



Strategic Bushfire Study

Belmore Road Precinct

Precinct Planning

CKDI Bringelly Pty Ltd

27 September 2023

(Ref: 19183)

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Executive summary

This report is a 'Strategic Bushfire Study' prepared to address the requirements of the NSW Rural Fire Service (RFS) document *Planning for Bush Fire Protection 2019* (NSW RFS 2019) and the *Environmental Planning and Assessment Act 1979* Section 9.2 Ministerial Direction 4.3 – 'Planning for Bush Fire Protection' for the proposal to rezone land within the site referred to as Belmore Road Precinct. The future uses will include residential development, a village centre and employment lands.

This study presents the results of a detailed investigation into landscape and site influences on bushfire behaviour and development design. The study maps the risk across the subject site to inform the development of the Indicative Layout Plan (ILP) and proposed land zoning and apply site specific bushfire protection measures. The study also assesses the access and evacuation capacity as well as impacts on emergency management.

Research on bushfire hazard (comprising vegetation and topography), fire weather, fire intensity patterns, fire history and ignition sources has allowed an analysis of potential fire scenarios that could impact the subject site. Potential fire paths identified included bushfire spread from west to east across the woodland vegetated hills towards the subject site. A fire could also emanate from the woodland and into agricultural lands to the south of the site creating a fast-moving grassfire.

Risk profile mapping for the subject site resulted in an unconstrained development environment with no high risk areas identified. Land within 100 m of the boundary were identified as 'medium' risk with the remainder of the subject site mapped low risk. Development can occur within both risk areas with compliant bushfire protection measures such as APZs and adequate access. The more vulnerable uses (high density development and school site) are situated within the low risk areas.

The proposed rezoning will facilitate new uses and improvements to access, infrastructure and emergency services which will achieve compliance with *Planning for Bush Fire Protection 2019*.

This study demonstrates the proposal to rezone the subject site satisfies EP&A Act s.9.2 Direction 4.3 – 'Planning for Bush Fire Protection' and *Planning for Bush Fire Protection 2019*. The proposal is not considered incompatible with the surrounding environment and bushfire risk. With sound bushfire management, the proposal can exist within bushfire prone land.

1 Introduction

1.1 Background

CKDI Bringelly Pty Ltd commissioned Peterson Bushfire to investigate the bushfire protection requirements associated with rezoning land within the South Creek West Release Area for future residential development including village centre, school, employment lands, parks and green space and associated infrastructure. Investigations are required to inform the precinct planning process, in particular the preparation of an Indicative Layout Plan (ILP) and Precinct Planning Report which will be submitted to the NSW Department of Planning, Infrastructure and the Environment (DoPIE) for rezoning.

This report is a 'Strategic Bushfire Study' as described by the NSW Rural Fire Service (RFS) document *Planning for Bush Fire Protection 2019* (NSW RFS 2019) and addresses the requirements for assessment of rezoning proposals involving bushfire prone land, namely the *Environmental Planning and Assessment Act 1979* Section 9.2 Ministerial Direction 4.3 – 'Planning for Bush Fire Protection'.

This study is based on a detailed investigation into landscape and site influences on bushfire behaviour and development design. An iterative process occurred identifying development constraints amongst a wider planning team to inform the preparation of an ILP. This report demonstrates compliance with the relevant bushfire protection legislation and policy.

Key changes proposed to the ILP to address comments from Council and public submissions include:

- Updates to the road network including:
 - Introduction of additional green streets into the ILP
 - Replacement of the landscape buffer along The Northern Road with a new street typology
 - Additional north-south lots across the Precinct
 - Removal of collector road between the two southern playing fields
 - Introduction of laneways west of the northern playing fields
 - Removal of sub-arterial road to reflect Lowes Creek Maryland gazetted proposal
- Updates to the Wentworth Road Investigation Area including:
 - Introduction of employment uses surrounding the local heritage item
 - Introduction of Low Density Band 1 residential
 - Introduction of an 8,000sqm local park

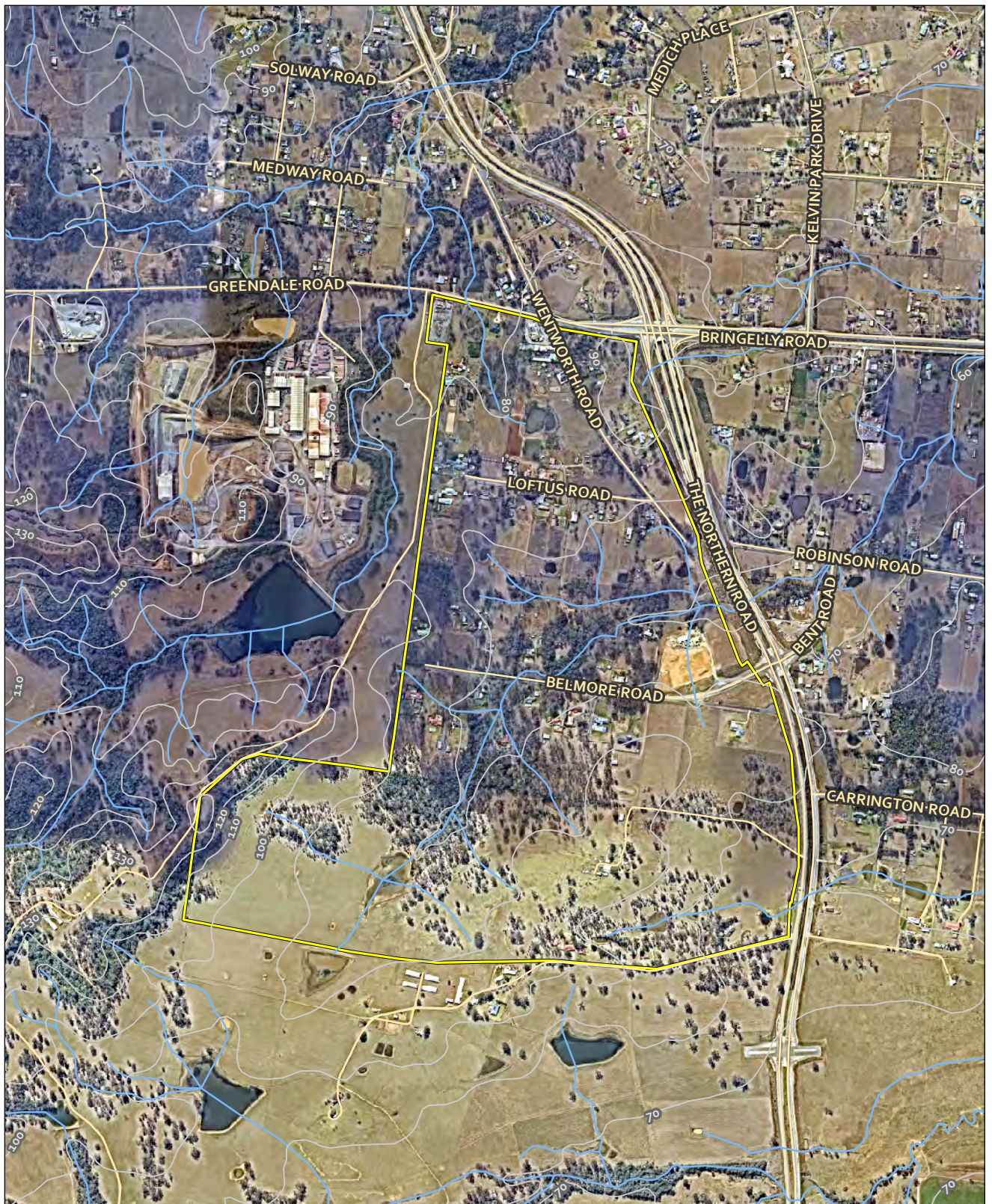
- Updates to open space including:
 - Introduction of a new open space category – tree retention (where tree retention is prioritised)
 - Introduction of a local park on the RMS landholdings north of Belmore Road
 - Relocate and increase the size of Local Park 7 from 4,000sqm to 5,000sqm
 - Increase the size of Local Park 8 from 6,000sqm to 7,000sqm
 - Introduction of a linear park in the south-west portion of the site, connecting the ridgeline to the riparian corridor
- Changes to residential areas including:
 - Removal of any residential land from the PMF flood level
 - Introduction of additional medium density on the RMS landholdings south of Belmore Road
 - Replacement of Low Density Band 2 with Medium Density Band 1 north of the northern playing fields
 - Introduction of Environmental Living lots on the south-west ridgeline
- Relocation of the future educational establishment onto the proponent's landholdings
- Introduction of a small retail centre within the south-west portion of the site

1.2 Location of subject land and description of proposal





The Belmore Road Precinct is within the Camden LGA and makes up just over 8% of the South Creek West Release Area. The land subject to rezoning comprises of approximately 60 lots covering an area of almost 190 hectares located to the west of The Northern Road and south of Greendale Road, Bringelly. The location and extent of the subject site is shown on Figure 1.

The lots are accessed by Greendale Road, The Northern Road, Loftus Road and Belmore Road as shown on Figure 1. Most of the land is zoned RU4 and consists of small rural holdings, most with a dwelling and some remnant patches of woodland. A small tributary runs through the site from south-west to north-east where it runs under The Northern Road to eventually feed into South Creek.

Belmore Road Precinct is to be rezoned to allow development including residential (low, medium and high density), a village centre, employment lands and a school. The ILP prepared as a result of the Precinct Planning study is included as Figure 2.



Legend

-  Contour - 10m
-  Watercourse
-  Road/Track
-  Subject Land



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0 125 250 500
Metres

Figure 1: The Subject Site

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

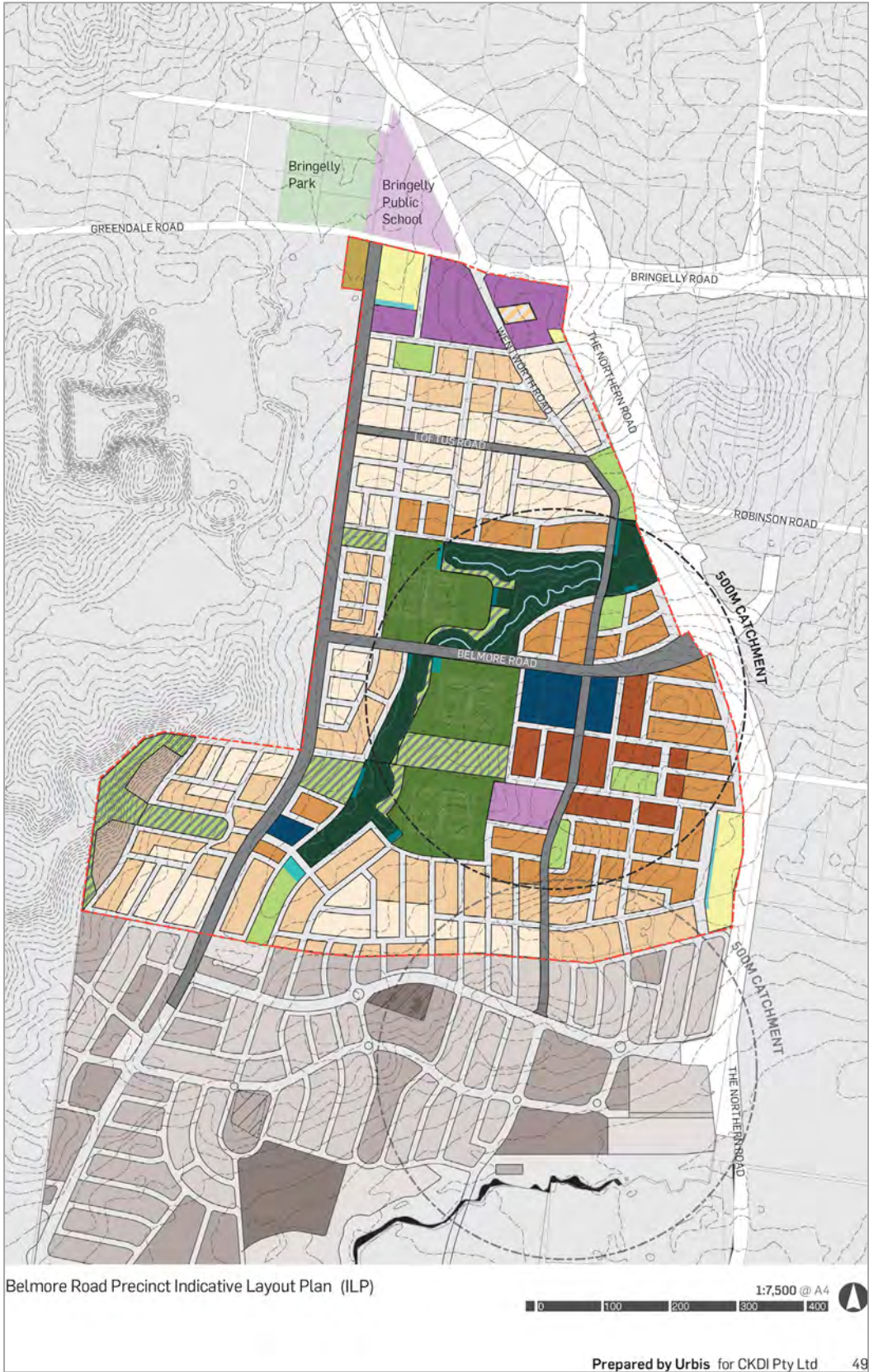


Figure 2: Indicative Layout Plan (ILP)

1.3 Bushfire assessment requirements

The subject site is identified as bushfire prone land as it contains or is within 100 m of vegetation that has the potential to sustain a bushfire or contribute to bushfire attack. Figure 3 shows the bushfire prone land mapping relating to the site.

When investigating the capability of bushfire prone land to be rezoned, submissions must have regard to Section 9.2 Direction 4.3 – ‘Planning for Bush Fire Protection’ of the *Environmental Planning and Assessment Act 1979*. The objectives of Direction 4.3 are:

- *To protect life, property and the environment from bushfire hazards, by discouraging the establishment of incompatible land uses in bushfire prone areas; and*
- *To encourage sound management of bushfire prone areas.*

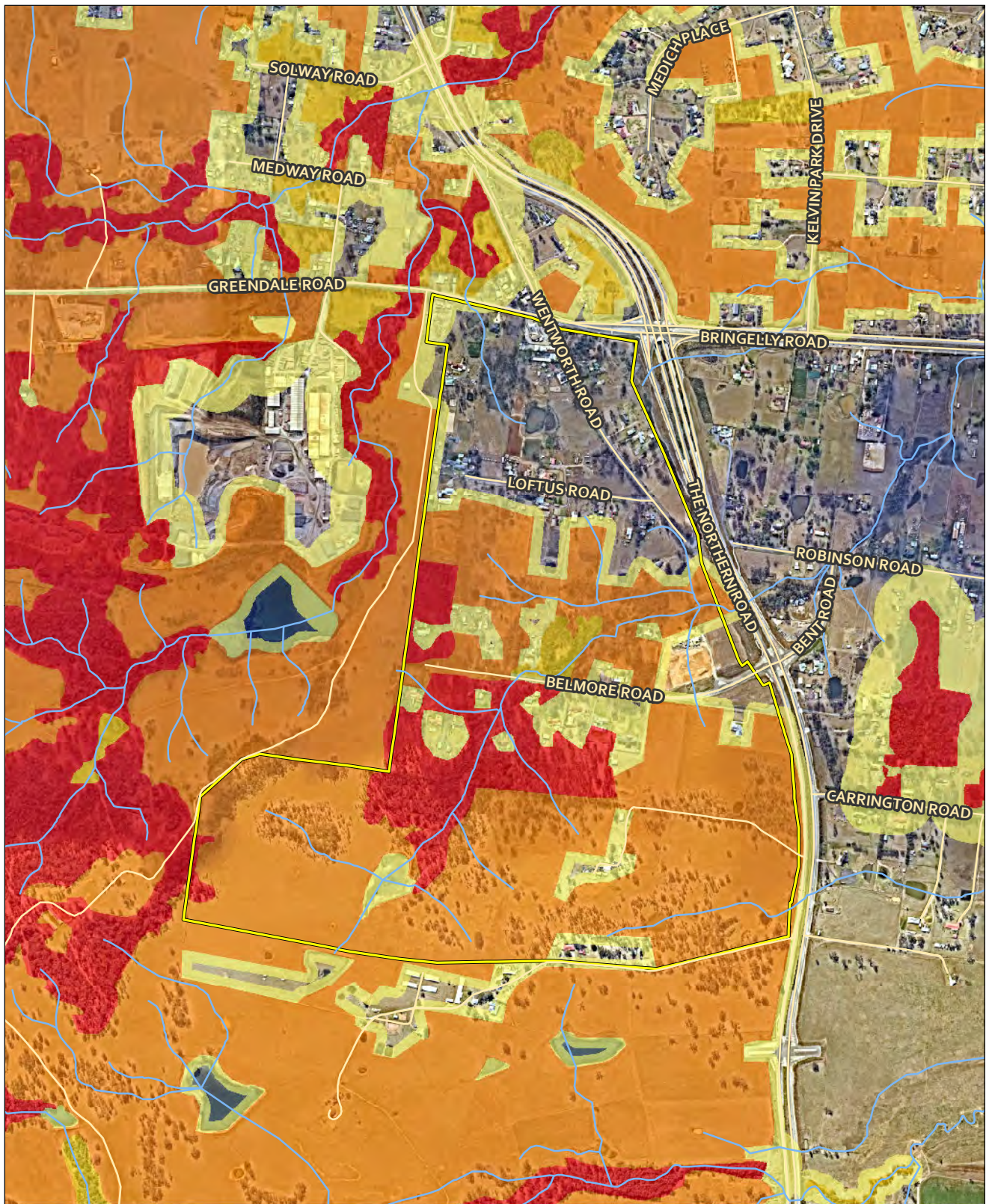
Direction 4.3 instructs councils on the bushfire matters which need to be addressed when drafting and amending Local Environmental Plans (LEP). They are as follows:

- *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 made.*
- *A planning proposal must:*
 - *have regard to the document Planning for Bush Fire Protection 2019;*
 - *introduce controls that avoid placing inappropriate developments in hazardous areas; and*
 - *ensure that bushfire hazard reduction is not prohibited within the Asset Protection Zone (APZ).*
- *A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:*
 - *provide an Asset Protection Zone (APZ) incorporating at a minimum:*
 - *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,*
 - *an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road.*
 - *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,

- *contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,*
- *contain provisions for adequate water supply for fire-fighting purposes,*
- *minimise the perimeter of the area of land interfacing the hazard which may be developed,*
- *introduce controls on the placement of combustible materials in the Inner Protection Area.*

In order to address the above requirements, *Planning for Bush Fire Protection 2019* (referred to as 'PBP' throughout this report) requires the preparation of a Strategic Bushfire Study. The study is to present a landscape assessment of fire behaviour that may impact the site and implications for land use, development scale and layout, access and evacuation, and fire-fighting infrastructure.



Legend

- | | |
|---|---|
|  Watercourse |  Vegetation Category 2 |
|  Road/Track |  Vegetation Category 3 |
|  Subject Land |  Vegetation Buffer |
| Bushfire Prone Land | |
|  Vegetation Category 1 | |



Date: 29/09/2023

0 125 250 500
Metres

Figure 3: Bushfire Prone Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

2 Assessment process

Table 1 below summarises the process followed to reach the proposed land use and bushfire protection provisions. This study is the result of a detailed investigation into bushfire behaviour and site constraints including research, field reconnaissance, modelling, and consultation with the planning team.

Table 1: Assessment process

Methodology	Task	Considerations
Desk-top review	A brief desk-top review of available mapping was undertaken to guide the field work	Familiarisation of terrain and vegetation communities
Field reconnaissance	Inspection of subject site and surrounding bushfire hazard	The inspection ground-truthed the desk top review and gathered site specific data on slope and vegetation
GIS analysis	Review and analysis of GIS mapping layers relevant to bushfire behaviour	Mapping layers include recent aerial imagery from Nearmap, vegetation mapping from OEH, and topographical data
Risk profiling	Ranking the subject site based on the outcomes of the GIS analysis	Noting any areas of concern where bushfire or environmental constraints may prevent development
Determination of constraints	Determine requirements of <i>Planning for Bush Fire Protection</i> related to the site and development potential	Primary protection requirements relating to rezoning consist of Asset Protection Zones and access
Consultation with planning team	Liaise with other technical disciplines to ensure bushfire constraints can be integrated into the ILP	Asset Protection Zone layer and access requirements presented to the team
Indicative Layout Plan review	The preferred plan was finalised through an iterative process	Final adjustments were made on detailed planning matters
Reporting	Preparation of Strategic Bushfire Study	Final report a 'Strategic Bushfire Study' prepared to address EP&A Act s.117 (2) Direction 4.3

3 Bushfire landscape assessment

An analysis of the bushfire landscape, or parameters that give rise to the bushfire threat, provides the foundation for strategic decision-making on appropriate land use patterns. The parameters to be analysed are discussed in the following subsections and consist of bushfire hazard (comprising vegetation and topography), fire weather, fire intensity patterns, fire history and ignition sources.

Figure 4 shows the wider landscape influencing a bushfire approaching the site. The predominant features are:

- Predominantly developed and managed lands to the north and east including the major roads of Greendale/Bringelly to the north, and The Northern Road to the east.
- Agricultural lands to the south and south-east which may present a grassland hazard.
- Proximity to woodland across hilly country generally to the west.

3.1 Vegetation communities

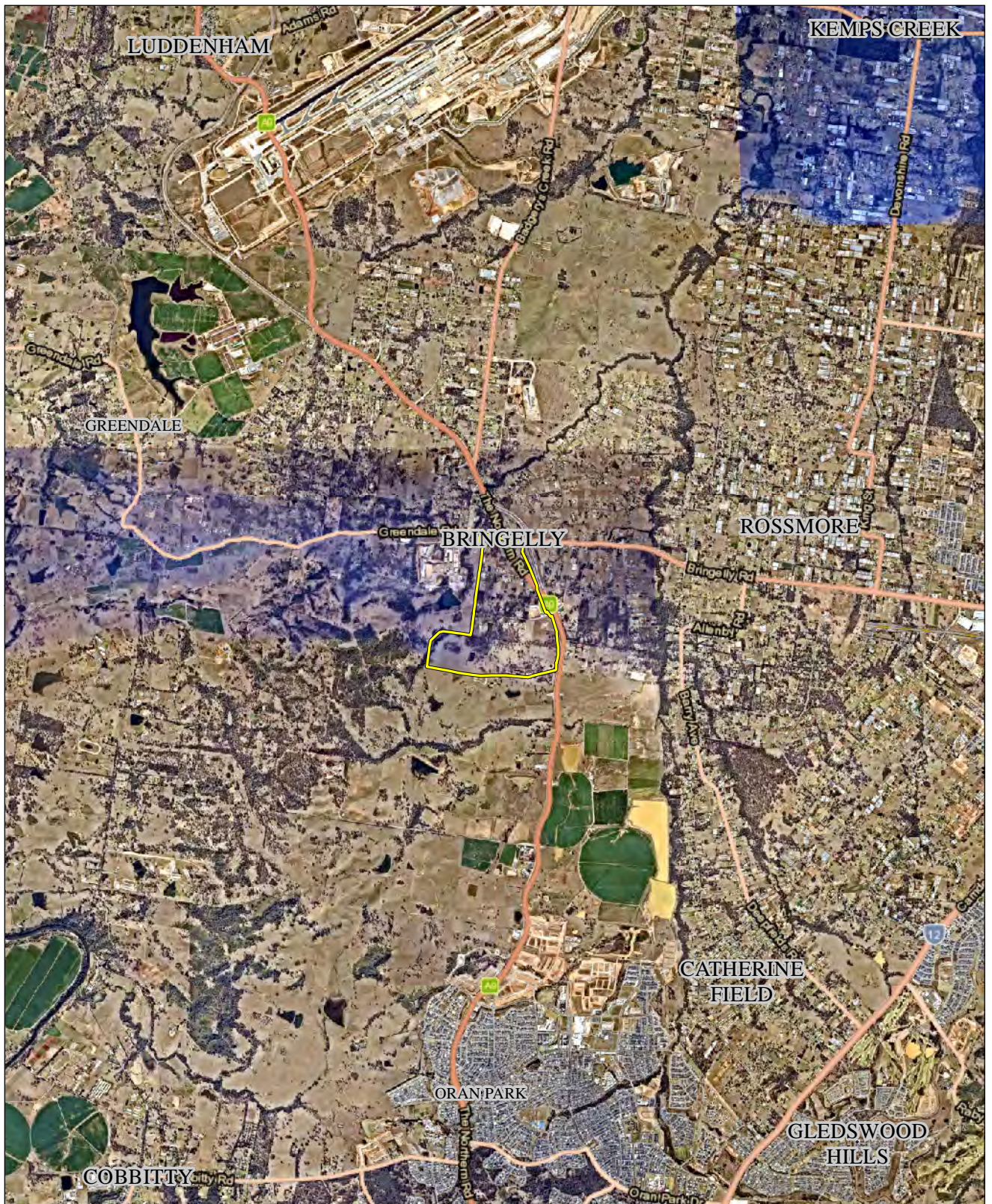
Bushfire fuel is the vegetative material in the landscape that burns during a bushfire. Bushfire behaviour is significantly influenced by fuel load, driving the intensity of a bushfire.

The vegetation communities known to occur throughout the area are listed in Table 2 below and mapped on Figure 5. The communities have been categorised into vegetation structural formations according to Keith (2004) in order to assign likely climax fuel loads following the RFS document *Comprehensive Vegetation Fuel Loads* (NSW RFS 2019).


Table 2: Vegetation communities and corresponding structural formations and fuel loads

Vegetation community	Structural formation (Keith 2004)	Fuel load (NSW RFS 2019)
Shale Plains Woodland	Woodland	10/18.07 tonnes/hectare
Shale Hills Woodland	Woodland	
Alluvial Woodland	Forest	14/24.97 tonnes/hectare
Grassland	Grassland	6/6 tonnes/hectare

The predominant vegetation structural formation across the site and surrounding landscape is woodland and grassland as evident on Figure 5. A very small portion of Alluvial Woodland (River-flat Eucalypt Forest) exists within the riparian corridor near The Northern Road, however its size is not large enough to classify as the predominant vegetation.



Legend

 Subject Land



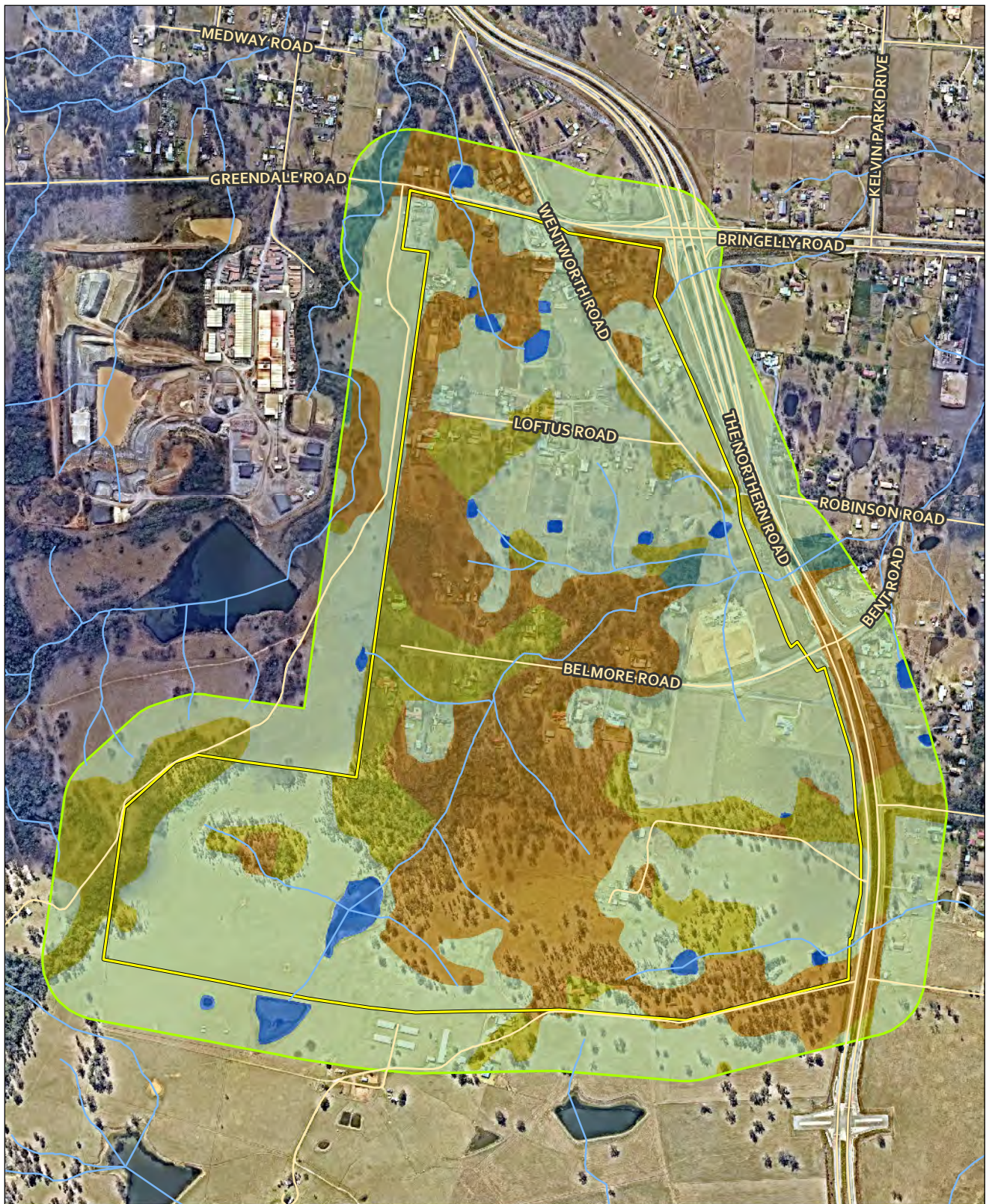
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Kilometers

Figure 4: Landscape Context

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Legend

	Watercourse	Vegetation Community		Waterbody
	Road/Track			Shale Plains Woodland
	Vegetation Assessment Buffer - 140m			Alluvial Woodland
	Subject Land			Shale Hills Woodland
				Grassland



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0 100 200 400
Meters

Figure 5: Vegetation Communities

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

3.2 Topography

Steeper slopes can significantly increase the rate of spread of fires, and it has been shown that with each 10 degree increase or decrease in slope a corresponding doubling or halving, respectively, in the rate of spread can be expected (McArthur 1962). Slope is a major factor determining the direction and rate of fire spread.

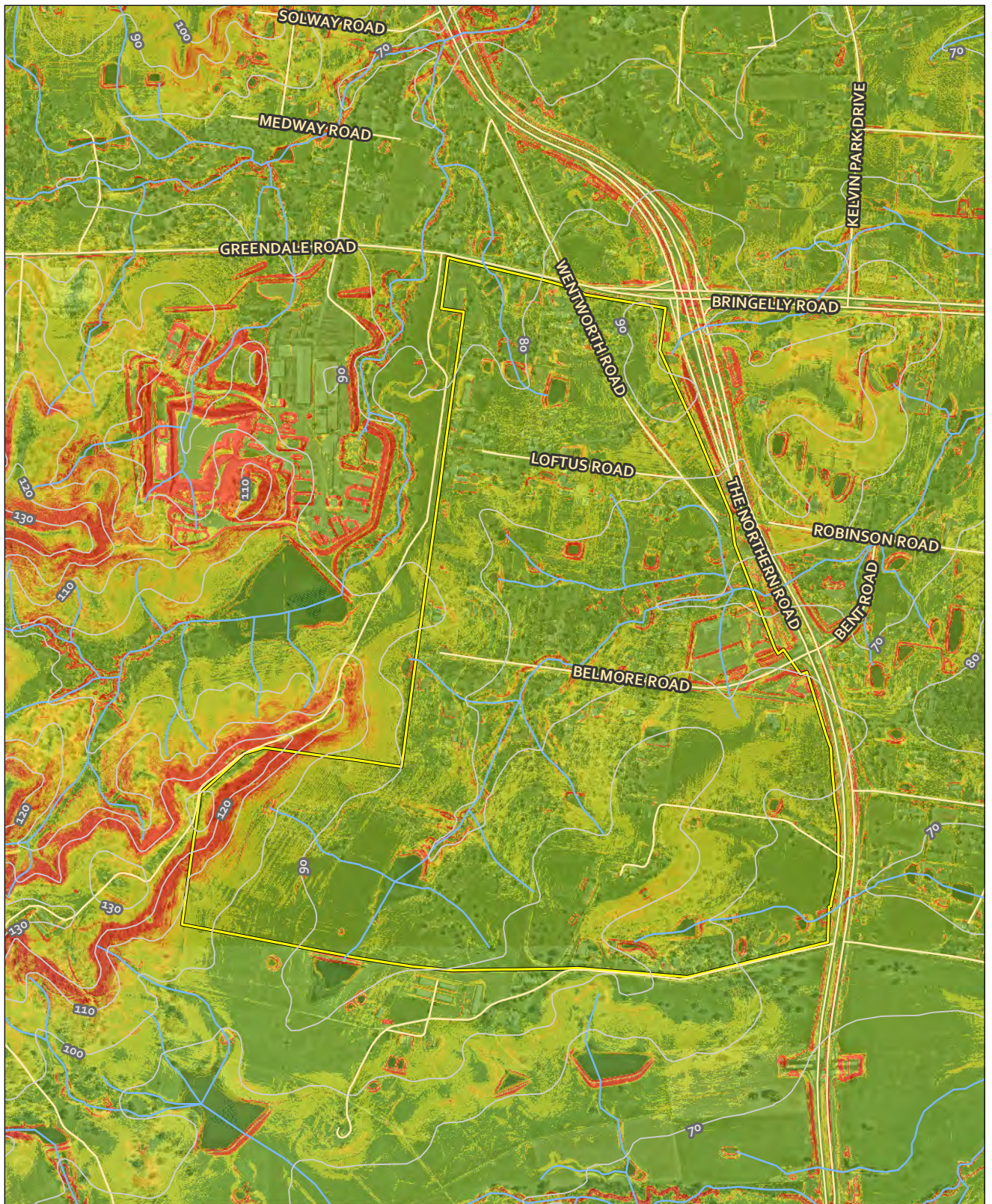
Figure 6 shows the pattern of the terrain across the site and surrounding landscape. The predominant feature is hilly terrain to the west of the site. The terrain in the remaining directions and within the site can be described as gently undulating.

3.3 Fire weather

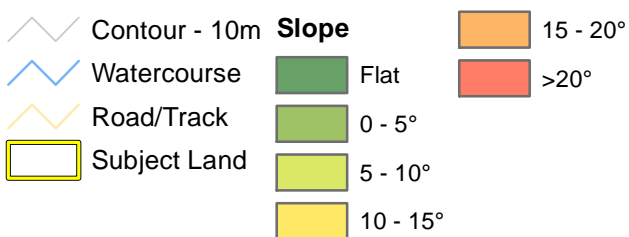
As described in the *Macarthur Bush Fire Risk Management Plan* (Macarthur Bush Fire Management Committee 2012) the area has a temperate climate with warm to hot summers and cool winters. Rainfall predominantly occurs during the summer.

The bushfire season usually runs from October to March whereby problematic fire weather can occur; a combination of high summer-time temperatures with low humidity and moderate to strong winds from the westerly sector. Dangerous bushfire seasons are most commonly associated with a combination of two or more of the following factors:

- Occurrence of an extended drought period;
- Lower than average rainfall through winter and spring;
- Persistent north-west winds; and
- Spring/summer thunderstorm activity ('dry' lightning strikes).



Legend



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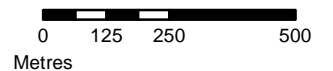


Figure 6: Terrain

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

3.4 Fire intensity analysis

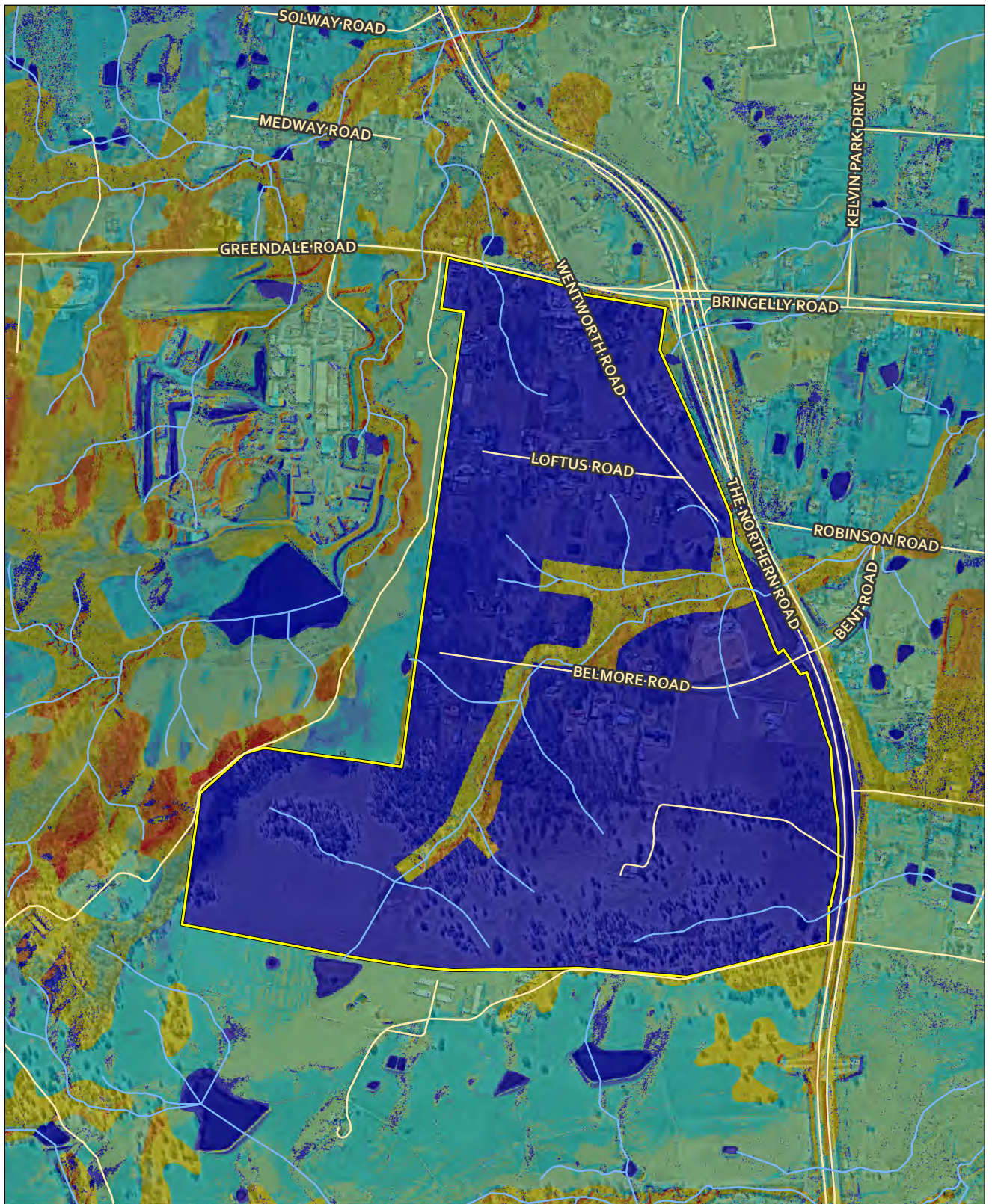
The predicted fire intensity across the area has been modelled using GIS (Figure 7). The map displays the intensity of a fire under the most problematic fire winds from the western sector by providing an understanding of rate of spread, risk to fire-fighters, fire control line feasibility and the relative bushfire risk across the landscape.

The GIS model is based on the fire behaviour formula of McArthur Mk 5 (1962) and utilised inputs of vegetation (fuel load), slope and aspect as described below:

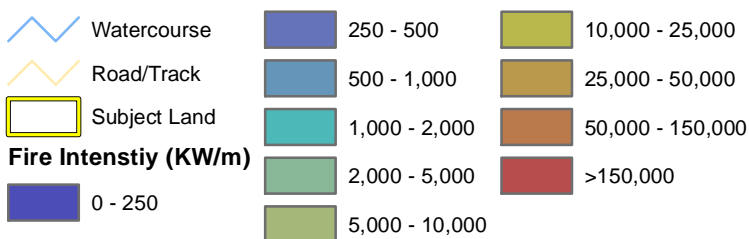
- Vegetation (Figure 5) fuel loads (t/ha) based upon likely climax fuel loads as specified by the NSW Rural Fire Service document *Comprehensive Vegetation Fuel Loads* (NSW RFS 2019);
- Slope in degrees (Figure 6);
- Fire weather represented by a Fire Danger Index (FDI) of 100 (which is a day of 'catastrophic' fire weather on the fire weather warning system). This is the planning (design) level;
- A direction of fire spread under the influence of winds from the western sector when problematic bushfires occurs in the region.

The mapping of areas into varying degrees of intensity does not indicate how often an area will receive potentially damaging fires, however, it provides a useful comparative ranking across the landscape. Mapping intensity assists in understanding the potential behaviour of bushfires and fire pathways. For example, locations with an expanse of higher bushfire intensity running in a west to east direction may represent a potential wildfire path.

The intensity mapping highlights the partially vegetated hilly areas to the west of the site. These areas of higher intensity indicate a potential fire path whereby a fire could propagate towards the site along the steeper slopes and ridgelines under the influence of westerly winds.



Legend



Date: 29/09/2023

0 125 250 500
Metres

Figure 7: Bushfire Intensity

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

3.5 Fire history and ignition sources

Information on fire history such as temporal and spatial pattern of fire spread is a useful factor in understanding the bushfire risk. The *Macarthur Bush Fire Risk Management Plan* (Macarthur Bush Fire Management Committee 2012) does not provide a detailed account of fire history and there are no adjacent or nearby reserves to rely on fire management plans for fire history.

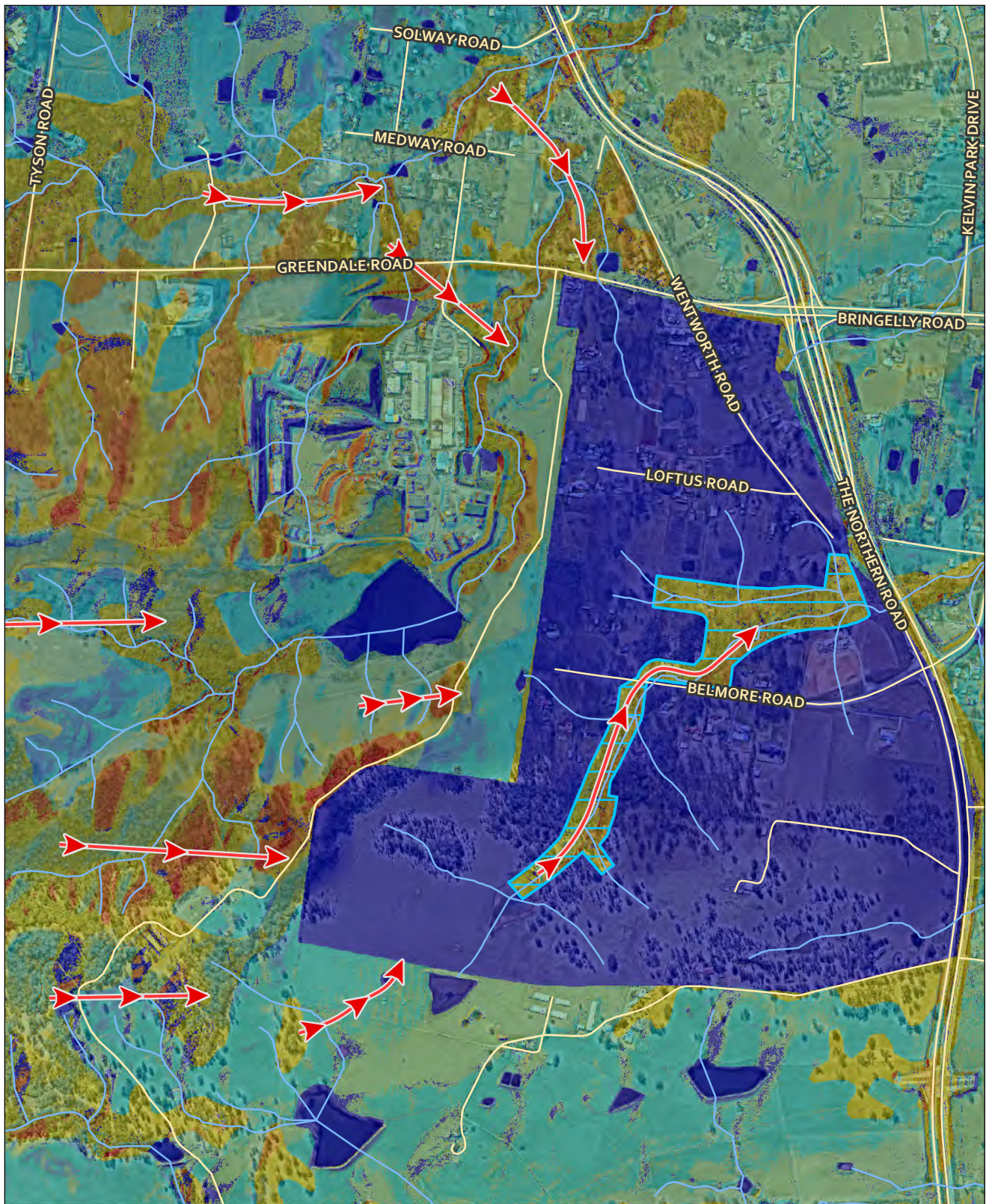
The *Macarthur Bush Fire Risk Management Plan* notes that there are 5 fires per year that could be considered a major fire, and these are usually in the eastern part of the district (i.e. Campbelltown LGA). The historical major fires discussed (1965, 1968, 1990 and 2001) were all in the eastern area associated with the forested catchment lands and reserves. The recent fires during 2019/2020 were arrested in Wollondilly LGA to the west of Camden LGA.

The *Macarthur Bush Fire Risk Management Plan* states that the primary ignition source is misuse of fire and arson, however these are more prevalent in the eastern part of the district and not in the Camden LGA.

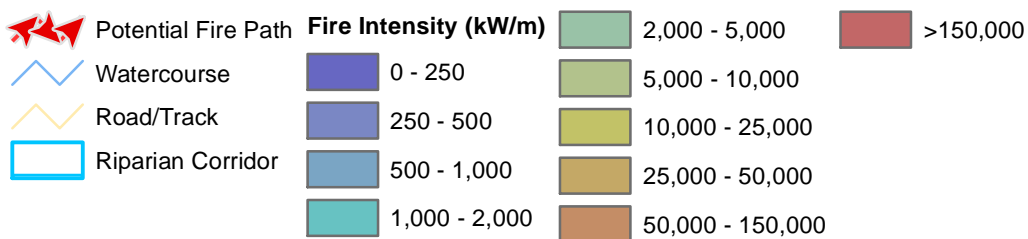
Generally, ignition can also occur along road corridors (such as vehicle fires or discarding cigarette butts), as accidental ignitions on rural properties, and from arching of overhead high-voltage powerlines.

3.6 Potential fire scenarios

Based on the information provided in the preceding sections on hazard, weather, intensity and historical fire activity, likely fire behaviour and potential fire paths and scenarios can be predicted. The problematic fire scenario is the combination of undesirable fire weather (i.e. hot and dry westerly winds during late spring and summer) with ignition to the west creating the potential for a bushfire to spread eastwards across the vegetated hills towards the subject site. A fire could emanate from the woodland and into agricultural lands to the south of the site creating a fast-moving grassfire. The potential fire scenarios are illustrated on Figure 8.



Legend



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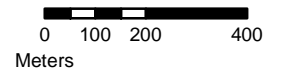


Figure 8: Potential Fire Scenarios

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

4 Land use assessment

4.1 Risk profiles

The risk of a bushfire igniting, spreading and causing damage to future development at the subject site has been assessed following the outcomes of the preceding Section 3 - Bushfire Landscape Assessment. The subject site has been divided into two broad risk profiles 'medium' and 'low' based on the same methodology used by NSW Rural Fire Service (BFCC 2008) in developing bushfire risk management plans across NSW.

As detailed in Section 3, considerations for the determination of the risk profiles include fire intensity mapping (a product of vegetation, topography and fire weather), historical fire history and potential fire attack scenarios. The risk profiles for the subject site are mapped on Figure 9.

Figure 9 shows that there are no areas of high risk within the subject site. This is primarily due to the predominance of grassland immediately adjacent the site and the gently undulating nature of the immediate surrounding topography.

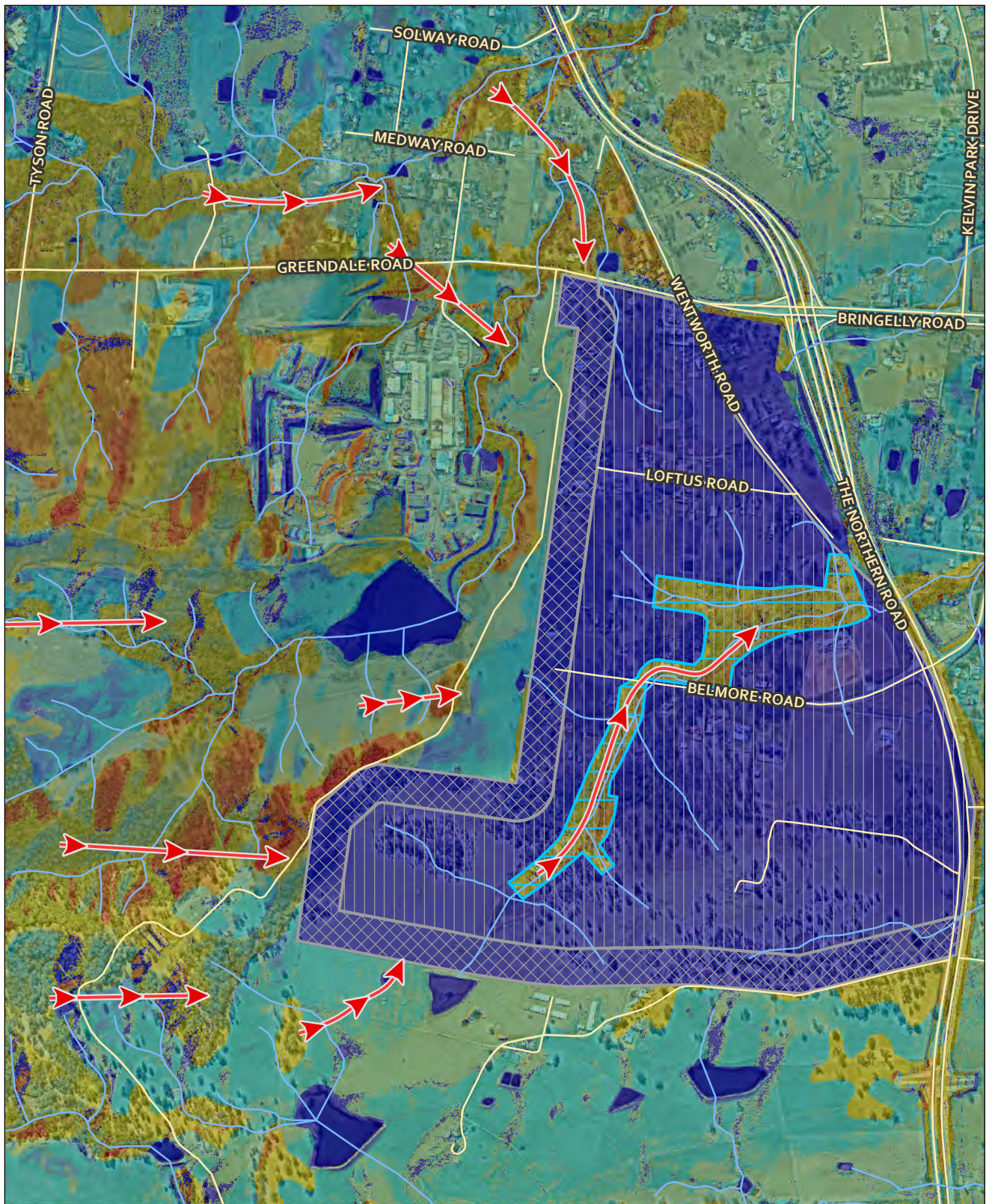
The land within 100 m of the western and southern boundaries of the site are classified medium risk as these areas will be deemed bushfire prone and could be subject to bushfire attack from these directions (refer to Section 3.6 - Potential fire scenarios). The remainder of the subject site, including the riparian corridor, is classified as low risk. The low risk area will be greater than 100 m away from the external influences of potential concern to the west and south, and the riparian corridor will not be large enough to sustain a landscape-wide fire.

Most noteworthy of Figure 9 is the absence of high risk. This allows greater flexibility with the land use decision making, allowing complete reliance on standard bushfire protection measures of PBP to provide a safe environment for all types and density of development in all locations.

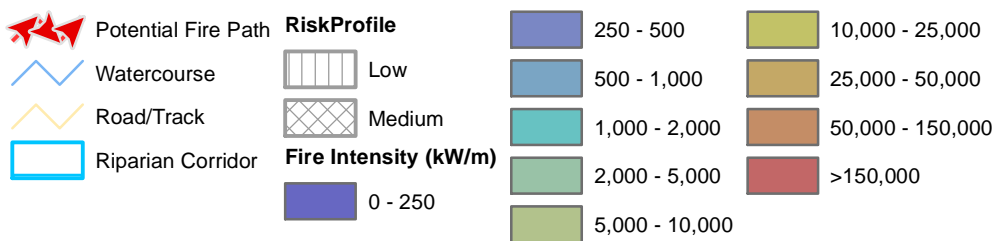
4.2 Land use recommendations

The proposed zoning is shown on the ILP included as Figure 10. The risk profiling (Section 4.1 and Figure 9) did not constrain zoning decisions. Despite this, the most vulnerable zones at the subject site (high density residential and the school site) are proposed within areas of low risk rather than medium risk.

Areas mapped as medium risk were deemed acceptable for residential development (medium and low density) and employment lands providing compliant Asset Protection Zone and access provisions could be applied.



Legend



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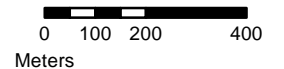


Figure 9: Risk Profiles for Land Use

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

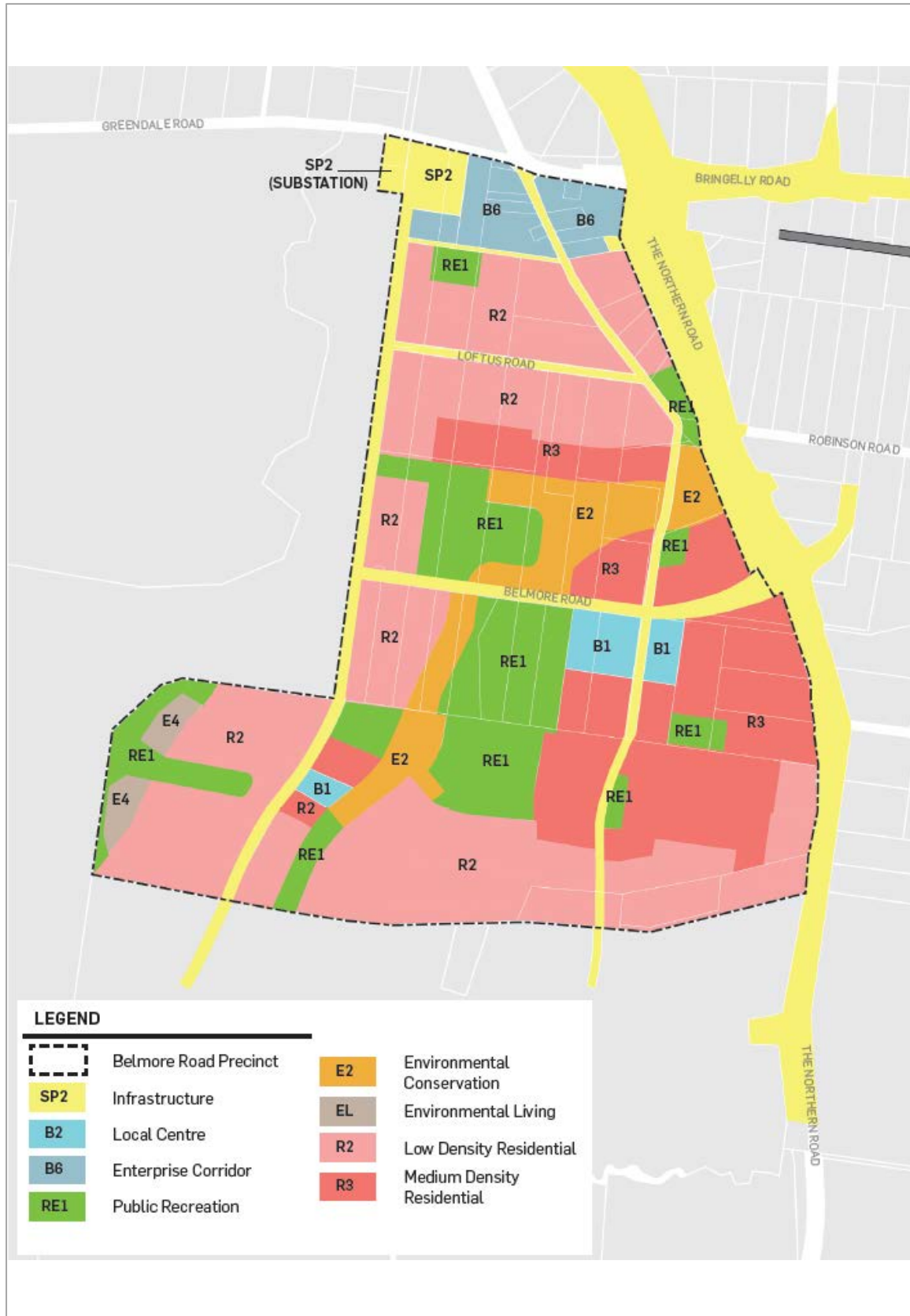


Figure 10: Proposed land use zones

4.3 Asset Protection Zones (APZ)

Using the vegetation and slope data presented in Section 3, APZs have been determined and accommodated within the ILP where required. The APZ layer is shown on Figure 11. The ILP has been designed to accommodate the required APZ dimensions. APZs are to be managed to achieve the requirements of an Inner Protection Area (IPA) as described within Appendix 4 of PBP.

Table 3: APZ determination

Boundary location (Figure 11)	Vegetation ¹	Slope ²	PBP APZ ³	How APZ will be achieved
A	Grassland	Upslope/Flat	10 m	APZ provided by external road
B	Woodland	Downslope 0-5°	16 m	APZ to be provided by perimeter road
C	Grassland	Downslope 0-5°	12 m	APZ to be provided by perimeter road
D	Grassland	Upslope/Flat	10 m	APZ to be provided by perimeter road
E	Grassland	Downslope 0-5°	12 m	APZ to be provided by perimeter road
F	Woodland	Downslope 0-5°	12 m	APZ to be provided by fire trail
G	Grassland	Upslope/Flat	10 m	APZ to be provided by perimeter road
H	Grassland	Downslope 0-5°	12 m	APZ to be provided by perimeter road
I (riparian corridor)	Woodland	Downslope 0-5°	16 m	APZ to be provided by perimeter road

¹ Predominant vegetation classification over 140 m from developable area.

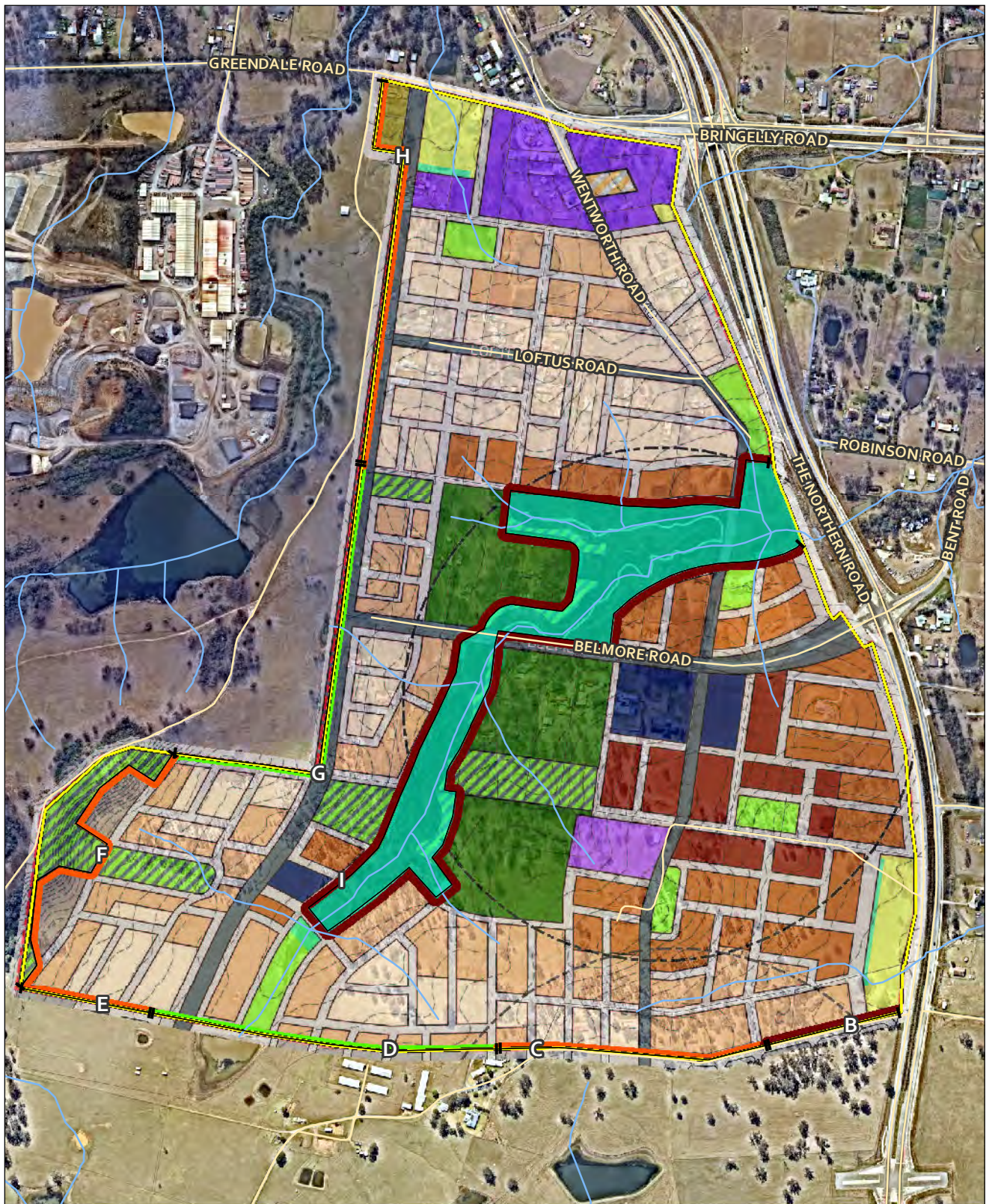
² Effective slope assessed over 100 m from edge of developable area where the bushfire hazard occurs.

³ Asset Protection Zone (APZ) required by Table A1.12.2 of Planning for Bush Fire Protection 2019.

4.4 Construction standards for future buildings

Buildings proposed within bushfire prone land are required to be assessed to ascertain the Bushfire Attack Level (BAL) in order to design and construct the building in compliance with the corresponding suite of construction specifications listed within Australian Standard AS 3959-2018 *Construction of buildings in bushfire prone areas* (SAI Global 2009). Such an assessment does not occur until the development application stage.

Based on the minimum APZ dimensions listed in Table 3, those buildings closest to the hazard will have a maximum rating of BAL-29. The rating reduces to BAL-19, BAL-12.5 and BAL-LOW (no requirements) the further a building is located from a hazard.



Legend

Watercourse

Road/Track

Riparian Corridor - Woodland

Subject Land

Asset Protection Zone

Asset Protection Zone - 10m

Asset Protection Zone - 12m

Asset Protection Zone - 16m



Date: 29/09/2023

0 100 200 400
Meters

Figure 11: Asset Protection Zone

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

5 Access and emergency services

The proposed rezoning will facilitate new uses and introduce improvements to access, infrastructure and emergency services for the area, ensuring an adequate level of bushfire protection for the new uses.

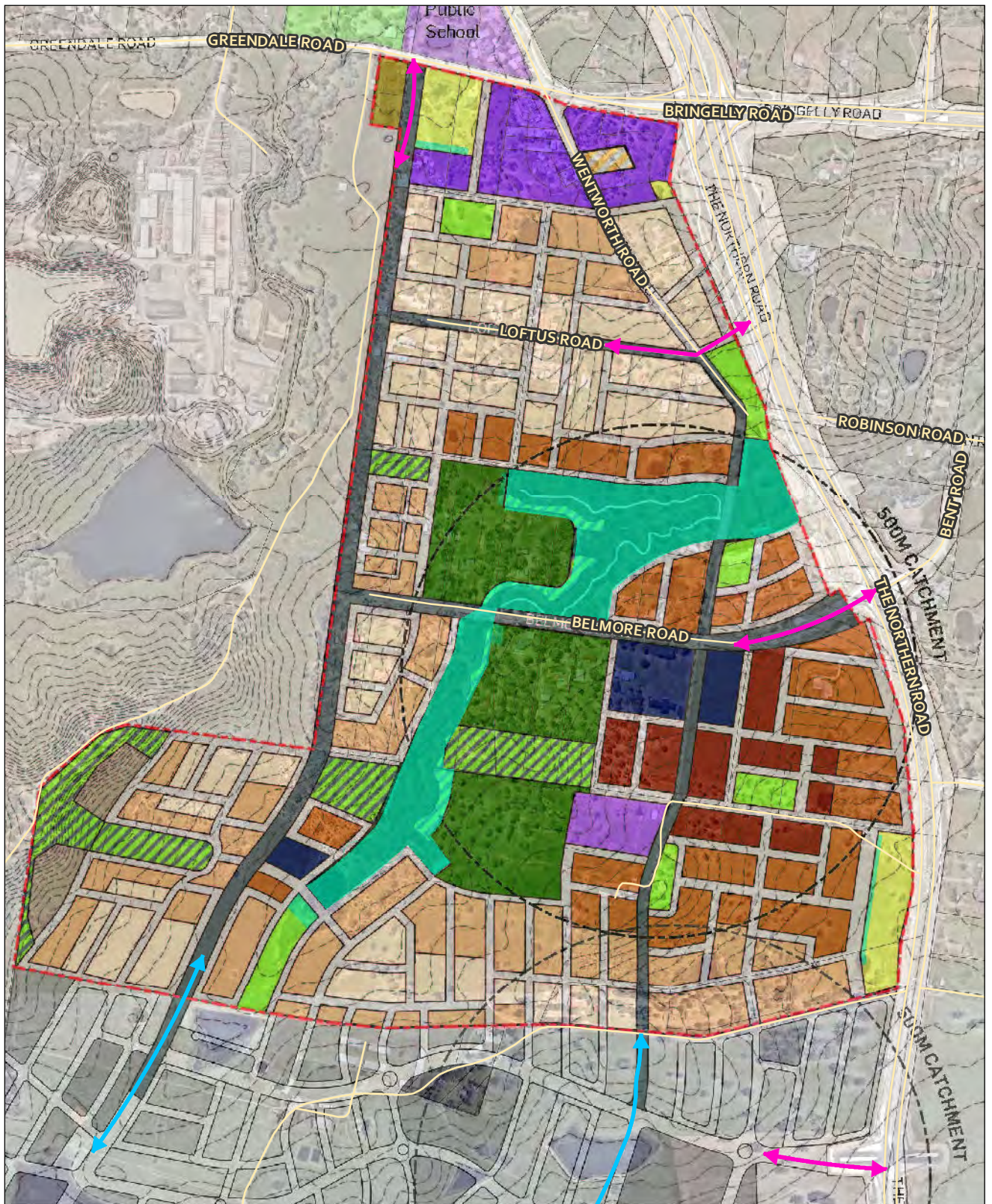
5.1 Access and evacuation

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





Access into and egress out of the subject site is available in several directions as shown on Figure 12. These access points are:

- North onto Greendale Road
- East onto The Northern Road
- South into future adjoining release area.

The multiple access points in alternate directions will ensure safe evacuation and operational response. The road layout as shown on the ILP (Figure 10) provides a logical pattern allowing direct thoroughfare to the access points.



Legend

-  Future Access Points
-  Immediate Access Points
-  Road/Track
-  Riparian Corridor



Date: 29/09/2023

0 100 200 400
Meters

Figure 12: Access and Evacuation

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

5.2 Road design

The road design is to comply with the PBP Acceptable Solutions for public roads in bushfire prone areas as required by PBP Table 5.3b. The requirements are repeated below.

PBP design standards for roads servicing residential subdivision:

- *Property access roads are two-wheel drive, all weather roads.*
- *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 emergency service vehicles.*
- *Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient.*
- *All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end.*
- *Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.*
- *Where access/egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.*
- *The capacity of perimeter and non-perimeter road surfaces and any bridges and causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); Bridges/causeways to clearly indicate load rating.*
- *Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.*
- *Hydrants are provided in accordance with AS 2419.1:2005.*
- *There is suitable access for a Category 1 fire appliance to within 4 m of the static water supply where no reticulated supply is available.*
- *Perimeter roads are:*
 - *two-way sealed roads;*
 - *8 m carriageway width kerb to kerb;*
 - *parking is provided outside of the carriageway width;*

- *hydrants are located clear of parking reserves;*
- *there are through roads, and these are linked to the internal road system at an interval of no greater than 500 m;*
- *curves of roads have a minimum inner radius of 6 m;*
- *the maximum road grade is 15° and average grade is 10°;*
- *the road crossfall does not exceed 3°;*
- *a minimum vertical clearance of 4 m to any overhanging obstruction, including tree branches, is provided.*
- *Non-perimeter roads are:*
 - *Minimum 5.5 m width kerb to kerb;*
 - *parking is provided outside of the carriageway width;*
 - *hydrants are located clear of parking reserves;*
 - *there are through roads, and these are linked to the internal road system at an interval of no greater than 500 m;*
 - *curves of roads have a minimum inner radius of 6 m;*
 - *the road crossfall does not exceed 3°;*
 - *a minimum vertical clearance of 4 m to any overhanging obstruction, including tree branches, is provided.*

5.3 Emergency services

Increasing development in the South Creek West Release Area will increase demand on emergency services, fire-fighting infrastructure and operational capability. The nearest Fire & Rescue NSW station is located at Horningsea Park 16 km to the east, and the nearest Rural Fire Service brigade station is located at Leppington 13 km to the east and at Catherine Field 16 km to the south-east. Additional stations will be considered under strategic emergency management planning in collaboration with emergency service organisations for the wider South Creek West Release Area facilitated by DoPIE.

5.4 Fire-fighting infrastructure

The subject site is to be supplied with a reticulated water system with hydrants installed to comply with the spacing and pressure requirements of Australian Standard AS 2419 *Fire hydrant installations - System design, installation and commissioning*.

6 Ministerial directions compliance

This section summarises how compliance with Section 9.2 Direction 4.3 – ‘Planning for Bush Fire Protection’ (*Environmental Planning and Assessment Act 1979*) is achieved. The response to requirements is set out below following the structure of Direction 4.3.

6.1 Direction 4.4 Objectives

Objective 1

“To protect life, property and the environment from bushfire hazards, by discouraging the establishment of incompatible land uses in bushfire prone areas”

The intention of the objective is to avoid a development outcome that is faced by or poses a risk that cannot be managed to an acceptable level. The land use assessment at Section 4 demonstrates that future development at the site will be faced by a risk that can be managed to an acceptable level by implementing the Acceptable Solutions of PBP therefore making it compatible with the surrounding environment.

It is concluded that the proposed land use is not considered incompatible with the surrounding bushfire prone area. Compliant APZs coupled with adequate access designed to address the bushfire risk produces a use not incompatible with the surrounding environment.

Objective 2

“To encourage sound management of bushfire prone areas”

The bushfire protection measures recommended throughout this report demonstrate sound management of the subject land for residential use.

6.2 Direction 4.4 Provisions

Provision 1

“have regard to the document Planning for Bush Fire Protection 2019”

Sections 4 and 5 address the provisions of *Planning for Bush Fire Protection 2019* relating to rezoning proposals.

Provision 2

“introduce controls that avoid placing inappropriate developments in hazardous areas”

The proposed rezoning is not considered inappropriate for the level of bushfire hazard in the area (refer to Section 4.1 and 4.2). Controls (bushfire protection measures) will be set in place to ensure compliance with PBP (refer to Section 4.3 and 5).

Provision 3

“ensure that bushfire hazard reduction is not prohibited within the Asset Protection Zone (APZ)”

Proposed APZs will be contained wholly within road reserves and private lots that will be routinely managed. APZs will not be placed into environmentally sensitive lands such as riparian corridors.

Provision 4

“provide an Asset Protection Zone (APZ) incorporating at a minimum:

- 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,
- an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road”

APZs will be provided to comply with the distances prescribed by PBP as detailed in Section 4.3. Perimeter roads will also be required.

Provision 5

“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 draft LEP permit Special Fire Protection Purposes (as defined under Section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with”

The proposal does not involve infill development. Section 4.3 details APZs compliant with the Acceptable Solutions of *Planning for Bush Fire Protection 2019*.

Provision 6

“contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks”

The ILP features two-way roads and a compliant road layout. More detail on the proposed access is detailed in Sections 5.1 and 5.2.

Provision 7

“contain provisions for adequate water supply for fire-fighting purposes”

Section 5.4 states the requirements for a reticulated water supply and hydrant installation.

Provision 8

“minimise the perimeter of the area of land interfacing the hazard which may be developed”

The perimeter of the subject site, including internal riparian area, is uniform in nature with no ‘pinch-points’, intrusions or otherwise extended hazard interface areas that could become problematic for evacuation or operational response.

Provision 9

“introduce controls on the placement of combustible materials in the Inner Protection Area”

Section 4.3 states that APZs are to be maintained to comply with Appendix 4 of PBP.

7 Conclusion

The Belmore Road Precinct has been developed via an iterative process involving strategic analysis, constraints assessment and consultation with bushfire protection requirements in mind. Risk profiling based on bushfire landscape analysis has resulted in an unconstrained development environment with no high risk areas identified. Areas mapped medium risk have development proposed with appropriate bushfire protection provisions such as APZs and adequate access as well as buffering high density residential development and the school site from the external hazard interface. The majority of the subject site is mapped low risk.

As demonstrated by this study, the proposal to rezone the subject site satisfies EP&A Act s.9.2 Direction 4.3 – ‘Planning for Bush Fire Protection’ and *Planning for Bush Fire Protection 2019*. The proposal is not considered incompatible with the surrounding environment and bushfire risk. With sound bushfire management, the proposal can exist within the adjacent bushfire prone land.



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