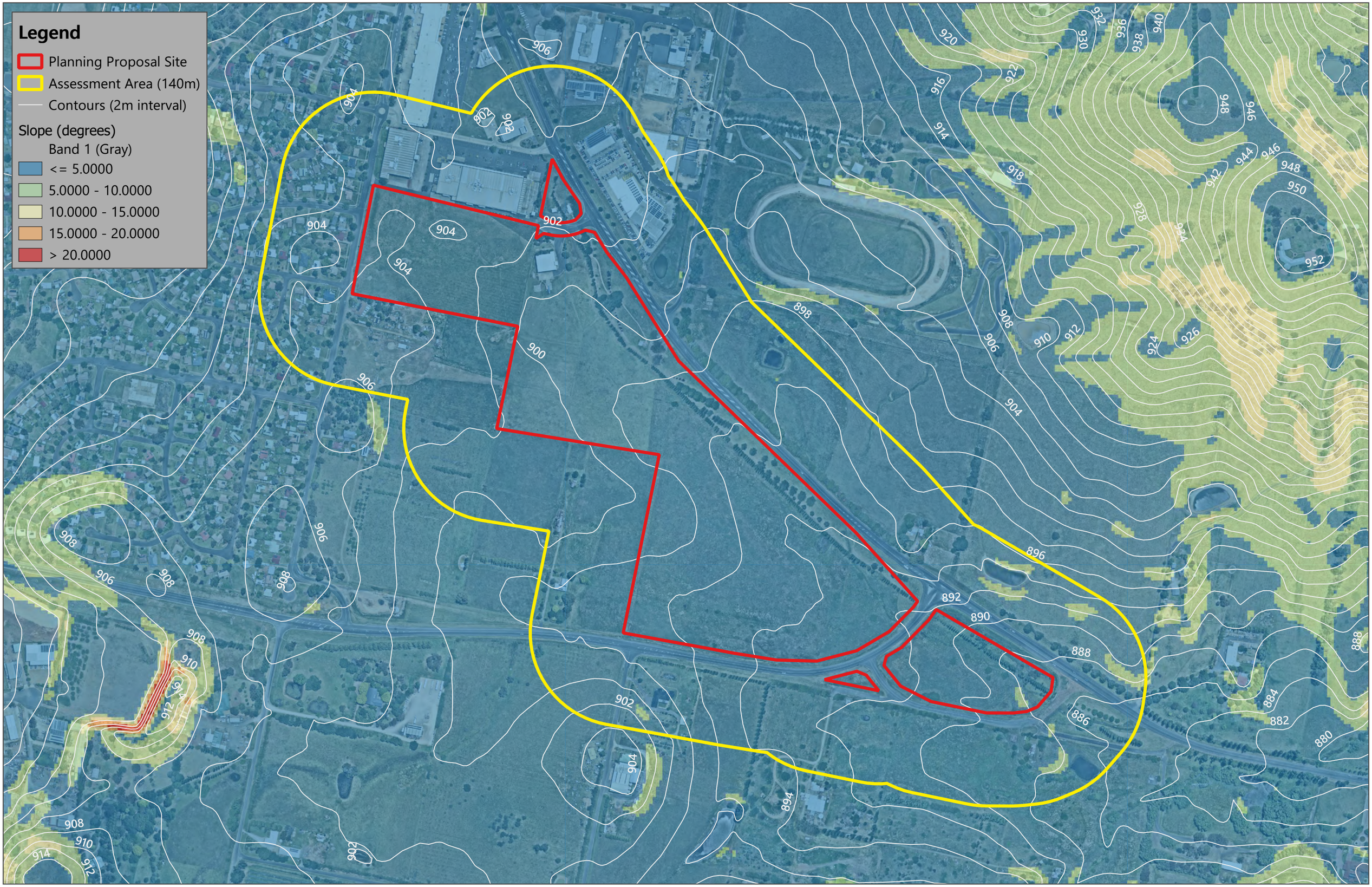
The land to the north and west of the site is predominantly urban development not constituting bush fire prone vegetation. The bushfire risk to the site subsequently originates from the south and east, and with limited fire runs from the south west.

2.2.1.2 Climate Change

The Adapt NSW's *Western Enabling Regional Adaption: Central West and Orana Region Report* has identified that the Central West and Orana Region is likely to experience the following impacts associated with climate change:

- *The region is expected to experience an increase in all temperature variables (average, maximum and minimum), more hot days, and fewer cold nights for the near and far futures. Heatwaves are also projected to increase, be hotter and last longer.*
- *Seasonality of rainfall will change. Autumn rainfall will increase in the near future and the far future. The majority of models agree that spring rainfall will decrease in the near future and far future. Winter rainfall is projected to decrease in the near future; however, summer rainfall is projected to increase in the far future.*
- *Fire risk will increase, with projected increases in average and severe Forest Fire Danger Index values in the near future and the far future (Adapt NSW 2017).*

With the effects of climate change, the FDI could in fact be higher thus impacting fire behaviour.



Source: NearMap; DCS Spatial Services
Ref: 23074

Figure 7: Topography

Legend

- Planning Proposal Site
- 140m Buffer
- Contours (2m)
- Slope (Degrees)

Vegetation Classification Post Development

- Exclusion
- Forest
- Grassland
- Woodland

0 200 400 m

1:5,000 @ A3

Source: NearMap; DCS Spatial Services
Ref: 23074

Figure 8: Slope

2.2.2 Potential Fire Behaviour

2.2.2.1 Introduction

In terms of land use planning, bushfire behaviour is usually characterised by rates of spread, fire line intensity and flame length.

2.2.2.2 Rates of Spread

The fire behaviour rate of spread equations used by AS3959:2018 for the vegetation classifications found within the assessment area are outlined in **Table 3.** This table also outlines the Rate of Spread for each vegetation type, based on the FDI of 80 and GFDI of 110 and the fuel loads as outlined in Table A1.12.8 of PBP.

Table 3: Rate of Spread

Fuel Type (Vegetation Classification)	Rate of Spread Equation	Understorey Fuel Load (t/ha)	Rate of Spread (km/h) FDI 80/GFDI 110
Forest	*R = 0.0012 x FDI x w*	22	2.112
Woodland	*R = 0.0012 x FDI x w*	10.5	1.008
Grassland	*R = 0.13 x GFDI*	n/a	14.3
Notes: R = rate of spread (km/h) FDI = McArthur Fire Danger Index and is dimensionless w = understory fuel load (tonnes/ha) from Table A1.12.8 of PBP 2018 GFDI = Grassland Fire Danger Index as shown in Table B2(A) of AS3959:2018			

Consistent with equation B1 of AS3959:2018, the slope correction for rate of spread is outlined for each scenario in **Table 4**. Conservatively the worst-case slope has been used for the assessment.

Table 4: Corrected Rate of Spread for effective slope

Initial Rate of Spread	Effective Slope	Rate of Spread Equation	Corrected Rate of Spread (km/h)
Forest			
2.112	Downslope >0° - 5°	$R_{slope} = R\ exp\ (-0.069\ slope)$	2.98
Woodland			
1.008	Upslope	$R_{slope} = R\ exp\ (-0.069\ slope)$	1.008
Grassland			
14.3	Downslope >0° - 5°	$R_{slope} = R\ exp\ (-0.069\ slope)$	20.19
Notes: R_{slope} = forward rate of spread adjusted for effective slope (km/h) R = rate of spread (km/h) determined in **Table 3**. Slope = effective slope (degrees)			

2.2.2.3 Fire line Intensity

Equation B2 of AS3959:2018 provides the formula for calculating fire intensity. It is outlined in **Table 5** along with the intensity for each Fuel Type/slope mix.

Table 5: Fire Intensity

Fuel Type (Vegetation Classification)	Fire Intensity Equation	Total Fuel Load (t/ha)	Intensity (kW/m)
Forest (>0° - 5°)	$I = HW R_{slope}/36$	36.1	55,622
Woodland (flat/upslope)	$I = HW R_{slope}/36$	20.2	10,520
Grassland (>0° - 5°)	$I = HW R_{slope}/36$	6	62,594

Notes:

I = fire intensity (kW/m)

H = heat of combustion (18,600 kJ/kg)

W = Total fuel load (tonnes/ha) from Table A1.12.8 of PBP 2018

R_{slope} = rate of spread (km/h) from **Section 2.2.2.2**

2.2.2.4 Flame Length

Equations B3 to B5 of AS3959:2018 provides the formulae for calculating flame length. It is outlined in **Table 6** along with the flame length for each fuel type/slope mix.

Table 6: Flame Length

Fuel Type (Vegetation Classification)	Flame Length Equation	Flame Length (m)
Forest (>0° - 5°)	$L_f = [13 R_{slope} + 0.24W]/2$	23.72
Woodland (flat/upslope)	$L_f = [13 R_{slope} + 0.24W]/2$	8.98
Grassland (>0° - 5°)	$Lf = 1.192 (I/1000)^{0.5}$	9.43

Notes:

L_f = Flame Length (m)

R_{slope} = rate of spread (km/h) from **Section 2.2.2.2**

W = Total fuel load (tonnes/ha) from Table A1.12.8 of PBP 2018

I = fire intensity (kW/m) from **Table 5**.

2.2.2.5 Radiant Heat

Radiant heat flux has been calculated for the site based on the methodology in Appendix 1 of PBP, utilising the post development plots in **Figure 5,** as outlined in **Table 7** and using Table A1.12.6 of PBP. The "acceptable level" of radiant heat exposure from a planning perspective for standard residential development is 29kW/m², which equates to the size of an Asset Protection Zone (APZ). The separation distance required to achieve this "acceptable level" is outlined in **Table 7**.

A Bushfire Attack Level (BAL) contour plan is provided in **Figure 8.** The APZs required to be provided within the development site shown in **Figure 9**.

Table 7: Radiant Heat Flux – APZ Requirements for Residential Development

Plot	Vegetation Classification	Effective Slope	Separation Distance to achieve 29kW/m² (APZ)
1	Grassland	Downslope >0° - 5°	11m
2	Exclusion A1.10	N/A	N/A
3	Exclusion A1.10	N/A	N/A
4	Exclusion A1.10	N/A	N/A
5	Exclusion A1.10	N/A	N/A
6	Exclusion A1.10	N/A	N/A
7	Grassland	Downslope >0° - 5°	11m
8	Exclusion A1.10	N/A	N/A
9	Exclusion A1.10	N/A	N/A
10	Grassland	Downslope >0° - 5°	11m
11	Woodland	Upslope	11m
12	Exclusion A1.10	N/A	N/A
13	Grassland	Upslope	10m
14	Exclusion A1.10	N/A	N/A
15	Grassland	Downslope >0° - 5°	11m
16	Grassland	Downslope >0° - 5°	11m
17	Grassland	Downslope >0° - 5°	11m
18	Grassland	Upslope	10m
19	Forest	Downslope >0° - 5°	25m
20	Forest	Downslope >0° - 5°	25m

For any developments that are defined as a Special Fire Protection Purpose Development (SFPP), the acceptable level of radiant heat exposure is 10kW/m² at 1200K. The required separation distance (i.e. APZ) required to achieve this is outlined in **Table 8**. **Figure 9** shows the required APZ for any SFPP developments on site (i.e. they cannot be located within the SFPP APZ area).

Table 8: Radiant Heat Flux – APZ Requirements for SFPP Developments

Plot	Vegetation Classification	Effective Slope	Separation Distance to achieve 10kW/m² @ 1200K (APZ)
1	Grassland	Downslope >0° - 5°	40m
2	Exclusion A1.10	N/A	N/A
3	Exclusion A1.10	N/A	N/A
4	Exclusion A1.10	N/A	N/A
5	Exclusion A1.10	N/A	N/A
6	Exclusion A1.10	N/A	N/A
7	Grassland	Downslope >0° - 5°	40m

Table 8: Radiant Heat Flux – APZ Requirements for SFPP Developments

Plot	Vegetation Classification	Effective Slope	Separation Distance to achieve 10kW/m² @ 1200K (APZ)
8	Exclusion A1.10	N/A	N/A
9	Exclusion A1.10	N/A	N/A
10	Grassland	Downslope >0° - 5°	40m
11	Woodland	Upslope	42m
12	Exclusion A1.10	N/A	N/A
13	Grassland	Upslope	36m
14	Exclusion A1.10	N/A	N/A
15	Grassland	Downslope >0° - 5°	40m
16	Grassland	Downslope >0° - 5°	40m
17	Grassland	Downslope >0° - 5°	40m
18	Grassland	Upslope	36m
19	Forest	Downslope >0° - 5°	79m
20	Forest	Downslope >0° - 5°	79m

2.2.2.6 Impacts of Climate Change

Based on the trends outlined in **Section 2.2.1.2**, it would seem likely that climate change will impact on FDI. It also has the potential to impact on fuel loads, through more/less rain and change in temperatures.

An increase in FDI will exacerbate the impacts of bushfire, including rates of spread, fire line intensity, flame length, radiant heat and consequentially the size of APZs.

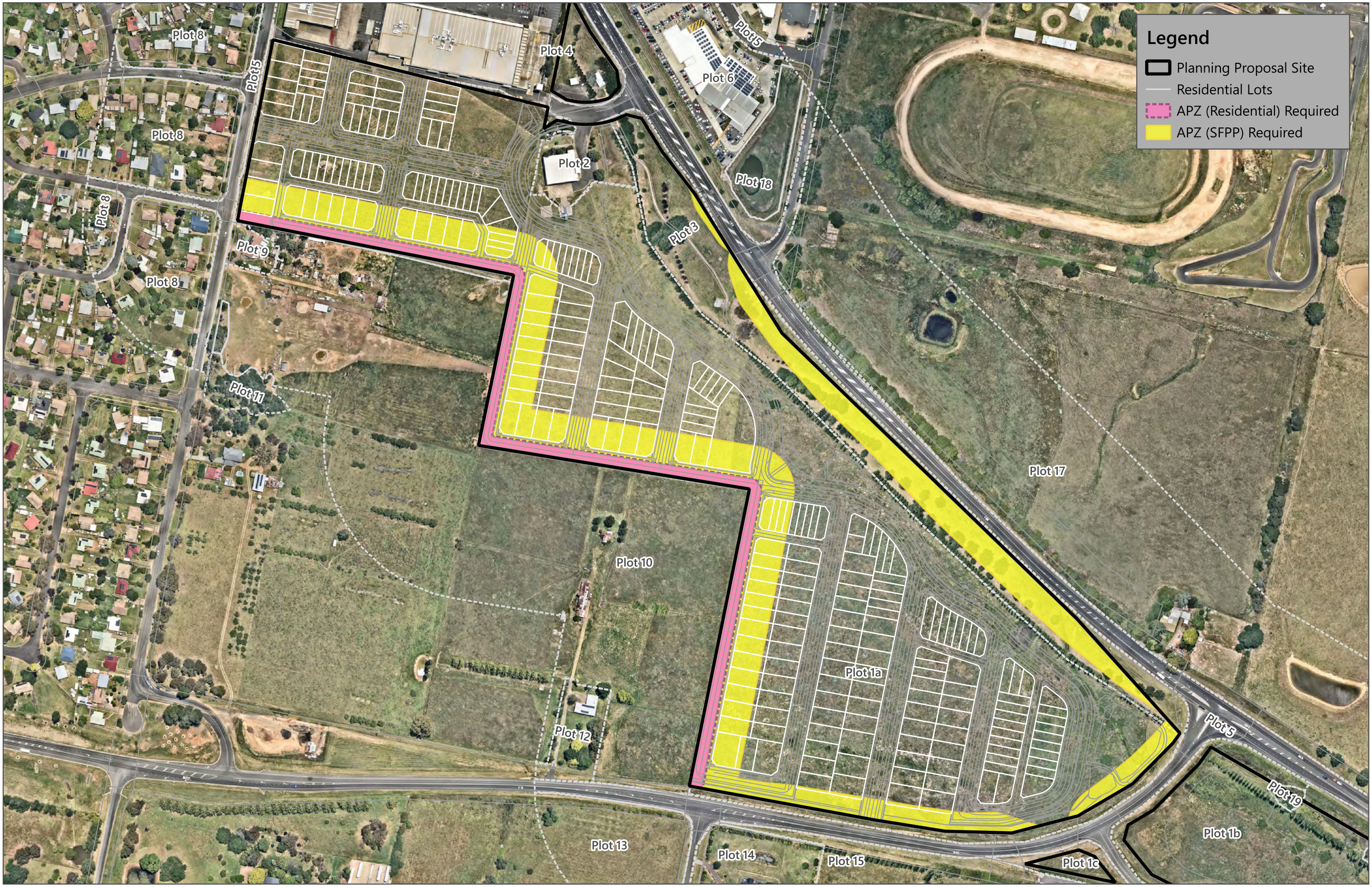
2.2.3 Bush Fire History

A review of Geoscience Australia's Fire History (see **Figure 10**) shows that a number of prescribed burns and wildfires/bushfires have occurred in the wider area. None have impacted in the vicinity of the site.

2.2.4 Potential Fire Runs

The area around the site is characterised by grassland vegetation, with small pockets of woodland and forest. There are direct fire runs from the south and limited runs from the south west. Fire runs exist from the east of the site beyond the Bathurst Road.

Legend
Planning Proposal Site
Residential Lots
BAL-FZ
BAL-40
BAL-29
BAL-19
BAL-12.5
Plot 8
Plot 15
Plot 4
Plot 5
Plot 6
Plot 2
Plot 18
Plot 3
Plot 9
Plot 11
Plot 10
Plot 12
Plot 13
Plot 14
Plot 15
Plot 1a
Plot 17
Plot 1b
Plot 1c
Plot 19
Plot 20
0
100
200 m
1:3,000 @ A3
Source: NearMap; DCS Spatial Services
Ref: 23074
Figure 9: BAL Contours



Source: NearMap; DCS Spatial Services
Ref: 23074

Figure 10: APZs Required on Site

Legend

Planning Proposal Site

Historical Bushfire Boundaries

Bushfire

Prescribed Burn

Unknown

Clergate

Windera

March

Summer Hill Creek

Lower Lewis Ponds

FREEMANTLE NR

Borenore

Clifton Grove

Orange

Suma Park Reservoir

Orange

Freemantle

Lewis Ponds

Nashdale

Emu Swamp

MOUNT CANOBOLAS SC

Spring Creek

Lucknow

Byng

Huntley

Canobolas

Springside

Shadforth

Guyong

Spring Hill

Spring Terrace

0 5,000 10,000 m

1:100,000 @ A3

Source: DCS Spatial Services; Geoscience Australia; SEED

Ref: 23074

Figure 11: Fire History

2.3 Land Use Assessment

The purpose of this section of the report is to identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.

The development site is subject to a fairly uniform bushfire risk from grassland. Internally, the development site itself will be wholly managed as an "exclusion" in accordance with Section A1.10 of PBP.

The PP will facilitate residential development. Though the standard permissible land uses within the residential zoning, the PP may in the future accommodate more vulnerable types of land uses such as those within the SFPP development definition.

The design of the development will therefore ensure that all future developable areas will have a maximum radiant heat flux exposure of 29kW/m² (refer **Figure 8**). This will be achieved through the provision of APZs, sized in accordance with PBP, throughout the future subdivision development.

The appropriate location of any future SFPP developments on the site would be required to be located outside of the SFPP APZ as shown in **Figure 9**.

2.4 Access & Egress

The purpose of this section is to consider the existing and proposed road networks both within and external to the masterplan area or site layout.

The existing local road network is shown in **Figure 12**. The site has frontage to Bathurst Road (formerly Mitchell Highway), Dairy Creek Road, Lone Pine Avenue, and Redmond Place.

Bathurst Road (formerly Mitchell Highway) is a state classified road (No.705) and forms the eastern boundary of the site. Bathurst Road connects into the Mitchell Highway (at intersection with the Northern Distributor) which provides connection between Bathurst and Orange and beyond. Direct access to Bathurst Road is not proposed. Bathurst Road is generally a two-lane two-way sealed road (refer **Plate 82** and **Plate 83**).

Redmond Place is a two-lane two-way sealed local road which connects to Bathurst Road in the north eastern corner of the site (refer **Plate 84**). The masterplan shows a new road connection to Redmond Place.

Dairy Creek Road is a two-lane two-way sealed local road which connects to Bathurst Road in the east and Blowes Road in the west (refer **Plate 85**). The masterplan shows that a new road connection will be provided to Dairy Creek Road.

Lone Pine Avenue is a two-lane two-way sealed local road which connects to Bathurst Road in the north and Dairy Creek Road in the south (refer **Plate 86** and **Plate 87**). The masterplan shows a new road connection to Lone Pine Avenue as well as an emergency access to Lone Pine Avenue.

Plate 82: Bathurst Road looking south at the intersection with Redmond Place

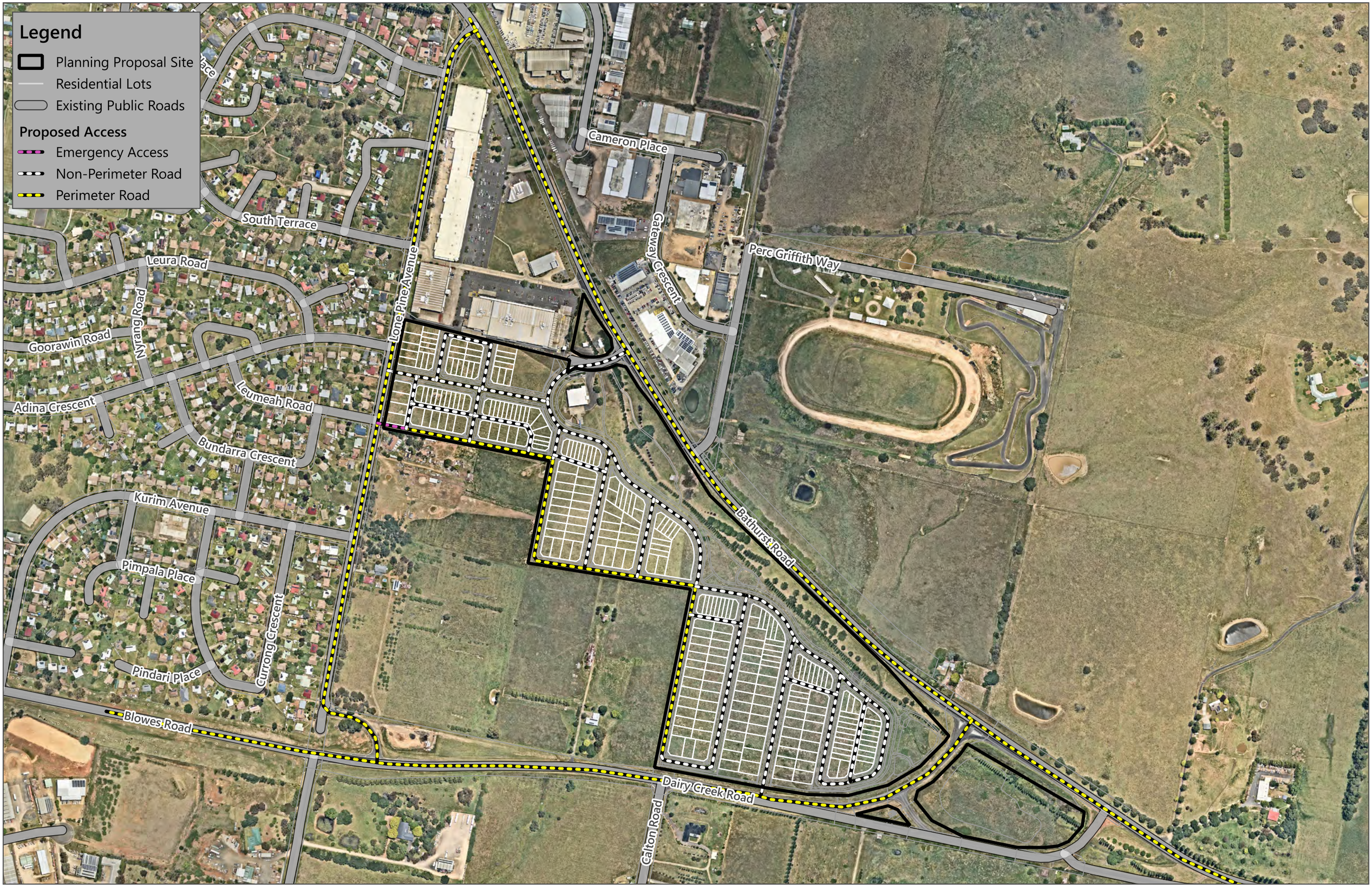
Plate 83: Bathurst Road looking south adjacent to the southern end of the site

Plate 84: Redmond Place looking east to Bathurst Road

Plate 85: Dairy Creek Road looking east adjacent to intersection with Calton Road

Plate 86: Lone Pine Avenue Looking north from north western corner of site

Plate 87: Lone Pine Avenue Looking south from north western corner of site



0 100 200 m

1:5,000 @ A3

Source: NearMap; DCS Spatial Services
Ref: 23074

Figure 12: Road Network

The PP road network features three access and egress points to and from the Site including:

- the existing intersection of Redmond Place and the Bathurst Road,
- a new access road onto Lone Pine Avenue,
- a new access road onto Dairy Creek Road.

PBP requires more than one access out of new subdivisions such as that proposed, which the development will comply with. The access to be provided will allow egress from the site in two directions from each of the access points (i.e. north and south along Lone Pine Avenue, east and west along Dairy Creek Road, and north and south along Bathurst Road from Redmond Place).

It is not expected that the development site would become isolated in the event of a bushfire due to the grassland predominating and adjacent non-bushfire prone areas to the west and north of the site.

The internal road network will provide for perimeter roads at the interface with all external bushfire hazards. Internal bushfire hazards will be provided with appropriate access and hazard separation. The internal road network has been designed to provide for a highly permeable road network, with nil no-through roads.

2.5 Emergency Services

This section provides consideration of the future impact of new development on emergency services provision.

The development will increase the demand for emergency services responding to a bushfire emergency. Consultation will be required with NSW Fire & Rescue and NSW Rural Fire Service in order to determine requirements for additional resourcing.

The development has been designed to comply with PBP requirements, and thus providing an environment to facilitate emergency services' ability to carry out fire suppression in a bushfire emergency.

2.6 Infrastructure

This section provides consideration of the issues associated with infrastructure provision.

The development will include the provision of a reticulated water supply. It will be designed to:

- Provide fire hydrant spacing, design, pressures and flows to comply with AS2419.1:2005;
- Provide a ring main system within the perimeter roads;
- Hydrants will not be located within road carriageways or be impeded by parking.

On this basis, it is expected that the reticulated water system will therefore be able to deal with a major bushfire event.

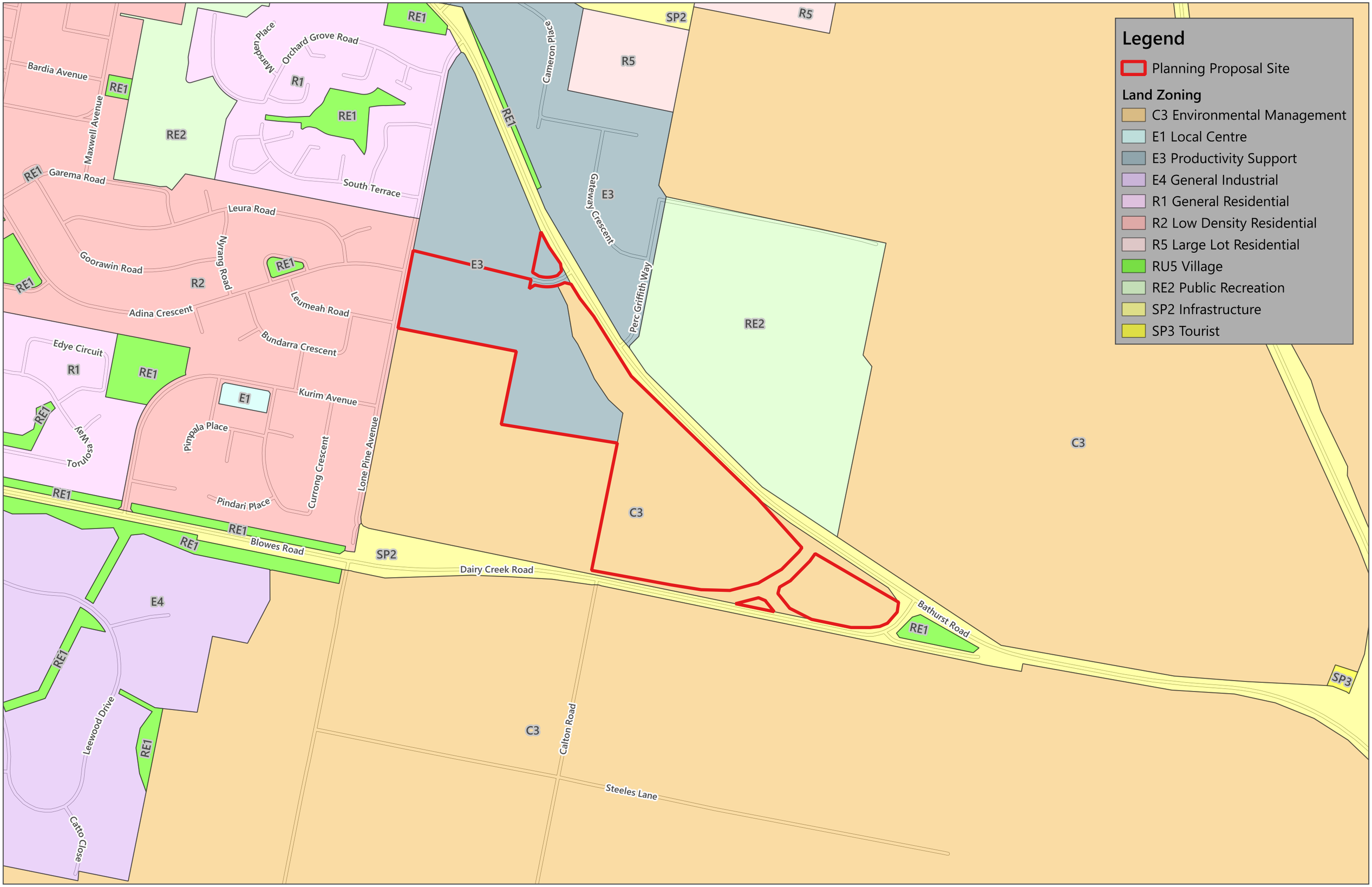
Electricity connections within the development site will be underground. Any gas provision will be required to be compliant with AS/NZS 1596:2014.

2.7 Adjoining Land

This section considers the impact of new development on adjoining landowners and their ability to undertake bush fire management.

Figure 12 shows the land surround the site and the current LEP zoning of the land. It can be seen that the land to the north and west of the site is urban, being a mixture of residential (R1 & R2) zoned land and commercial (E3). The land to the east of the site is zoned RE2 Public Recreation, and to the south and further to the east is C3 Environmental Management.

The land to the southwest, south, east and north east of the site has the ability to carry a bushfire as outlined in **Section 2.2**. The development has been designed to be consistent with PBP. It is therefore not expected that the development would place increased pressure on the adjoining landowners to introduce or increase bush fire protection measures as a result of the changes in land use.



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Source: NSW Spatial Services; SEED
Ref: 23074

Figure 13: LEP Zoning

3 Bush Fire Protection Measures

3.1 Introduction

This section of the report provides a high-level consideration of the Bush Fire Protection Measures (BFPM) that apply to subdivisions that will accommodate residential land uses. There are six key BFPMs outlined by PBP:

- Asset Protection Zones and Defendable Space;
- Construction Standards and Design;
- Access Standards (public roads, private access and fire trails);
- Water Supply and Utility Services;
- Emergency Management Arrangements; and
- Landscaping

The BFPMs relevant to the development have been considered in below.

3.2 Asset Protection Zones & Defendable Space

The intent of measures for the Asset Protection Zone (APZ) BFPM is:

> *to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.*

The following table outlines the Performance Criteria and associated Acceptable Solutions for the APZ BFPM, and how the development responds.

Table 9: Asset Protection Zone (APZ) Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
Asset 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.	☒	☐	☐	As outlined in **Section 2.2.2.5,** APZs will be provided in accordance Table A1.12.3 of PBP to ensure all future dwellings are not exposed to radiant heat levels exceeding 29 kW/m².
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.	☒	☐	☐	Any future APZs will be able to be managed in accordance with the requirements of Appendix 4 of PBP.
The APZs is provided in perpetuity	APZs are wholly within the boundaries of the development site	☒	☐	☐	APZs are wholly within the subject 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.	☒	☐	☐	The APZs will be located on land with a slope of less than 18 degrees.
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 Appendix 4; and	☒	☐	☐	Any future landscaping of the lots is to be in accordance with the requirements of Appendix 4 of PBP.
	Fencing is constructed in accordance with section 7.6.	☒	☐	☐	Any future fencing is to be constructed in accordance with Section 7.6 of PBP.

3.3 Construction Standards & Design

No built form is proposed as part of this Planning Proposal. Nevertheless, no future dwelling would be greater than BAL-29 as outlined in **Section 2.2.2.5**.

3.4 Access

The intent of measures for the Access BFPM is:

to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

The following table outlines the Performance Criteria and associated Acceptable Solutions for the Access BFPM, and how the development responds.

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
Access (General Requirements)					
Firefighting vehicles are provided with safe, all-weather access to structures.	Property access roads are two-wheel drive, all-weather roads;	☒	☐	☐	All roads are to be two wheeled drive, all weather roads.
	Perimeter roads are provided for residential subdivisions of three or more allotments;	☒	☐	☐	Perimeter roads are to be provided at the interface with adjacent offsite hazards (referred to as the Interface Street within the masterplan). The existing external road network (i.e. Bathurst Road, Dairy Creek Road and Lone Pine Avenue) also provide perimeter roads.
	Subdivisions of three or more allotments have more than one access in and out of the development;	☒	☐	☐	The masterplan provides three connections to the existing external road network.

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	Traffic management devices are constructed to not prohibit access by emergency services vehicles;	☒	☐	☐	All traffic management devices are to be constructed to facilitate 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;	☒	☐	☐	Grades are to not exceed 15 degrees for sealed roads.
	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;	☐	☐	☒	No dead end roads.
	Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	☒	☐	☐	The development can comply.
	Where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and	☐	☐	☒	No access through forest, woodland or heath vegetation.

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	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.	☐	☐	☒	No one way public access roads provided.
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 the road surfaces will be sufficient to carry a fully laden fire fighting vehicle.
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 are to 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 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and	☒	☐	☐	Hydrants are to be provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning
	There is suitable access for a Category 1 fire appliance to within 4m of the static	☒	☐	☐	Reticulated water supply to be provided.

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	water supply where no reticulated supply is available.				
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 environment for emergency service personnel during firefighting and emergency management on the interface.	Are two-way sealed roads;	☒	☒	☐	Perimeter roads are to be two way sealed roads, apart from a very small section adjacent to Lone Pine Avenue, which will be provided as an emergency access. The perimeter road could not be continued straight through in this location as it would result in an inappropriate traffic planning outcome by producing a four way intersection with Leumeah Road and result in inconsistent road geometry. The small section of emergency access will in fact provide for improved access for fire fighting vehicles as it will be dedicated for their use and therefore have no conflict with egressing residents. Further it will provide for operational space free from impact of egressing residents. A performance solution based on this proposal would be consistent with the performance criteria.
	Minimum 8m carriageway width kerb to kerb;	☒	☐	☐	Perimeter roads can achieve 8m kerb to kerb minimum.
	Parking is provided outside of the carriageway width;	☒	☐	☐	Parking is to be outside of the carriageway width.
	Hydrants are located clear of parking areas;	☒	☐	☐	Hydrants are to be located clear of parking areas.

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	Are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	☒	☐	☐	All perimeter roads are through roads and 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 perimeter roads are to have curves with 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 road is to be 15 degrees and average grade of not more than 10 degrees.
	The road crossfall does not exceed 3 degrees; and	☒	☐	☐	The road crossfall will 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 is to be provided to any overhanging obstructions, including tree branches.
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;	☒	☐	☐	All non-perimeter roads will have a minimum 5.5m wide carriageway.
	Parking is provided outside of the carriageway width;	☒	☐	☐	Parking is to be provided outside of the carriageway for all non-perimeter roads.
	Hydrants are located clear of parking areas;	☒	☐	☐	Hydrants are to be located clear of parking areas.

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	☒	☐	☐	All roads are through roads and 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 non-perimeter roads are to have curves with a minimum inner radius of 6m.
	The road crossfall does not exceed 3 degrees; and	☒	☐	☐	Cross fall on the public roads will not exceed 3 degrees.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☒	☐	☐	All public roads will have a minimum vertical clearance of 4m.
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 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.	☒	☐	☐	Will be an urban area with dwellings < 70m from the public road and speed limit < 70km/h.
	In circumstances where this cannot occur, the following requirements apply:				

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	• minimum 4m carriageway width;	☐	☐	☒	N/A – urban area
	• 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;	☐	☐	☒	N/A – urban area
	• a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;	☐	☐	☒	N/A – urban area
	• provide a suitable turning area in accordance with Appendix 3;	☐	☐	☒	N/A – urban area
	• curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	☐	☐	☒	N/A – urban area
	• the minimum distance between inner and outer curves is 6m;	☐	☐	☒	N/A – urban area
	• the crossfall is not more than 10 degrees;	☐	☐	☒	N/A – urban area
	• maximum grades for sealed roads do not exceed 15 degrees and not	☐	☐	☒	N/A – urban area

Table 10: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	more than 10 degrees for unsealed roads; and				
	• a development comprising more than three dwellings has access by dedication of a road and not by right of way.	☐	☐	☒	N/A – urban area
	Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, 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.				

3.5 Services – Water, Electricity & Gas

The intent of measures for the Services – Water, Electricity & Gas BFPM is:

> *To provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.*

The following table outlines the Performance Criteria and associated Acceptable Solutions for the Services – Water, Electricity and Gas BFPM, and how the development responds.

Table 11: Services – Water, Electricity & Gas Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
Water Supply					
Adequate water supplies is provided for firefighting purposes.	Reticulated water is to be provided to the development where available;	☒	☐	☐	Reticulated water supply to be provided.
	A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and	☐	☐	☒	Reticulated water supply to be provided and supply guaranteed.
	Static water supplies shall comply with Table 5.3d.	☐	☐	☒	Reticulated water supply to be provided
• 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 2419.1:2005;	☒	☐	☐	Will be designed to comply.
	Hydrants are not located within any road carriageway; and	☒	☐	☐	Will be designed to comply.

Table 11: Services – Water, Electricity & Gas Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	☒	☐	☐	Will be designed to comply.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	☒	☐	☐	Will be designed to comply.
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps; and	☒	☐	☐	Will be designed to comply.
	Above-ground water storage tanks shall be of concrete or metal.	☒	☐	☐	Not applicable as reticulated supply provided.
Electricity Services					
Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where practicable, electrical transmission lines are underground;	☒	☐	☐	It is understood that electrical transmission lines within the subdivision will be underground.
	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.	☐	☐	☒	N/A

Table 11: Services – Water, Electricity & Gas Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
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;	☒	☐	☐	Any future gas installation will be required to comply.
	All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;	☒	☐	☐	Any future gas installation will be required to comply.
	Connections to and from gas cylinders are metal;	☒	☐	☐	Any future gas installation will be required to comply.
	Polymer-sheathed flexible gas supply lines are not used; and	☒	☐	☐	Any future gas installation will be required to comply.
	Above-ground gas service pipes are metal, including and up to any outlets.	☒	☐	☐	Any future gas installation will be required to comply.

3.6 Emergency Management Arrangements

It is strongly recommended that a Bush Fire Survival Plan be prepared by the residents of the property in accordance with the NSW RFS' guidelines located on the following webpage http://www.rfs.nsw.gov.au/resources/bush-fire-survival-plan

3.7 Landscaping

Any future landscaping is to be undertaken in accordance with guidelines provided within Appendix 5 of PBP.

4 Conclusion

This SBFS has been prepared to support a PP for the rezoning of Lot 1 DP 153167, Lot 6 DP 1031236, and part Lot 200 DP 1288388, Redmond Place, Orange. The intent of the proposed LEP amendment is to facilitate residential subdivision of the site with a minimum lot size of 150m² for medium density and 300m² for low density residential.

The SBFS has provided a bushfire landscape assessment and has demonstrated:

- in a land use assessment, that the future land uses are appropriately located given the bushfire exposure,
- access and egress from the development site will be appropriate in relation to PBP,
- the development will not result in an unplanned for demand for emergency services,
- the infrastructure to be provided to the development site will be appropriate to support the development and consistent with PBP, and
- the development will not result in pressure on adjoining land owners to increase bushfire protection measures.

The PP has been designed to ensure the future subdivision/masterplan can comply with PBP.

The PP is consistent with Local Planning Direction 4.3 Planning for Bushfire Protection as it will:

- Provide for APZ, in accordance with Table A1.12.3 of PBP, to ensure that all residential development will be exposed to no greater than 29kW/m² of radiant heat;
- The APZ will contain a perimeter road, in accordance with PBP, for the interface of the development site with external bushfire hazards.
- Contain a network of two-way roads that link to the perimeter roads.
- Ensure adequate reticulated water supply is provided in accordance with PBP.
- Where possible minimise the perimeter of the area of land interfacing with the bushfire hazard that is to be developed.
- Introduce controls on the placement of combustible materials within the APZs on site.

On completion, the proposed subdivision will ensure that all habitable development is located in an area that has an acceptable bushfire hazard level (i.e. ≤BAL-29). With the implementation of the requirements of PBP as part of the future subdivision development, the PP:

- ensures the land is suitable for development in the context of bush fire risk,
- ensures the new development will comply with PBP,
- avoids/minimises the reliance on performance based solutions,
- provides adequate infrastructure for emergency evacuation and firefighting operations, and
- facilitates appropriate on-going land management practices.

5 References

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Appendix A

Masterplan

4.1 Master Plan

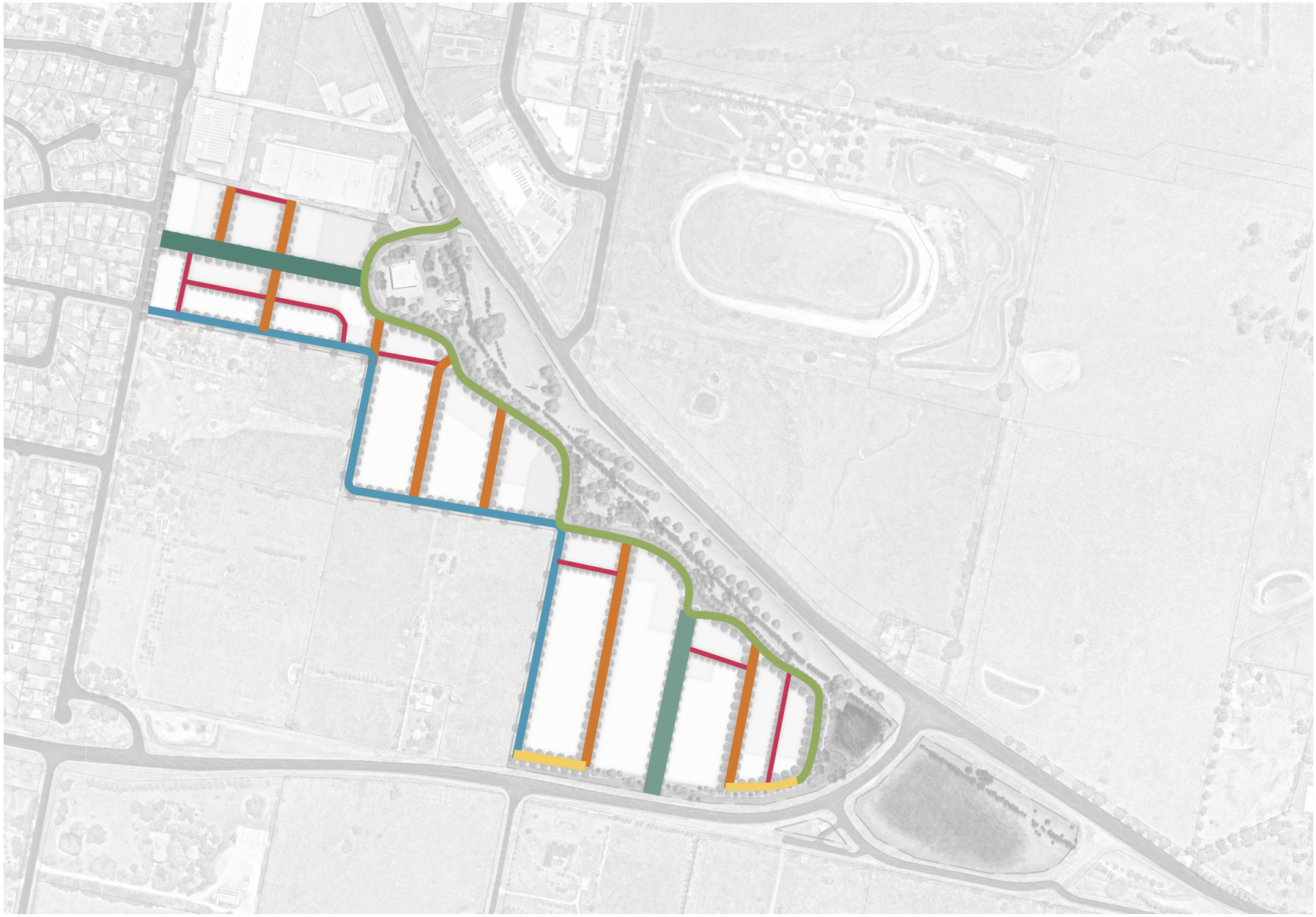
Legend

1	Homemaker precinct
2	Northern Entry Street
3	Existing picnic shelter and toilet block
4	Hangar building
5	Northern park
6	Central park
7	Stormwater basins
8	Southern entry street
9	Drainage swale
10	Wetland
11	Sewer pump station
	Open Space
	Low Density Lots
	Medium Density Lots
	Low Rise Apartments
	Site Boundary

Street Network
Streets Types

Legend

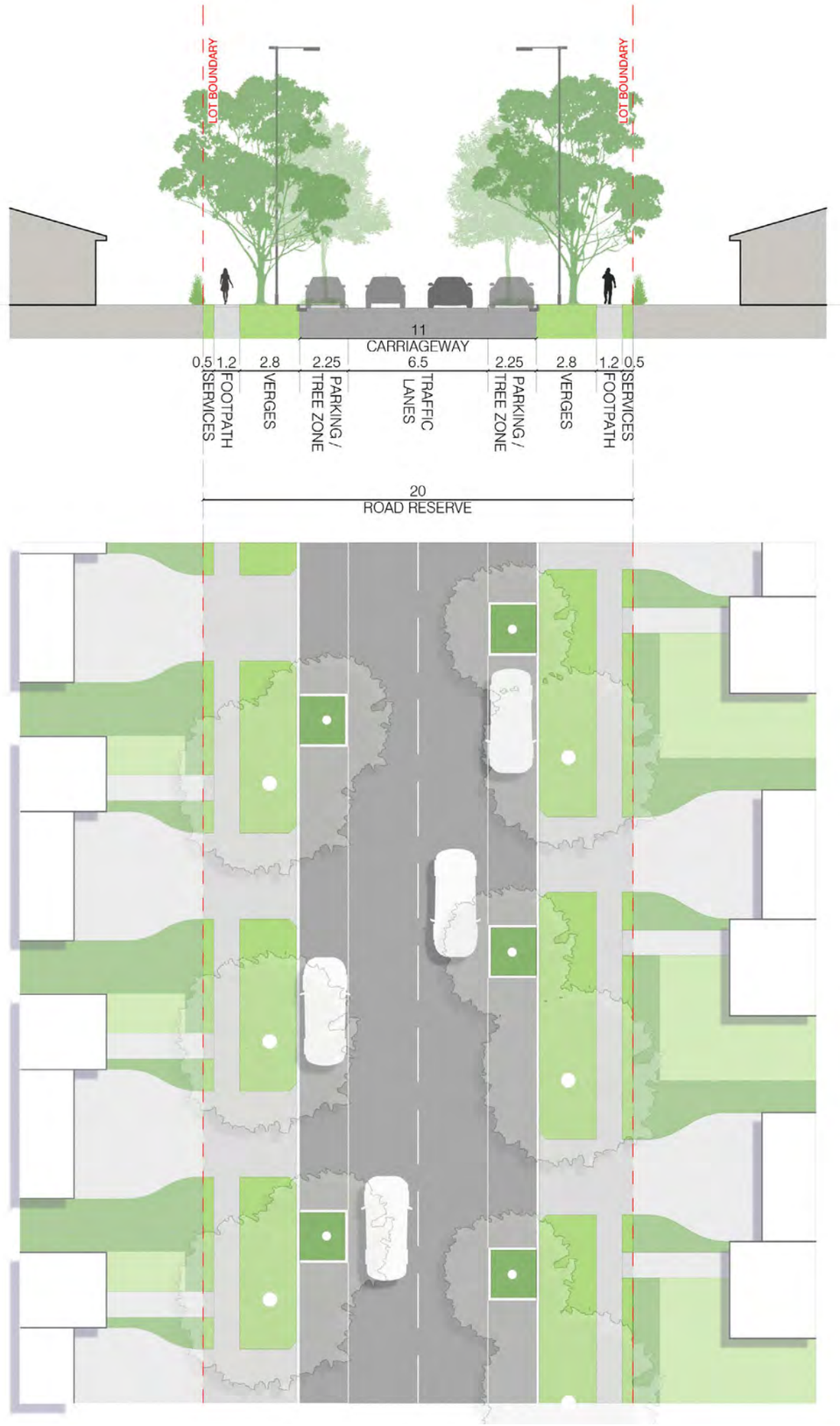
- Local Street
- Park Street
- Northern Entry Street
- Southern Entry Street
- Interface Street
- Southern Interface Street
- Laneway



0m 40 100 200m

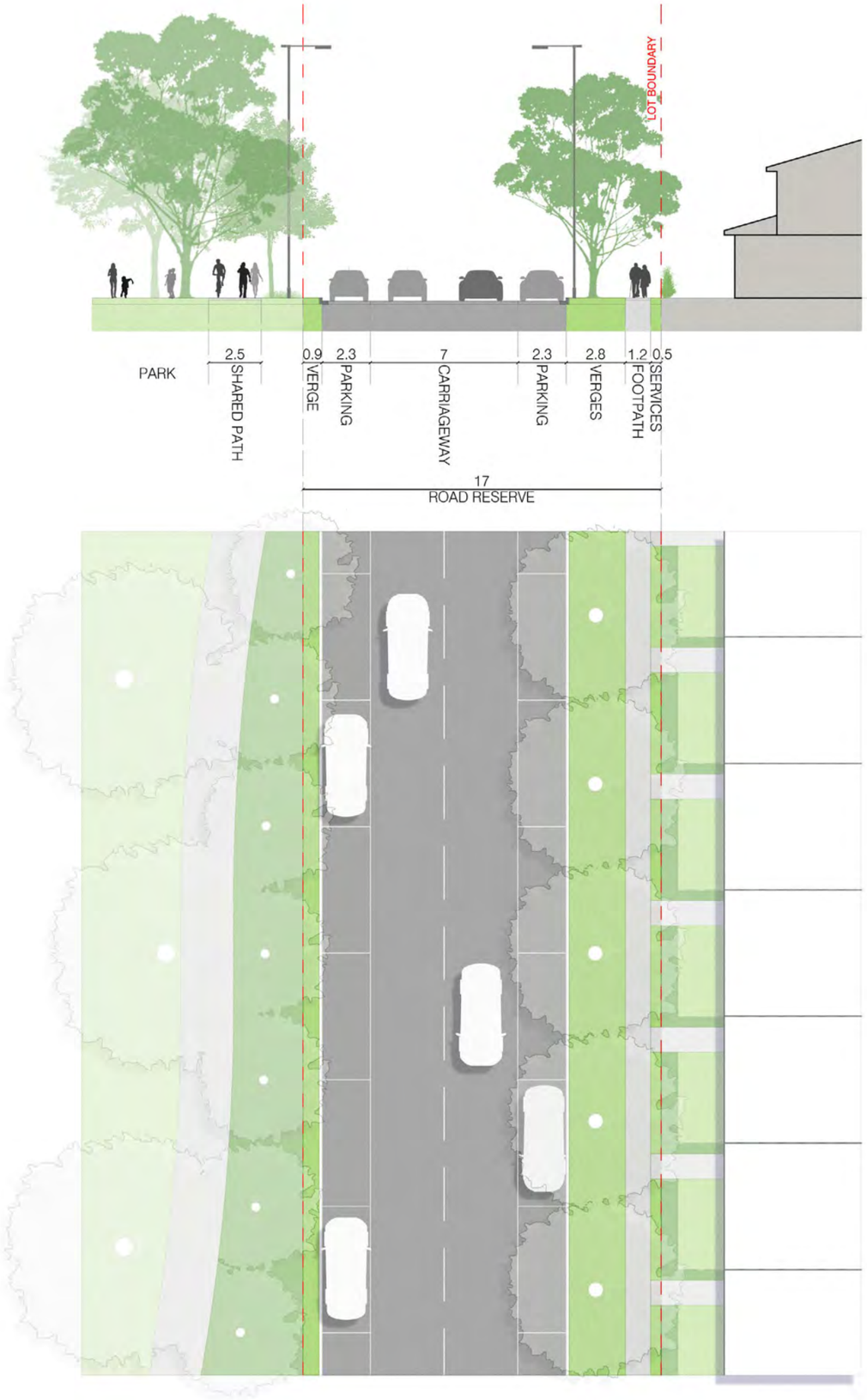
Street Network
Local Street

+ Trees in carriageway to be considered, subject to available room and distances between driveways



Street Network
Park Street

+ Verge incorporated into park to reduce reserve width
+ Bus route (partial)

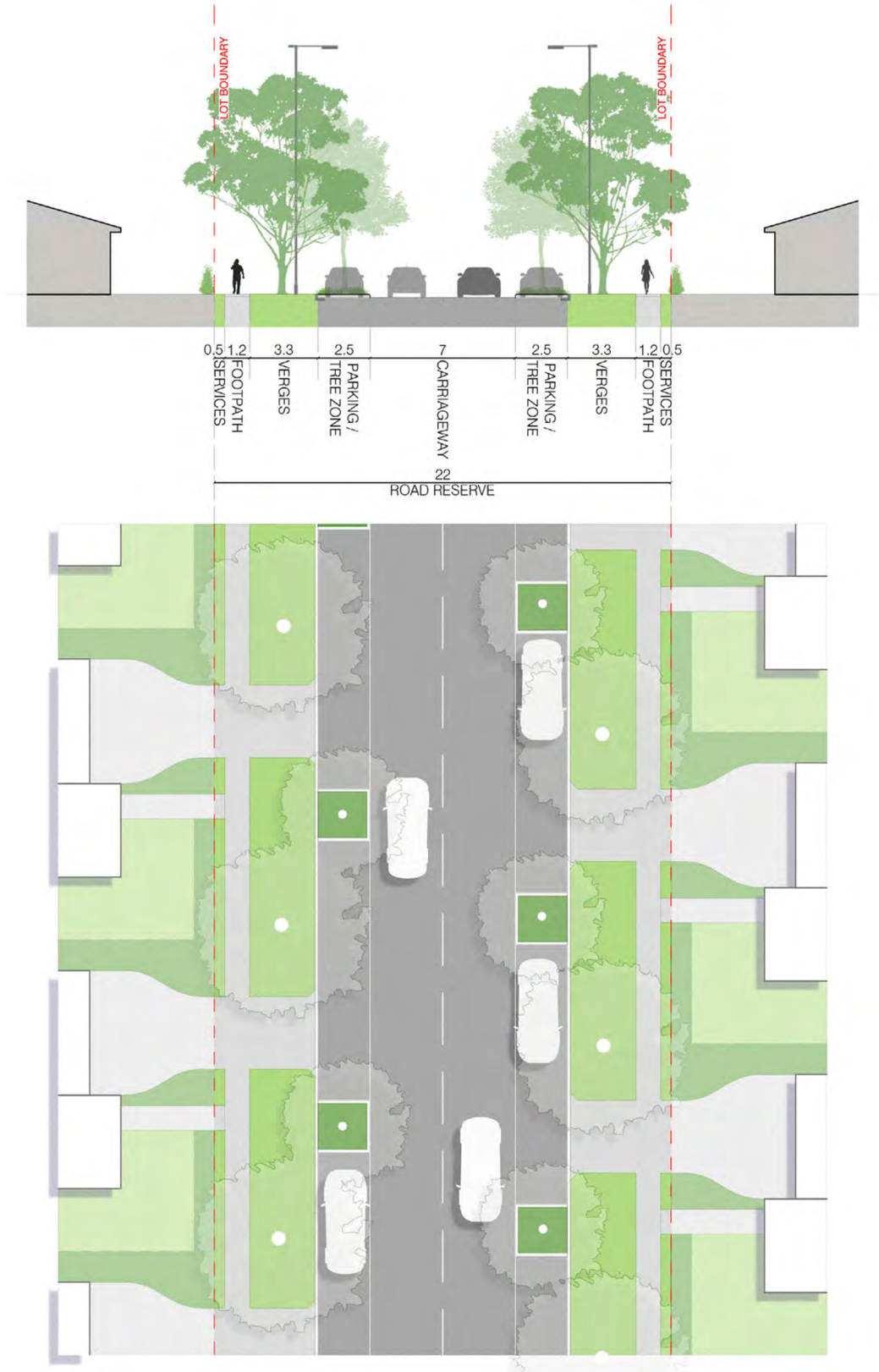


Street Network
Northern Entry Street

+ Create an avenue / green link to open space
+ Opportunity for WSUD in median
+ Bus route

Street Network
Southern Entry Street

+ Create an avenue / green link to open space
+ Trees in carriageway to be considered against available room and distances between driveways
+ Footpath both sides and consider trees in parking zones
+ Bus route

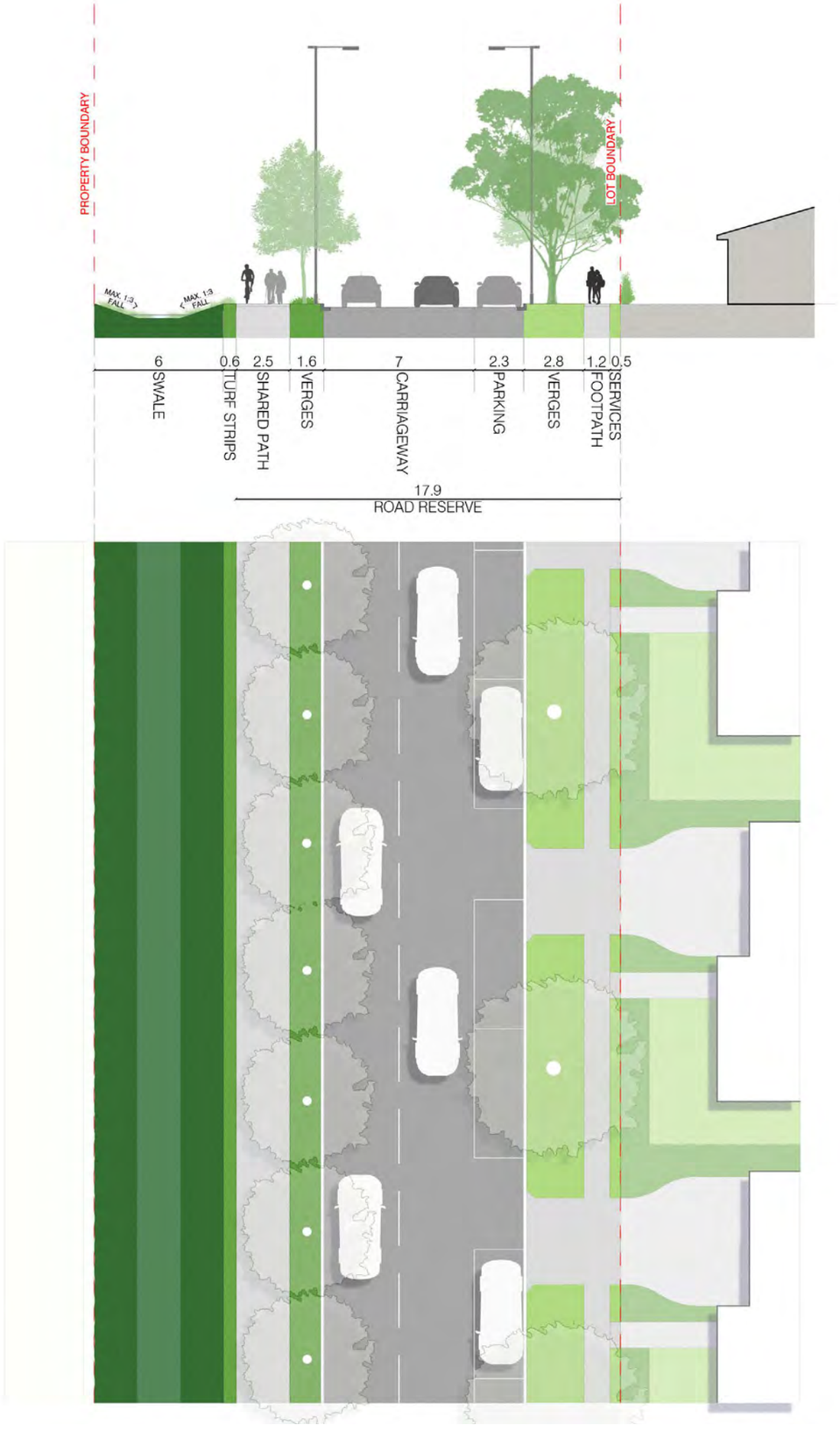


Street Network
Interface Street

+ 3m landscape verge/strip vs boundary with planting to meet APZ requirements
+ 8m 2-way carriageway with no designated parking.
+ 8m road + 3m verge = 11m APZ
+ Reduced tree canopy within APZ

Street Network
Southern Interface Street

+ Parking on northern side only
+ 2.5m shared path connects into open space
+ 6m swale along southern boundary



Street Network
Laneway

+ Laneways to act as shared pedestrian / vehicle zones