# Menangle Park Gateway Determination
# Strategic Bush Fire Study

## Dahua Group

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## DOCUMENT TRACKING

| | |
|---|---|
| **Project Name** | Menangle Park Gateway Determination Strategic Bush Fire Study |
| **Project Number** | 21SUT-18006 |
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| **Status** | **Draft** |
| **Version Number** | **v1** |
| **Last saved on** | **18 June 2021** |

This report should be cited as 'Eco Logical Australia 2021. *Menangle Park Gateway Determination Strategic Bush Fire Study*. Prepared for Dahua Australia Limited.'

### ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Dahua Group.



Template 2.8.1

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# Executive Summary

When investigating the capability of Bush Fire Prone Land (BFPL) in relation to planning proposals (i.e. rezoning or similar) the NSW *Environmental Planning and Assessment Act 1979* prescribes that consent authorities must have regard to s.9.1 (2) Direction 4.4 – 'Planning for Bushfire Protection'. Direction 4.4 prescribes consultation with the NSW Rural Fire Service having regard to 'Planning for Bushfire Protection' and compliance with the provision of bushfire protection measures.

This Strategic Bush Fire Study (SBS) evaluates the proposal against the strategic planning principles and 'inappropriate development' requirements stated in Chapter 4'Strategic Planning' of PBP. The applicable bushfire assessment framework for strategic planning outlined in PBP was applied to the master plan proposal relevant to the Menangle Park Gateway Determination.

# 1. Introduction

This Draft Strategic Bush Fire Study has been prepared with consideration of a master planning proposal for land located at Menangle Park and to facilitate discussion with the NSW Rural Fire Service (RFS). The final report will supplement the gateway determination for the subject land. The study provides an assessment of the master plan proposal for the Menangle Park site in regard the strategic planning principles outlined in 'Planning for Bush Fire Protection 2019' (PBP)(RFS 2019). This is the first step in the planning pathway, and finalisation of the design will be an iterative process as the proposal progresses to the development application (DA) stage where detailed design will be finalised.

The subject land is situated within the Campbelltown Local Government Area (LGA), located within the Menangle Park Urban Release Area of the Greater Macarthur Growth Area, as identified in the *Greater Macarthur 2040 Plan* (NSW Department of Primary Industry and Environment (DPIE) 2018) (**Figure 1**). *Greater Macarthur 2040* was established as an implementation plan with key actions to enable activation of the identified precincts through the private sector, and in a manner that is consistent with the broader vision for the area, recognising a balance between conservation, residential land release, the provision of infrastructure, economic opportunity and public amenity.

The site was rezoned from rural land to urban purposes on 18 November 2017 to accommodate approximately 3,400 residential lots, a retail/commercial town centre, employment lands and community and recreational facilities. The amended master plan, which the current gateway determination addresses, builds upon the site's previous rezoning and to include:

- An increase in the number of dwellings
- A new major town centre comprising 30,000m² of retail/employment gross floor area;
- A new neighbourhood centre (approximately 3,500m² of employment floor space);
- A revised road and street network to provide better permeability throughout the site;
- Sporting fields and parks;
- Integrated passive recreation area within a riparian corridor network;
- Land for environmental conservation;
- Community facilities to support the proposed increase to the population; and
- A school.

This study considers the amended master plan for the future development of land held by the Dahua Group and includes the land parcels detailed in **Table 1**. The master plan area will proceed to DA in stages, with Stage 1 and 2A approved and under construction, and Stages 4B and 3C next to be delivered (see **Appendix A** for staging plan).

**Table 1: Subject Land**

| Lot | DP | Lot | DP | Lot | DP |
|---|---|---|---|---|---|
| 4 | DP787283 | 12 | DP251335 | 33 | DP1101983 |
| 1 | DP598067 | 641 | DP600334 | 1 | DP708770 |
| 2 | DP554242 | 7 | DP787284 | 1001 | DP1219028 |
| 2 | DP598067 | 15 | DP251335 | 1000 | DP1219023 |

| Lot | DP | Lot | DP | Lot | DP |
|---|---|---|---|---|---|
| 59 | DP10718 | 7 | DP260089 | 1002 | DP1234642 |
| 1 | DP707225 | 3 | DP236059 | 2006 | DP1234643 |
| 17 | DP251335 | 1 | DP1091474 | 2007 | DP1234643 |
| 4 | DP628052 | 124 | DP1097090 | 2011 | DP1234643 |
| 9 | DP249530 | 125 | DP1097138 | 2013 | DP1234643 |
| 1 | DP727098 | 32 | DP1101983 | 2010 | DP1234643 |
| D | DP19853 | 31 | DP1101983 | 2009 | DP1234643 |
| 32 | DP1105615 | 1 | DP1232321 | 2008 | DP1234643 |
| 1 | DP249393 | 1 | DP1247661 | | |

## 1.1 Aims and Objectives

The aim of this study is to review the master plan in relation to the strategic planning requirements of PBP. The key objective is to undertake a Strategic Bush Fire Study (SBS) as per the strategic planning principles, 'inappropriate development' exclusions and assessment considerations outlined in PBP.

## 1.2 Study Area

Menangle Park (Figure 2) is located approximately 56 km south-west of the Sydney CBD. The Menangle Park planning area is bounded by the Hume Highway to the east and the Nepean River is located to the west and south of the site. The Campbelltown CBD is situated 12 km to the north-east of the site. Menangle village is located to the south of the planning area, along with other areas identified for development in the Great Macarthur growth area.

Currently the master plan area is dominated by a rural landscape, with grassland primarily modified for pastoral pursuits. Remnant vegetation within the subject land is generally located within the riparian corridor of the Nepean River to the west, and its tributaries, with scattered remnant vegetation also present. North of Menangle Road, adjacent the western boundary of the site is the existing Menangle Park residential area.

## 1.3 Bushfire Prone Land Status

The subject land is mapped as bush fire prone land (BFPL) on the Campbelltown City Council (CCC) maps and as published by DPIE (Figure 3). Therefore under Ministerial Direction 4.4 (Planning for Bushfire Protection) issued under Section 9.1 (2) of the Environmental Planning and Assessment Act 1979 (EP&A Act), where a planning proposal includes or is in close proximity to BFPL, the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service (RFS) following receipt of a gateway determination. Therefore, the assessment detailed in this study seeks to outline how the Menangle Park proposal can adhere to the requirements of PBP.

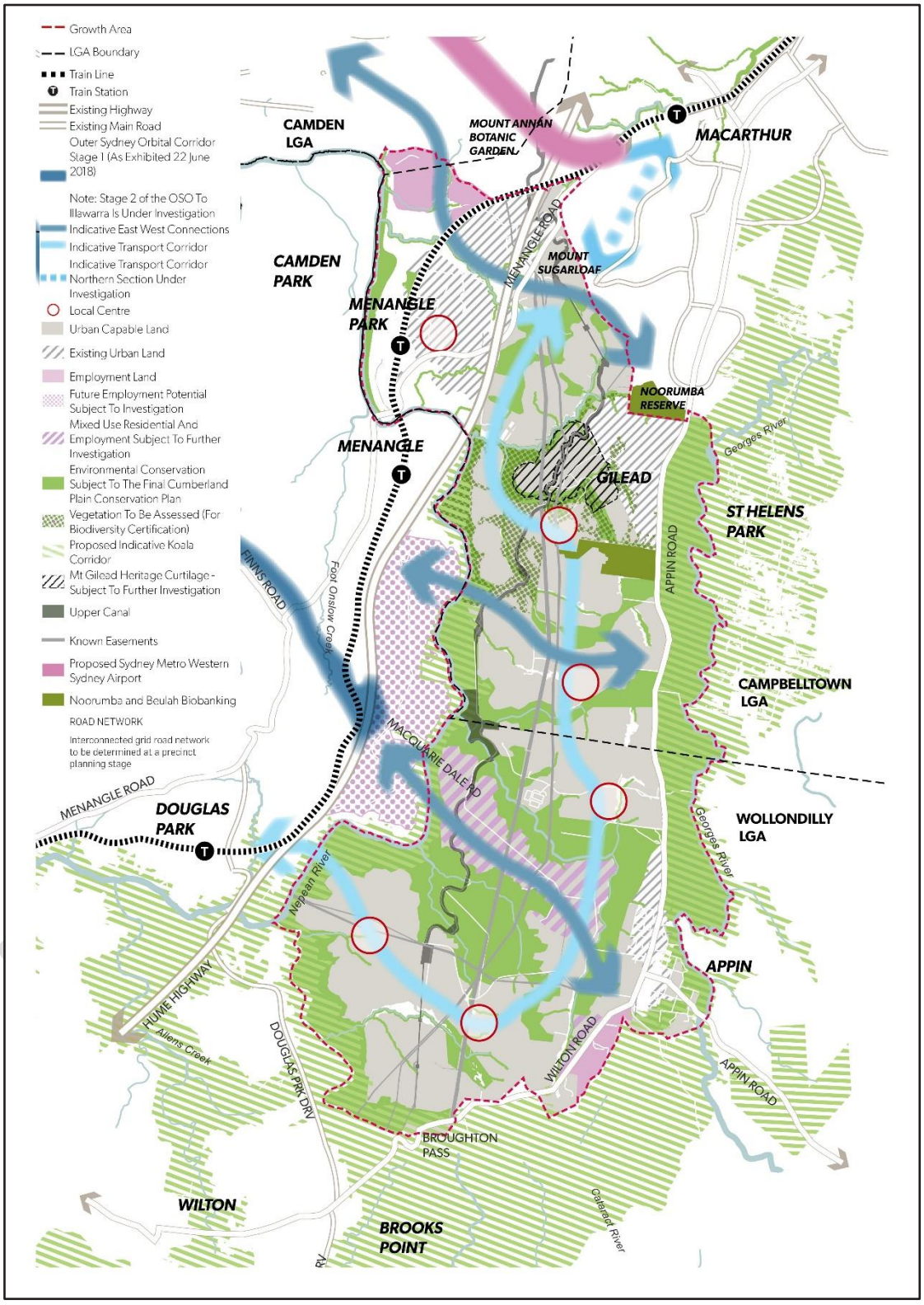


**Figure 1: Greater Macarthur Growth Area**

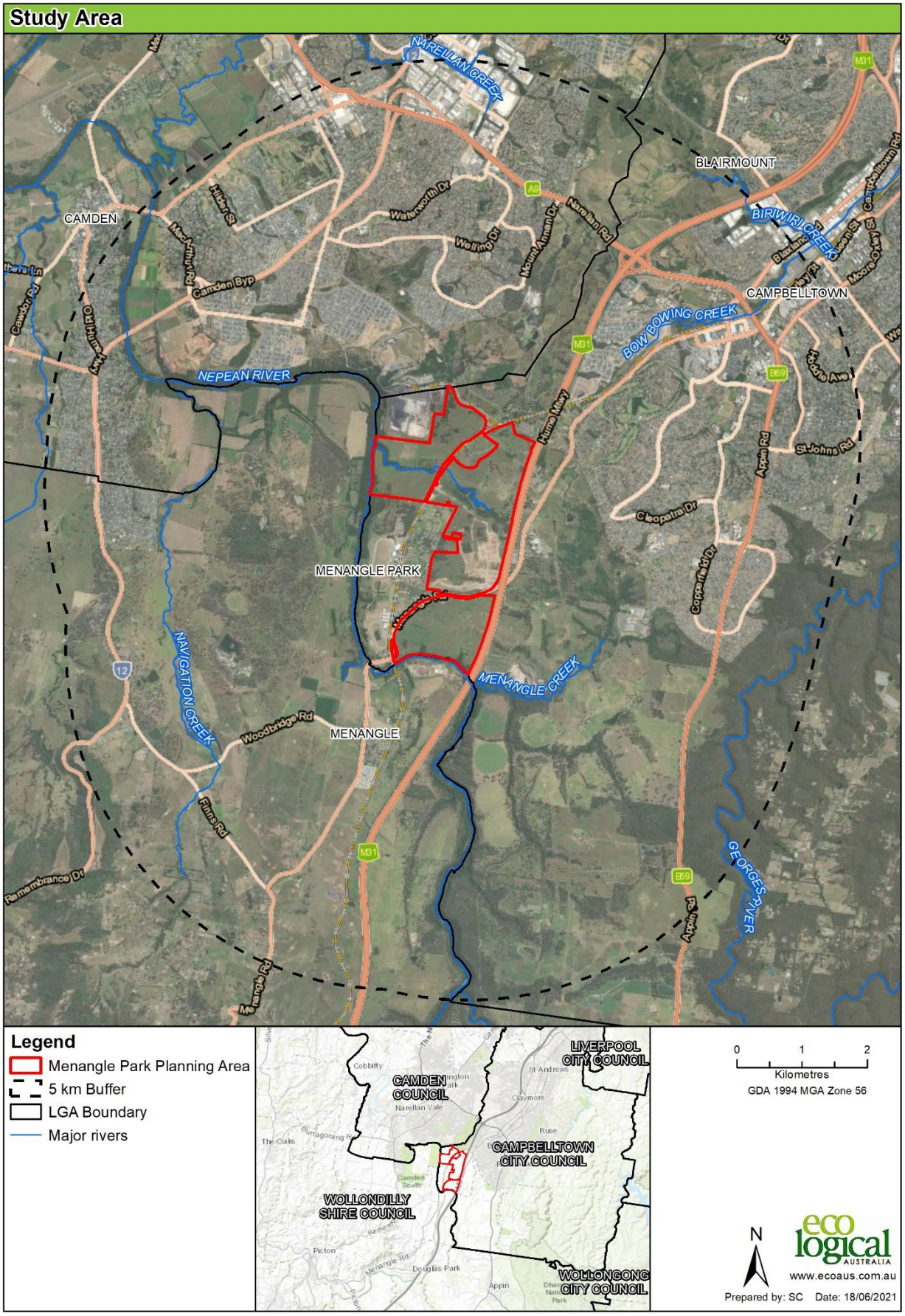


**Figure 2: Menangle Park study area**

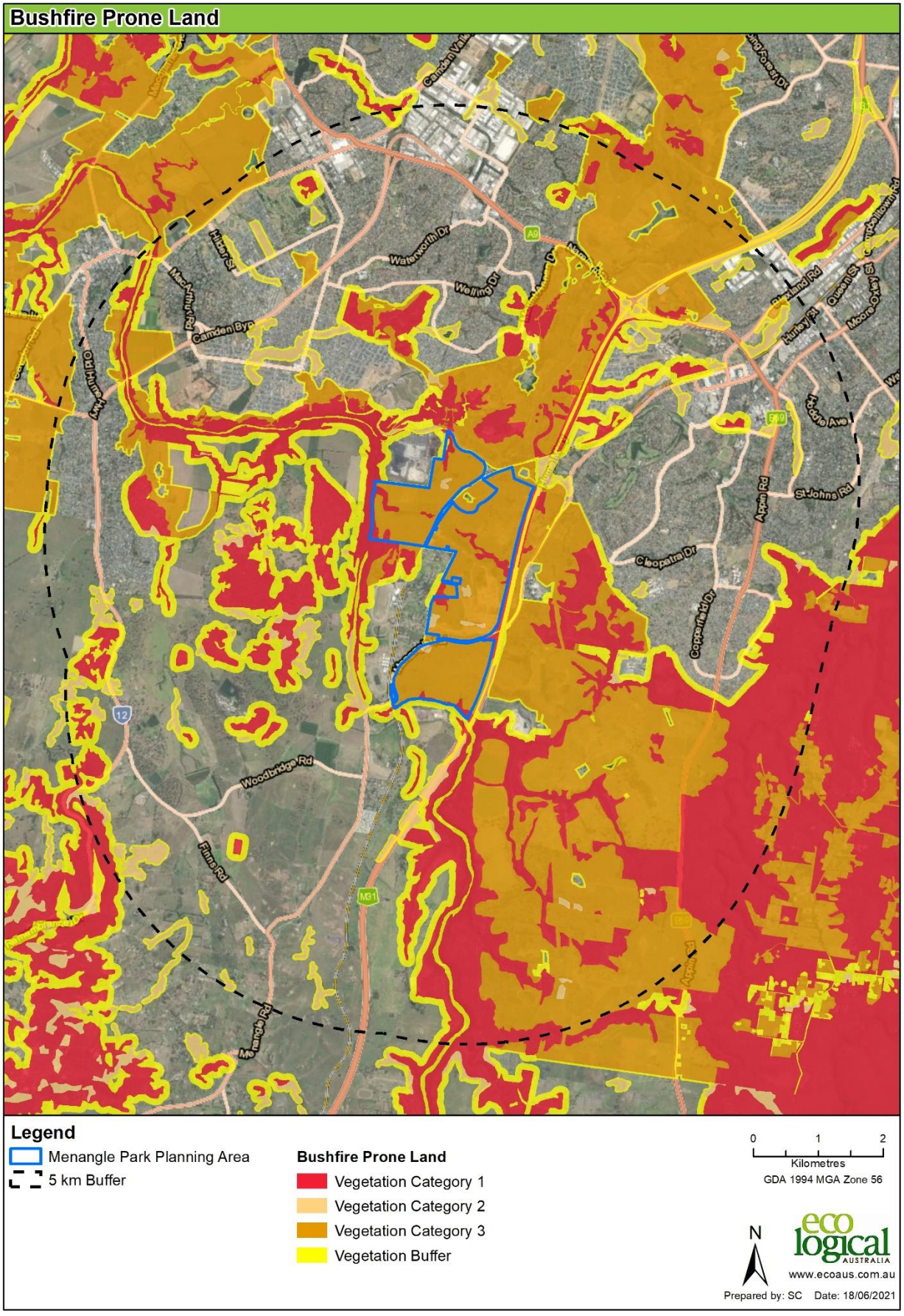


**Figure 3: Excerpt of CCC BFPL Map**

## 1.4 Legislative Framework

The legislative framework guiding the assessment of bushfire risk and the application of bushfire protection measures at the strategic level includes the NSW EP&A Act and the *Rural Fires Act 1997* (RF Act). Key aspects of these instruments are outlined below.

### 1.4.1 NSW Environmental Planning and Assessment Act (1979)

The NSW EP&A Act is the principal planning legislation for the state, providing a framework for the overall environmental planning and assessment of development proposals. Various legislation and instruments are integrated with the EP&A Act, including the RF Act.

Section 10.3 of the EP&A Act requires the identification of BFPL and development of BFPL maps, which act as a trigger for bush fire assessment provisions for strategic planning and development.

When investigating the capability of BFPL in relation to a planning proposal, consent authorities must have regard to s.9.1 (2) Direction 4.4 – 'Planning for Bushfire Protection' of the EP&A Act. The objectives of Direction 4.4 are:

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

Direction 4.4 instructs the consent authority on the bushfire matters which need to be addressed with respect to master planning. This includes:

- Consultation with the Commissioner of the NSW RFS and consideration to any comments made;
- Regard to requirements of PBP; and
- Compliance with numerous bushfire protection provisions where development is proposed.

Further, there are various provisions within the EP&A Act that may be applicable to proposals on BFPL as outlined below:

- Section 3.29 of the EP&A Act relates to the development of State Environmental Planning Policies (SEPPs) and within these policies, bushfire considerations may apply for example:
  - Codes SEPP (Exempt and Complying Development Codes)
    - Clause 34 specifies complying development standards that prescribe compliance with PBP and AS 3959, with development on BFPL not permitted within BAL-40 and BAL-FZ;
  - Seniors Housing SEPP (Housing for Seniors or People with a Disability)
    - Clause 27 of the SEPP requires PBP compliance and RFS consultation for development on BFPL; and
  - Infrastructure SEPP
    - Clause 16 of the SEPP requires RFS consultation for residential or Special Fire Protection Purpose (SFPP) development on BFPL;
- Section 4.14 relates to infill and other development.
  - Requires that all development on BFPL conforms to the specifications and requirements outlined in PBP, i.e. the specific requirements for residential infill in Chapter 7; and

  - The consent authority should be satisfied that the development conforms to PBP, or otherwise consult with the RFS Commissioner.
- Section 4.46 relates to integrated development and triggers Section 100B of the RF Act and Clause 44 of the *Rural Fires Regulation 2013* (RF Reg):
  - Applicable to subdivision, with specific requirements in Chapter 5 of PBP;
  - Applicable to SFPP developments, with specific requirements in Chapter 6 of PBP; and
  - Requires a bush fire safety authority under Section 100b of the RF Act.
- Section 9.1 relates to strategic or local planning.
  - Applicable to land use planning that covers large areas and may include a variety of land uses and longer-term development objectives. Specific requirements are outlined in Chapter 4 of PBP.

### 1.4.2 Rural Fires Act 1997 (RF Act)

The *RF Act* is integrated into the *EP&A Act* and triggered by Section 4.46 as outlined above. The key objectives of the act are to provide for the:

- prevention, mitigation and suppression of bushfires;
- co-ordination of bush firefighting and bush fire prevention;
- protection of persons from injury or death, and property from damage, arising from fires;
- protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires; and
- protection of the environment by requiring certain activities have regard to the principles of ecologically sustainable development.

## 1.5 Assessment Approach

Section 9.1 (2) of the EP&A Act triggers consideration of PBP for strategic planning. Chapter 4 of PBP contains strategic planning principles, 'inappropriate development' exclusions and assessment considerations required for strategic planning proposals. Chapter 4 of PBP prescribes the completion of a Strategic Bush Fire Study (SBS), which provides the opportunity to assess whether proposed land uses associated with master planning are appropriate in the bushfire risk context. It also provides the ability to assess the strategic implications of future development for bushfire mitigation and management.

The strategic planning principles of PBP are:

- Ensuring land is suitable for development in the context of bushfire risk;
- Ensuring new development on BFPL will comply with PBP;
- Minimising reliance on performance-based solutions;
- Providing adequate infrastructure associated with emergency evacuation and firefighting operations; and
- Facilitating appropriate ongoing land management practices.

These principles trigger the consideration of bushfire protection measures at the strategic planning stage, to provide an opportunity to consider the suitability of future land uses within the broader bushfire risk setting and that future land uses can meet the aim and objectives of PBP outlined below:

*The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.*

*The objectives are to:*

*i afford buildings and their occupants protection from exposure to a bush fire;*
*ii provide for a defendable space to be located around buildings;*
*iii provide appropriate separation between a hazard and buildings which, in combination with other measures, minimises material ignition;*
*iv ensure that appropriate operational access and egress for emergency service personnel and residents is available;*
*v provide for ongoing management and maintenance of bush fire protection measures; and*
*vi ensure that utility services are adequate to meet the needs of firefighters.*

In addition, Chapter 4 of PBP prescribes that strategic planning should exclude 'inappropriate development' in bush fire prone areas, where:

- the development area is exposed to a high bush fire risk and should be avoided;
- the development is likely to be difficult to evacuate during a bush fire due to its siting in the landscape, access limitations, fire history and/or size and scale;
- the development will adversely affect other bush fire protection strategies or place existing development at increased risk;
- the development is within an area of high bush fire risk where density of existing development may cause evacuation issues for both existing and new occupants; and
- the development has environmental constraints to the area which cannot be overcome.

This SBS therefore assesses the proposal in the context of the PBP strategic planning principles, 'inappropriate development' exclusions and the assessment considerations identified in Table 4.2.1 of PBP, summarised in Table 2 below.

**Table 2: Summary of PBP assessment considerations for a Strategic Bush Fire Study**

| Issue | Summary of Assessment Considerations |
|---|---|
| Bush fire landscape assessment | A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape. |
| Land use assessment | The land use assessment will identify the most appropriate locations within the master plan area or site layout for the proposed uses. |
| Access and egress | A study of the existing and proposed road networks both within and external to the planning proposal/master plan area and site layout. |
| Emergency services | An assessment of the future impact of the new development on emergency services provision. |
| Infrastructure | An assessment of the issues associated with infrastructure provision. |
| Adjoining land | The impact of new development on adjoining landowners and their ability to undertake bush fire management. |

### 1.5.1 Assessment Framework

Investigation of the suitability for development within an area of interest, involves a complex and large array of bushfire-related issues and concepts. Prioritisation of first principle bushfire risk considerations is critical. Therefore, the following bushfire assessment framework will guide this study.

#### *1.5.1.1 Residual risk*

All BFPL poses a bushfire risk. Complete removal of bushfire risk is not appropriate or possible in many instances, nor is it a policy setting under PBP. Determining whether the level of residual risk (i.e. the level of risk after application of bushfire protection measures) is a key factor in the strategic assessment of whether a development proposal is appropriate.

Provided the risk exposure is appropriately reduced, development can occur with an appropriate level of safety on BFPL. PBP outlines the measures to achieve bushfire risk reduction generally and establishes the NSW policy setting for appropriate bushfire protection. Experience and research have successfully demonstrated appropriate bushfire protection is feasible within a very wide range of bushfire risk situations. Nevertheless, development on BFPL always has a residual bushfire risk e.g. from burning debris or for offsite evacuation, regardless of the initial risk level and risk treatments. This SBS acknowledges that the outcome of any potential development on BFPL resulting from the planning proposal includes a level of residual risk and explores the acceptability of that risk.

#### *1.5.1.2 Risk to life versus risk to property*

A lower residual risk is required for the protection of life than that required for the protection of built assets, due to the vulnerability of people exposed to bushfire attack and the pre-eminent value assigned to human life. Assessment of the residual risk has therefore considered life and property risks separately, in the first instance.

#### *1.5.1.3 Life protection and evacuation*

An appropriately low residual risk to human life is fundamentally important in bushfire protection. Whilst offsite evacuation potentially offers a safer destination, the risks associated with undertaking an offsite evacuation (travel) pose an additional risk. Also, the logistical challenges of offsite evacuation can be high and should not become an unacceptable burden on emergency services, and in a strategic planning context should not adversely impact the demands of the existing emergency service evacuation management.

Early evacuation is the nationally accepted safest means for protection of life and for offsite evacuation to be effective, it should not require the assistance of emergency services. Notwithstanding, early unassisted evacuation being a key risk assessment benchmark in this SBS; experience and research has demonstrated that it is not fail-safe or always feasible. Research and post incident inquiries have also found that providing evacuees options (and warnings and information) is important to their survival.

Alternatives such as 'shelter-in-place' are also not fail-safe, but design solutions exist in many situations to lower the residual risk to an appropriate level for both shelter-in-place and offsite options and a well-designed combination of the two may achieve the lowest residual risk; even if the shelter-in-place option is considered a 'redundancy' in terms of bushfire risk planning.

#### *1.5.1.4 Emergency service response*

The acceptability of proposed development should not be reliant on emergency service response/intervention. However, an emergency service response is a legitimate risk lowering consideration, that can be viewed as bushfire protection 'redundancy' in a strategic planning context.

#### *1.5.1.5 Adjoining lands*

Whilst fuel management (e.g. hazard reduction burning) lowers bushfire risk under most circumstances, during extreme bushfire attack and with increasing time after a burn, the life and property protection benefit is likely to be minimal. As fuel management programs achieving a satisfactory level of risk reduction cannot be guaranteed, they cannot be relied upon for life and property protection design, and certainly not in a SBS.

### 1.5.2 Acceptance Criteria

A clear quantification of an acceptable level of residual risk is important in assessing the appropriateness of a strategic planning proposal, however, PBP does not provide a clear quantification of an acceptable level of residual risk or define 'inappropriate' development with measurable criteria. In response to this limitation, the over-arching acceptance criteria for this study are that:

- The aims, objectives and Performance Criteria in PBP for the protection of life and property are achieved;
- The master plan complies with the strategic planning principles of PBP;
- The 'inappropriate' development exclusion requirements of PBP are not triggered by the development proposed by the Structure Plan;
- The Acceptable Solution bushfire protection measures within PBP can be met by the future development envisaged by the master plan;
- Compliance with PBP is not reliant on the intervention/response by emergency services or hazard management on adjoining land;
- The proposed development will not adversely impact the bushfire safety of occupants of nearby existing development and wherever possible will lower that risk; and
- An appropriate level of safety is possible from 'unassisted' offsite evacuation.

# 2. Proposal

The proposed amended master plan will facilitate differing land use activities and future constructions across the site, as shown in Figure 4. It presents a structure plan that incorporates a variety of dwelling topologies and non-residential uses, including opportunities for education, employment, recreation, community and conservation. The alignment of future land uses enabled in the master plan would be subject to various aspects of PBP, when occurring on BFPL. These aspects are summarised in Table 3 below.

**Table 3: Proposal relationship to Planning for Bushfire Protection**

| Land Use | Associated Facilities and/or Activities | Key PBP Considerations for future development |
|---|---|---|
| **Residential Land Use** | | |
| Low and medium density residential; large lot and rural residential | Dwellings | Chapter 5 of PBP and performance criteria identified for APZs, access and infrastructure.<br>Increased residential densities such as dual occupancy and second swellings subject to additional consideration outlined in Section 8.2.1 (Increased residential densities) of PBP. |
| Top Shop Apartments | Multi-storey residential | Chapter 5 of PBP and performance criteria identified for APZs, access and infrastructure, as well as additional considerations outlined in Section 8.2.2 of PBP (Multi-storey residential development). |
| **Non-Residential Land Use** | | |
| Neighbourhood Centre | Community centre, retail, and other commercial facilities | Section 8.3.11 of PBP (Public Assembly Buildings) for buildings used for public assembly with a floor space >500m$^2$ and Chapter 6 (Special Fire Protection Purpose), otherwise Section 8.3 (Other Development).<br>Section 8.3.10 of PBP (Commercial and Industrial Development). Relevant protection measures to meet PBP aim and objectives.<br>Chapter 6 of PBP (Special Fire Protection Purpose (SFPP) development for SFPP uses such as childcare centre |
| School | Education facilities | Chapter 6 of PBP (Special Fire Protection Purpose (SFPP) development for SFPP and performance criteria identified for APZs, access, infrastructure, construction standard and emergency management |
| Employment Lands | Industrial/commercial buildings | Section 8.3.10 of PBP (Commercial and Industrial Development). Relevant protection measures to meet PBP aim and objectives. |
| Fields/Open Space | Sporting fields, parking, amenities | Relevant bushfire protection measures to meet PBP aim and objectives. |

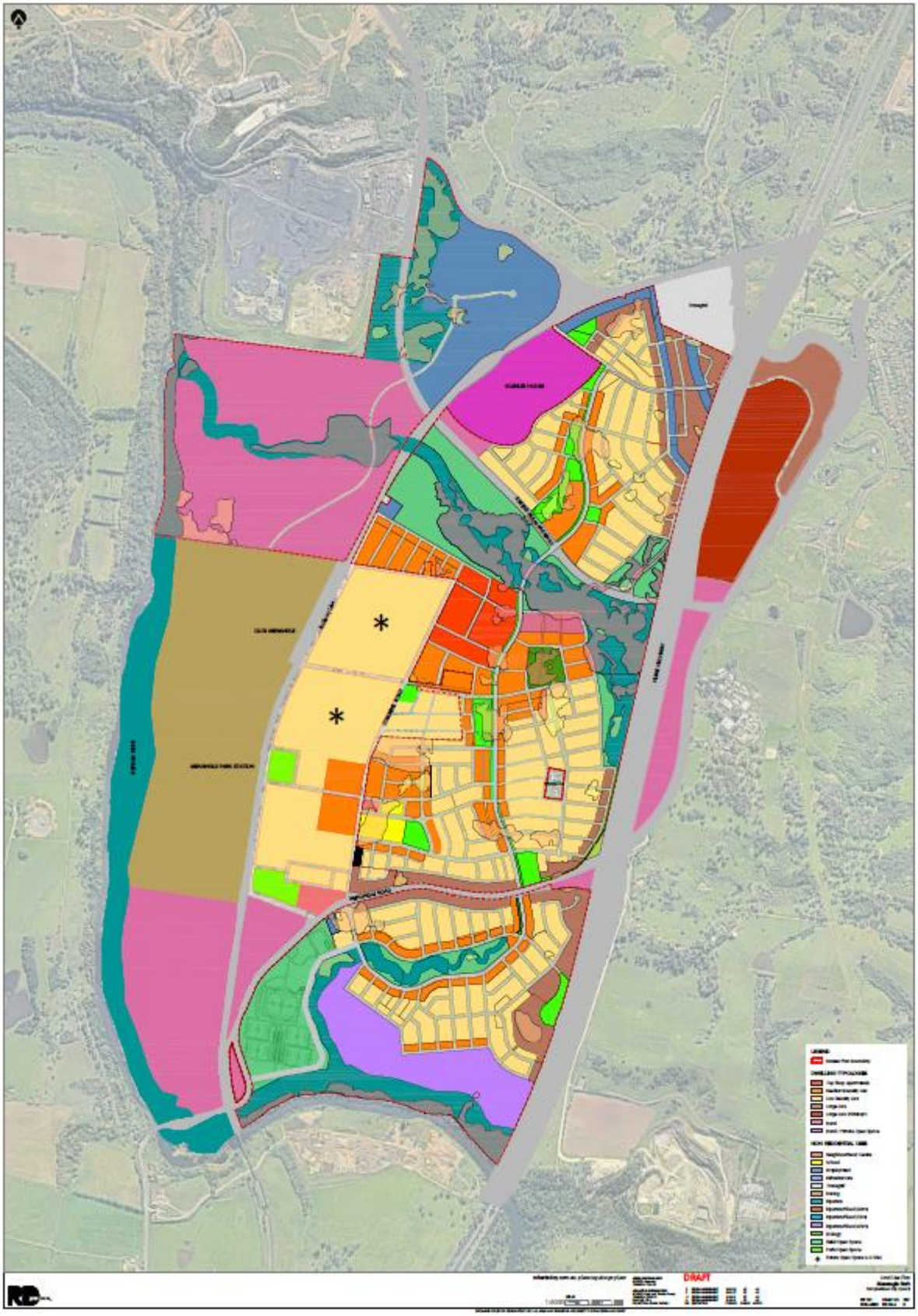

**Figure 4: Menangle Park master plan area.**

# 3. Bushfire Landscape Risk Assessment

A landscape risk assessment was undertaken for the master plan proposal and includes assessment of bushfire hazard, potential fire behaviour and bushfire history within a 5 km radius of the LGA.

## 3.1 Bushfire Hazard

The Menangle Park planning area is situated within an evolving bushfire landscape with increasing residential development to the north and planned future urban growth to the south and east of the site as per the Macarthur Growth area draft plan (Figure 1). As a result, the bushfire hazard to the north is largely fragmented, whilst the hazard to the south is dominated by rural grasslands under varying management regimes.

The bushfire hazard has been classified using the PBP methodology, through assessment of vegetation, slope and bushfire weather.

### 3.1.1 Vegetation

Vegetation mapping for the site was provided by Dahua Group and mapped by Cumberland Ecology in 2018. (Figure 5). External vegetation mapping was sourced from SEED (Vegetation Mapping of the Cumberland Plain, VIS ID: 4207) (Figure 6). Areas of planned revegetation provided by the client are shown in Figure 7**.**

Figure 8 shows the classification of mapped vegetation within a 5km study area from the site, with vegetation formation tabulated in Table 4**.**

The vegetated landscape consists of fragmented remnant woodland and forested wetland vegetation set within lands primarily cleared for agriculture. Although existing vegetation mapping did not include grassland communities, it is highly likely that vegetation within rural areas would be classified as grassland under PBP. Therefore, these areas were included from desktop mapping as shown in Figure 8.

### 3.1.2 Slope

Slope across the broader study area was been identified from a Digital Elevation Model (DEM) generated from 2 m contours and classified into the following slope classes (Figure 9):

- Upslope and flat;
- >0 – 5°
- >5° – 10°
- >10° – 15°
- >15° – 20°
- >20°

As evident in Figure 9, the terrain within the master plan area generally falls within the >0-5 slope class, with steeper sloped areas mirroring the riparian networks of the Nepean River, as evident along the western and southern boundary of the site. More broadly within the study area, steeper slopes are associated with the Nepean River in the south and Georges River in the east, along with Mount Annan to the north and Razorback to the south west.

### 3.1.3 Fire Catchment

High level analysis of the potential fire catchments influencing the study area was undertaken and the results of this analysis are displayed in Figure 10. Delineation of fire catchments helps to identify the location and size of potential fire attack scenarios for different locations within the master plan area. This informs assessment of the risk profile across the site, with exposure to larger fire catchments generally resulting in an elevated bushfire risk.

As evident in Figure 10**,** fire catchments influencing the master plan area are highly fragmented. The most prominent fire catchment extends from the south-east, however the connection of this catchment to the site relies on the assumption that rural grassland is unmanaged and can facilitate a fire pathway to the site.

**Table 4: PBP hazard class and fuel loads for vegetation types in the study area**

| PBP Hazard Class | Fuel Load (t/ha)[1] | Keith Formation | Plant Community Type |
|---|---|---|---|
| Forested Wetlands | 15.1 | Coastal Floodplain Wetlands<br>Eastern Riverine Forests | PCT 835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion<br>PCT 1292: Water Gum - Coachwood riparian scrub along sandstone streams, Sydney Basin Bioregion<br>River Oak Riparian Woodland<br>River Flat Eucalypt Forest |
| Forests | 36.1 | Dry Sclerophyll Forests<br>Coastal Swamp Forest<br>Swamp Oak Floodplain Forest EEC[1] | PCT 1181: Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion<br>PCT1790: Red Bloodwood - Grey Gum - Stringybark open forest on enriched sandstone ridges of the western Woronora plateau and lower Blue Mountains<br>PCT1789: Smooth-barked Apple - Blackbutt - Red Bloodwood open forest in enriched sandstone gullies of the western Woronora plateau |
| Freshwater Wetlands | 4.4 | Freshwater Wetlands | As mapped by Cumberland Ecology |
| Grasslands | 6 | Unmanaged grasslands<br>Derived Native Grasslands | |
| Woodland | 20.2 | Coastal Valley Grassy Woodlands | PCT 830: Forest Red Gum - Grey Box shrubby woodland on shale of the |

| PBP Hazard Class | Fuel Load (t/ha)[1] | Keith Formation | Plant Community Type |
|---|---|---|---|
| | | | southern Cumberland Plain, Sydney Basin Bioregion<br><br>PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion<br><br>PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion<br><br>PCT 1395: Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion |
| Rainforest | 13.2 | Dry Rainforests | PCT 877: Grey Myrtle dry rainforest of the Sydney Basin Bioregion and South East Corner Bioregion |
| Tall Heath | 36.9 | Heathlands | Elderslie Banksia Scrub Forest[2] |

[1]SWAMP OAK FLOODPLAIN FOREST EEC IS COMPRISED OF VARIOUS PCT'S, SOME OF WHICH ARE CLASSED AS COASTAL SWAMP FOREST. THEREFORE, THIS VEGETATION WAS CONSERVATIVELY ASSIGNED AS 'FOREST' IN THIS ASSESSMENT

[2]ELDERSLIE BANKSIA SCRUB FOREST FALLS WITHIN THE PBP 'FOREST' FORMATION HOWEVER THE CURRENT EXTENT WITHIN THE STUDY AREA IS MORE CLOSELY ALIGNED TO TALL HEATH IN THIS INSTANCE.

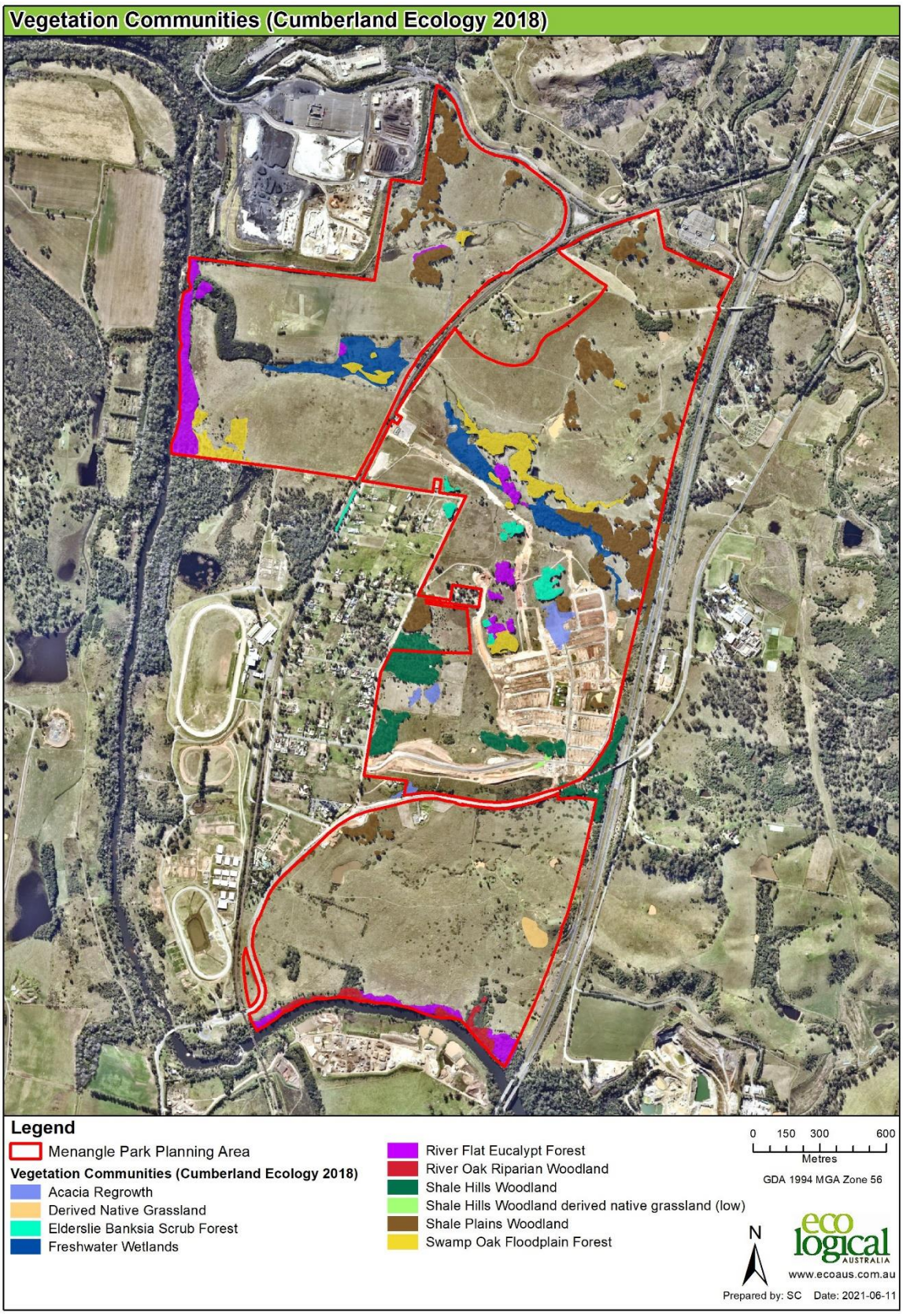


**Figure 5: Vegetation Mapping Cumberland Ecology (2018) (Source Dahua Group)**

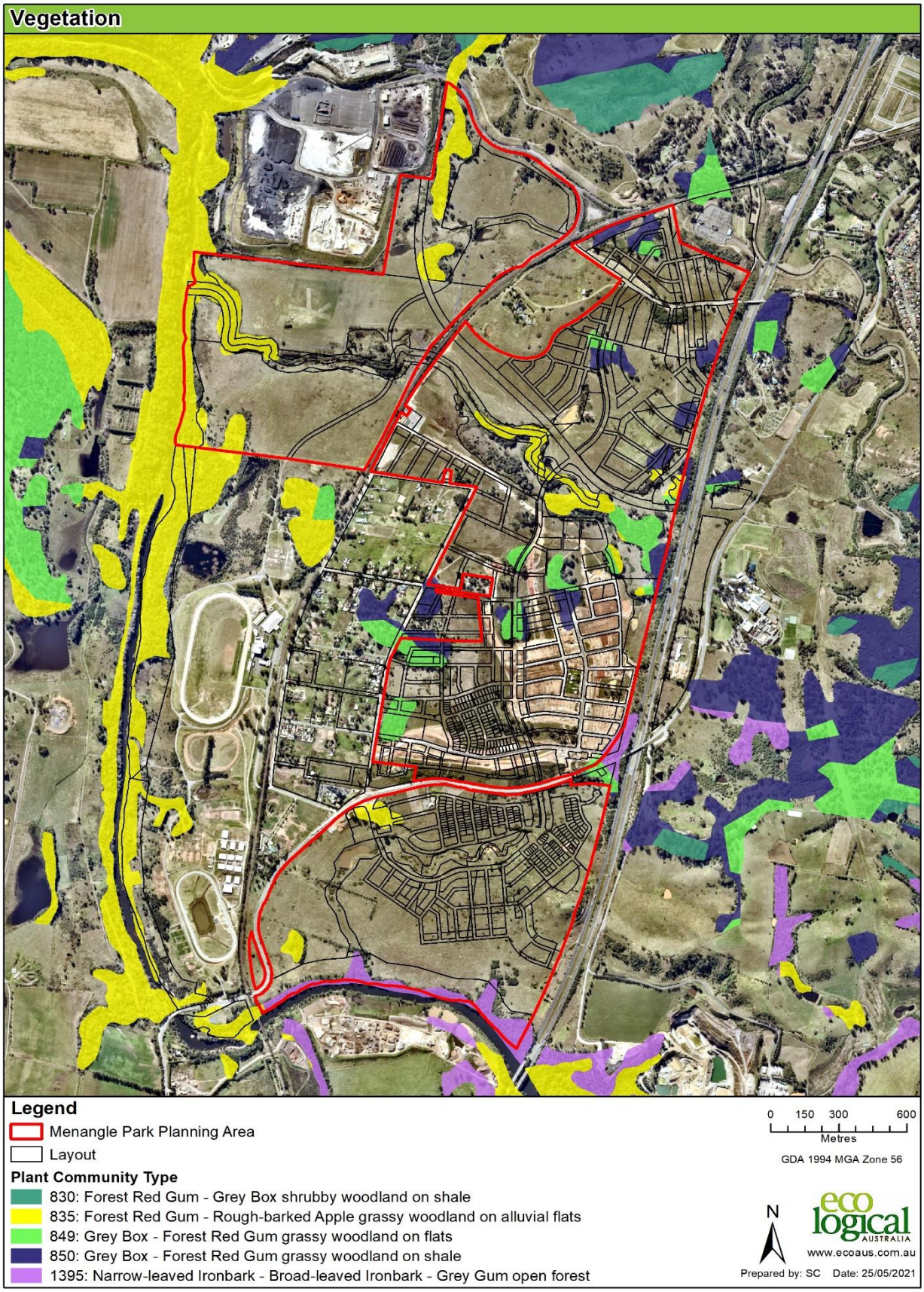


**Figure 6: OEH Mapping (VIS 4207)**

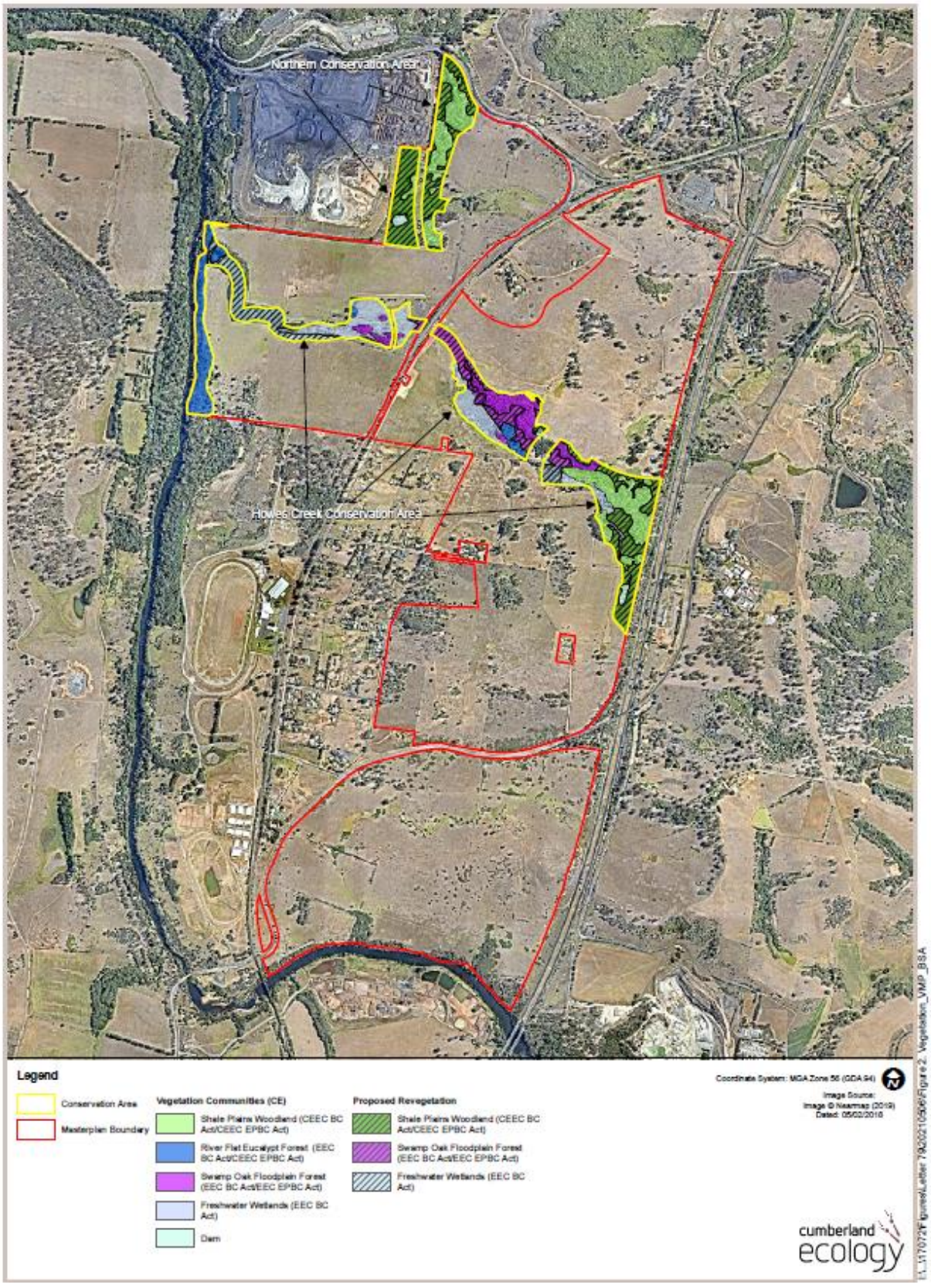


**Figure 7: Planned Revegetation (source: Dahua Group)**

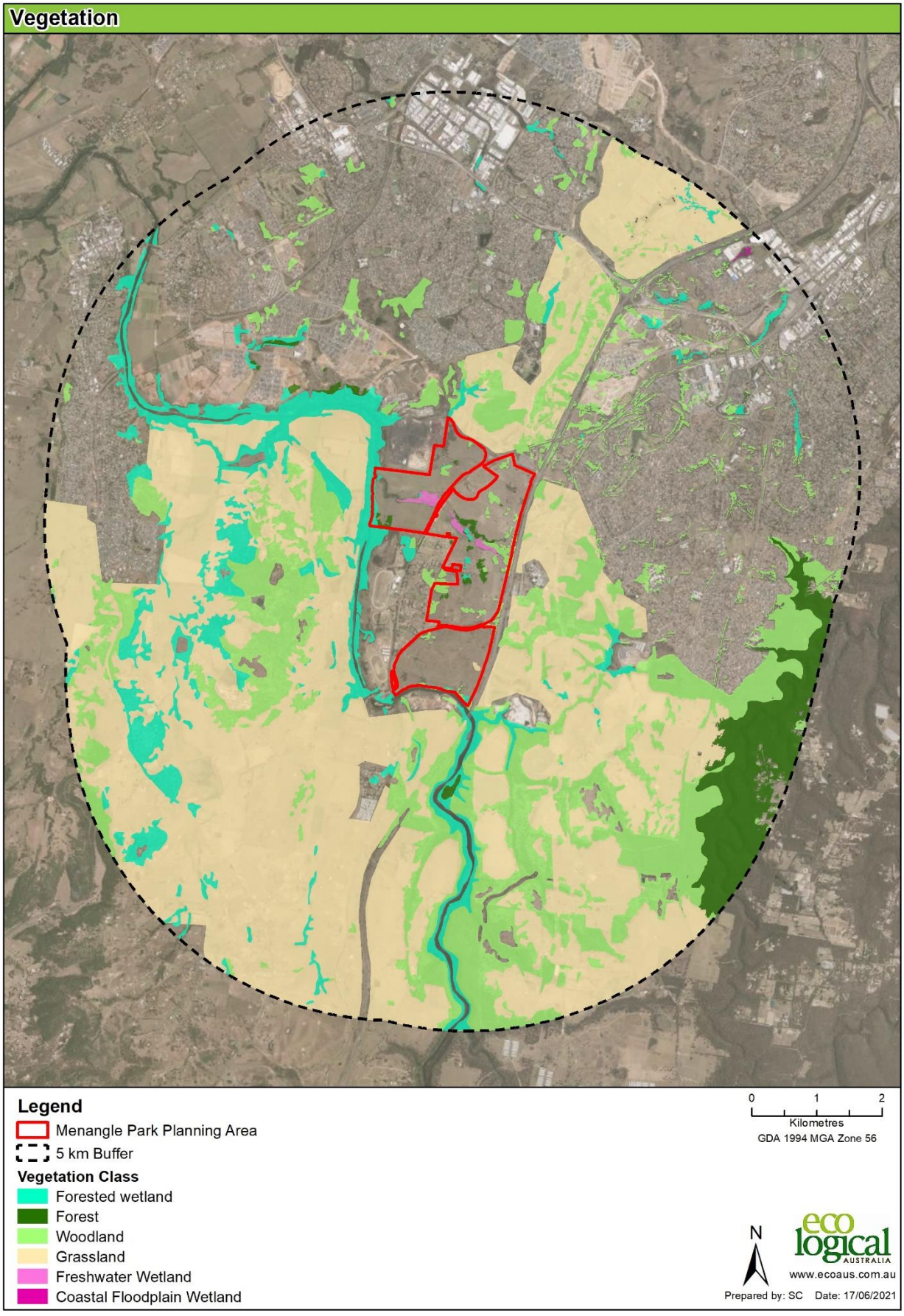


**Figure 8: Vegetation Formations in the study area**

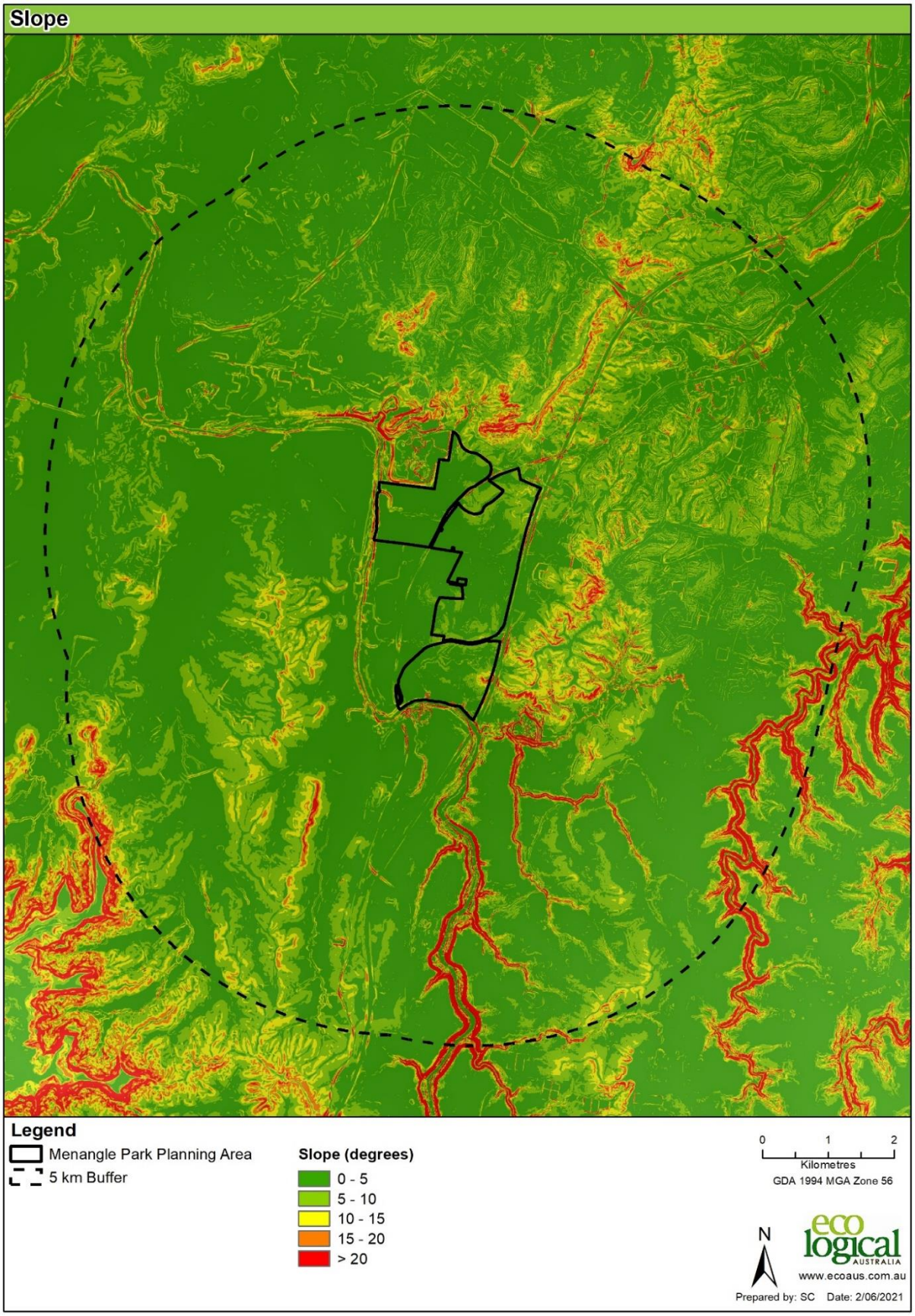


**Figure 9: Slope within the study area**

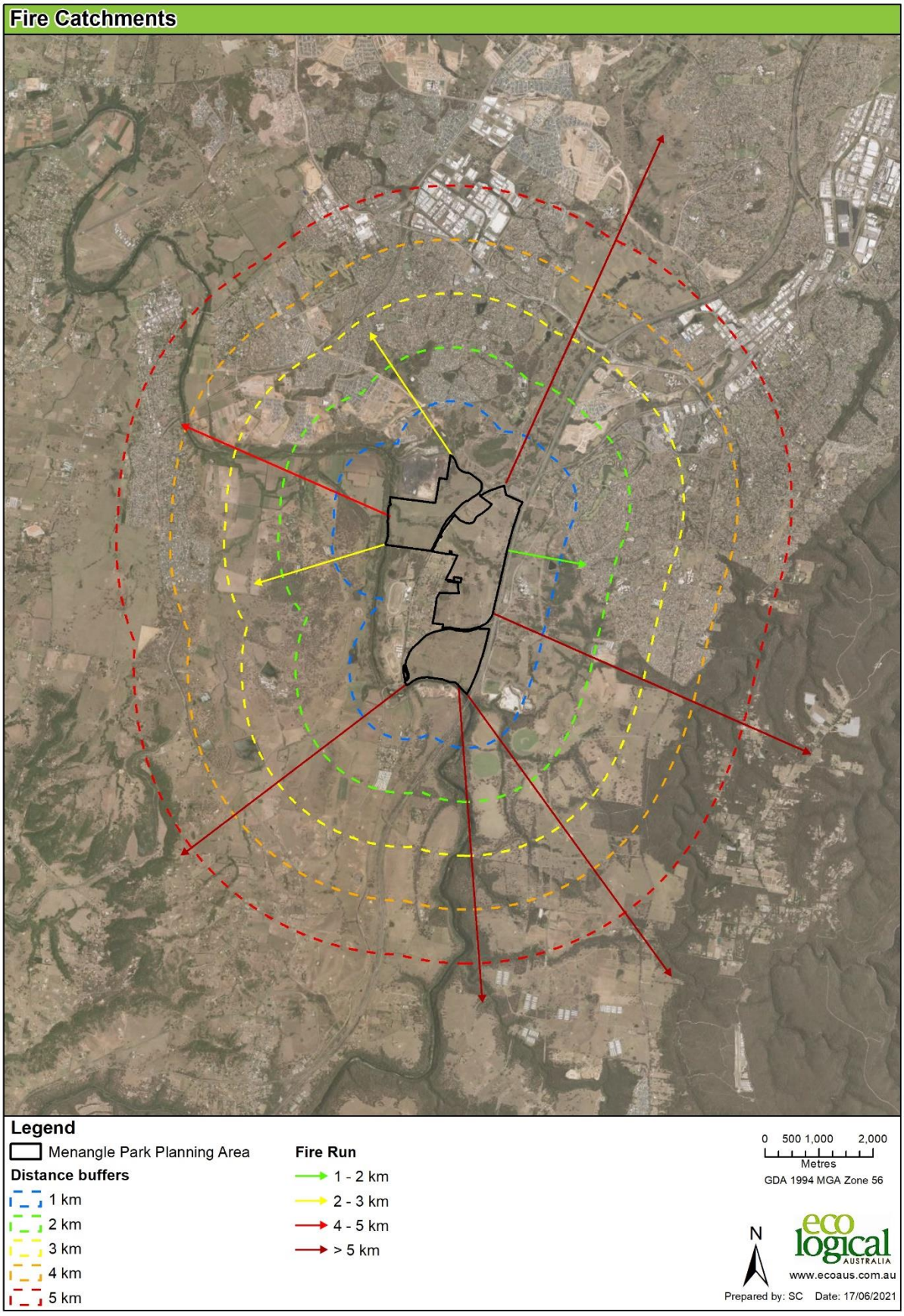


**Figure 10: Fire Catchments within the study area.**

### 3.1.4 Bushfire Weather

Menangle Park is situated in the Macarthur Bush Fire Management Committee (BFMC) Area. Within the Committee Area, the climate is generally warm temperate, with high summer rainfalls between January and March. Relative humidity is low, with little temporal variation. Winds are predominantly north-west, with southerly winds also occurring in summer (BFMC 2012). Warmer months are November to March, however the BMFC identifies the greatest danger is the period between a cool dry winter (May to August) and the onset of summer rain.

Days of Very High Fire Danger Rating (FDR) or above occur on average about 9 days per year based on data analysed from the National Bushfire Weather Data set Sydney Airport weather station (station number 066037) (Lucas 2010). Weather data developed by Lucas (2010) under the National Historical Fire Weather Dataset (1972-2020) incorporates the daily Forest Fire Danger Index (FFDI), where suitable inputs are available from over 70 weather stations across Australia. Data from the Sydney Airport weather station (the closest weather station within the National Historical Fire Weather Dataset) was analysed to determine the maximum FFDI for a 1 in 50-year event, being the accepted recurrence period for land use planning (RFS 2006).

PBP (RFS 2019) identifies that the FDI that applies to the subject land is FDI 100. The FDI used by PBP influences a number of bushfire protection measures, including Asset Protection Zones (APZ) and construction standards via the assessment of the Bushfire Attack Level (BAL).

The bushfire weather relevant to the Study Area was identified by analysis of long-term historical weather records. Bushfire weather is often described in terms of the Forest Fire Danger Index (FFDI) and this metric has a direct influence on the intensity of bushfire behaviour. The following was identified from the analysis:

- Maximum FFDI for wind directions from the north to south-east was 63;
- Maximum FFDI for wind directions from the south-east to south-west was 46; and
- Maximum FFDI for wind directions from the south-west to north was 114.

This analysis indicates that there is variation in the potential likelihood and consequence of bushfire attack from different directions toward the study area (**Figure 11**). Areas exposed to bushfire attack at higher FFDI are more likely to be impacted by fire as adverse fire weather will occur more often from those directions and a higher fire intensity is more likely as the weather conditions reach higher FFDI values. Areas exposed to bushfire attack at lower FFDI have a lower (but still significant) risk profile.

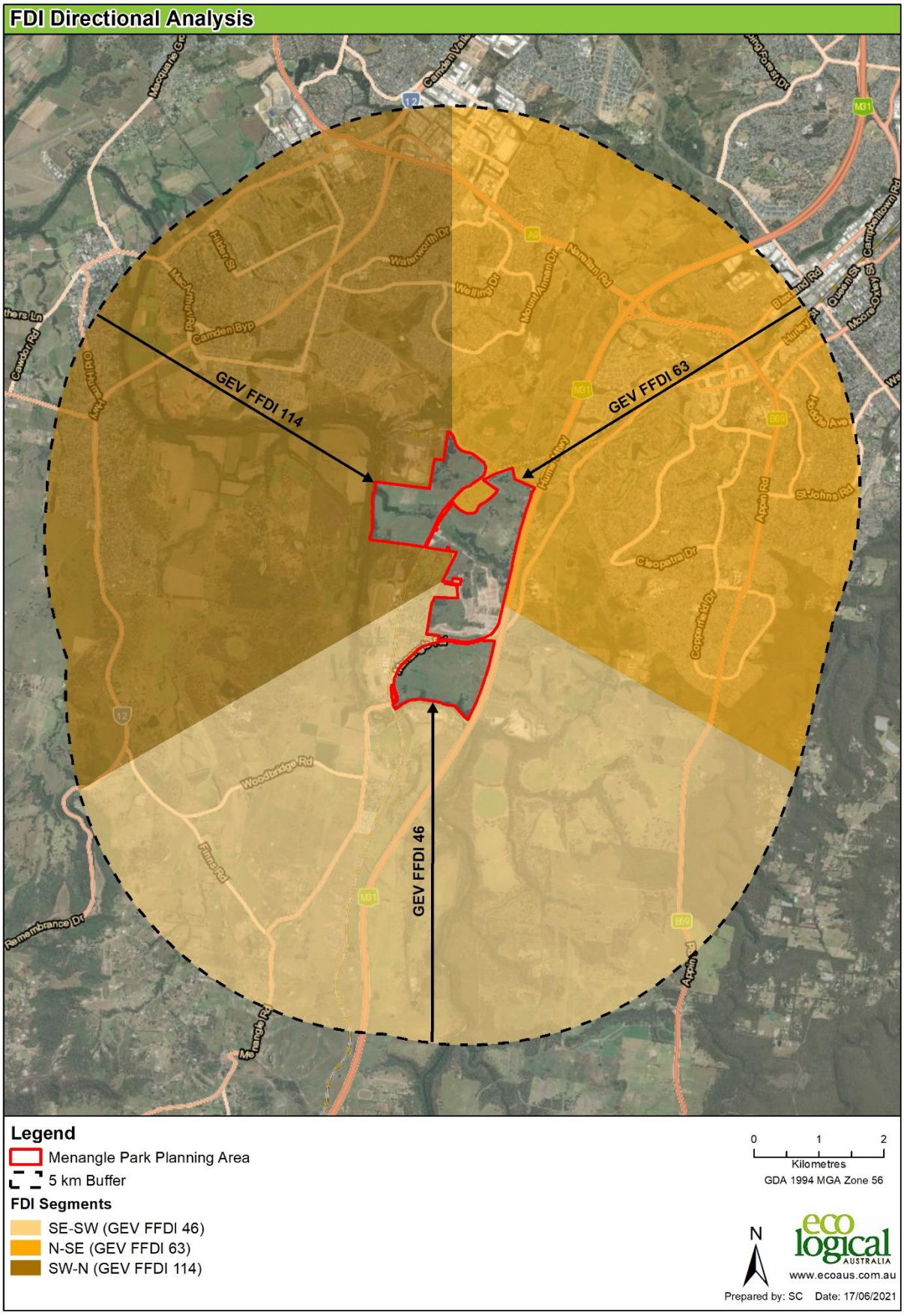


**Figure 11: Directional FDI Analysis**

## 3.2 Potential Fire Behaviour

Whilst each bushfire event is different, fire spreads by responding to changes in fuel, terrain, and weather conditions. Therefore, based on weather analysis, landscape conditions and fire history, potential fire behaviour can be determined. It is generally anticipated that a potential fire within the study area and surrounds, would spread more quickly and have the potential for higher intensities when:

- Burning under the influence of north-westerly and southerly winds, particularly during warmer summer months; and/or
- Moving upslope in the steeper, vegetated areas particularly in the west and south-west of the subject land but also surrounding the subject land in all directions within the study area.

### 3.2.1 Fire Intensity

A fire intensity model for the locality and surrounds was prepared by ELA. The model provides an indication of the potential head fire intensity from the direction of attack for the scenarios being modelled and uses the fire intensity formulae of McArthur (for Forest) and Catchpole et al (for Heath) and the directional FDI outputs derived from the weather analysis discussed in Section 3.1. Bushfire intensity is a significant determinant of risk to life and property and the controllability of bushfires and therefore important in the consideration of the bushfire risk context. However, it is important to note the models also so do not consider extreme fire behaviour/weather including such phenomena as:

- Spotting/firestorm;
- Fire tornado/whirls;
- Lateral vortices;
- Junction zones (Jump fires);
- Eruptive fires;
- Conflagrations;
- Downbursts; and
- Pyro-convective events.

Figure 12 shows that very high fire intensities can occur in various directions and these modelled areas that demonstrate potential for relatively higher bushfire intensities present a higher bushfire risk for the site. However, risk mitigation measures employed in areas of higher predicted intensity can help ensure fire pathways are lowered to an appropriate level.

Generally, the areas higher fire intensities occur are to the far east and west. However, much of the land to the west land was conservatively assessed as grassland and fuel loads on these lands are likely to be significantly reduced due to land management. Therefore, the fire intensity in these areas is expected to be lower than predicted and less contiguous, based on a reduced fuel load due to the application of various management practices across these lands (grazing, cropping, irrigation etc).

The location of the master plan area also provided mitigation advantages to reduce fire pathways and intensity, including the location of the Hume Highway adjacent the eastern boundary, Menangle Park village to the west and the Nepean River riparian corridor to the south and west, which promotes lower fuel load vegetation, corresponding to lower fire intensities. With increasing development occurring

across the Macarthur region, further reduction in fire intensities and fragmentation of fire pathways is expected.

## 3.3 Bushfire History

The Macarthur Bush Fire Risk Management Plan (BFRMP) identifies the main sources of ignition in the BFMC area is arson, with deliberate ignition to motor vehicles, structures, and bushland them main sources (BFMC 2012). According to the BFRMP, there are on average 417 bushfires each year of which, on average, only 5 progress to major fires.

As mapped in the NPWS fire history mapping data set and evident in **Figure 13**, since 1965 very few fires have occurred within the study area, with no fires impacting the master plan area during this time. As discussed above, the reduced fuel load and management of lands within the broader study area, along with fire mitigation advantages, has resulted in very few fires impacting the study area. Where fires have initiated on the eastern periphery of the study area, the direction of prevailing winds influencing the region is also advantageous in reducing the influence of fire pathways from the east. As evident in **Figure 14** not only have very few fires impacted the broader study area, the frequency of fire is low.

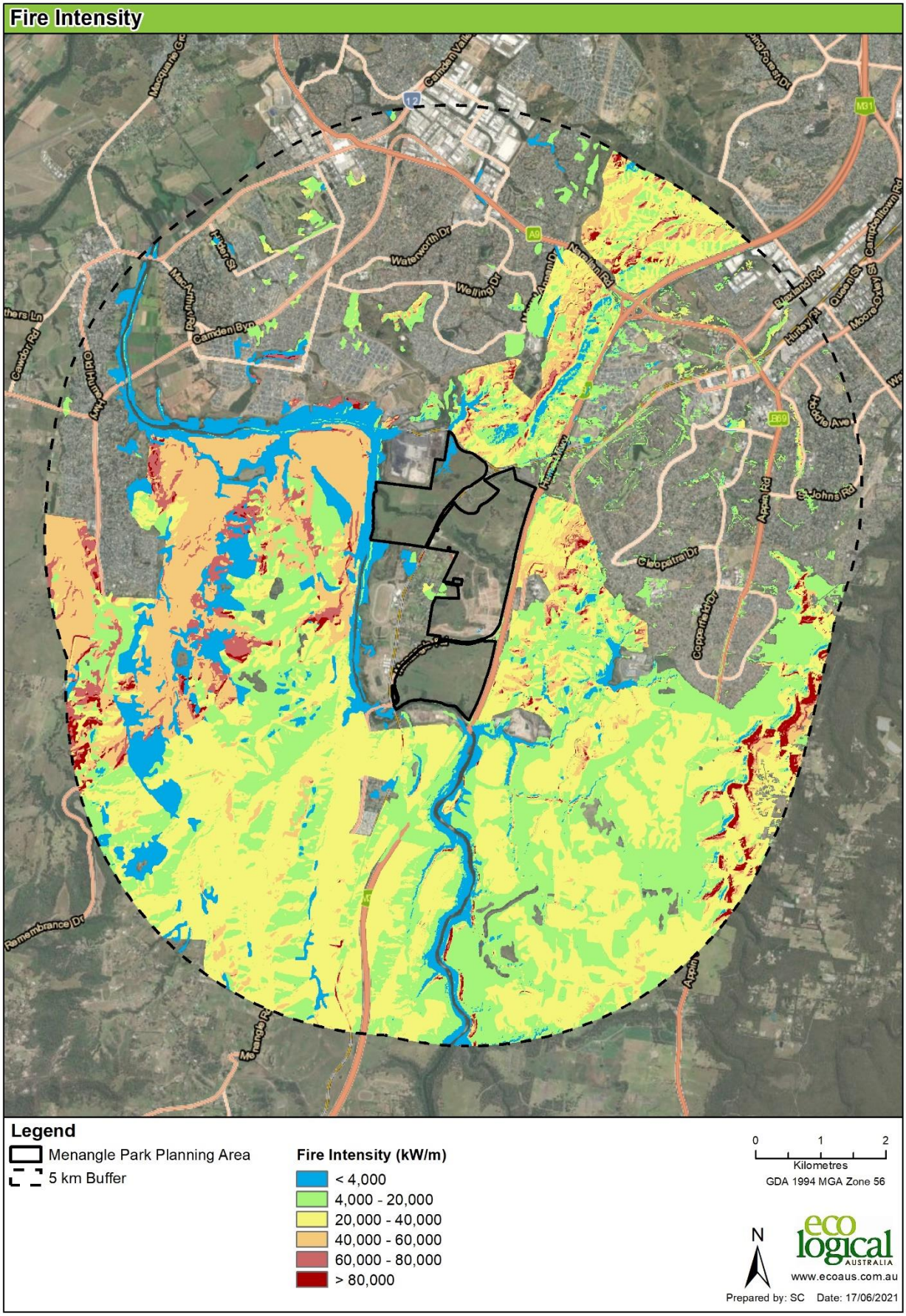


**Figure 12: Fire intensity modelling within the study area (based on a directional FDI analysis)**

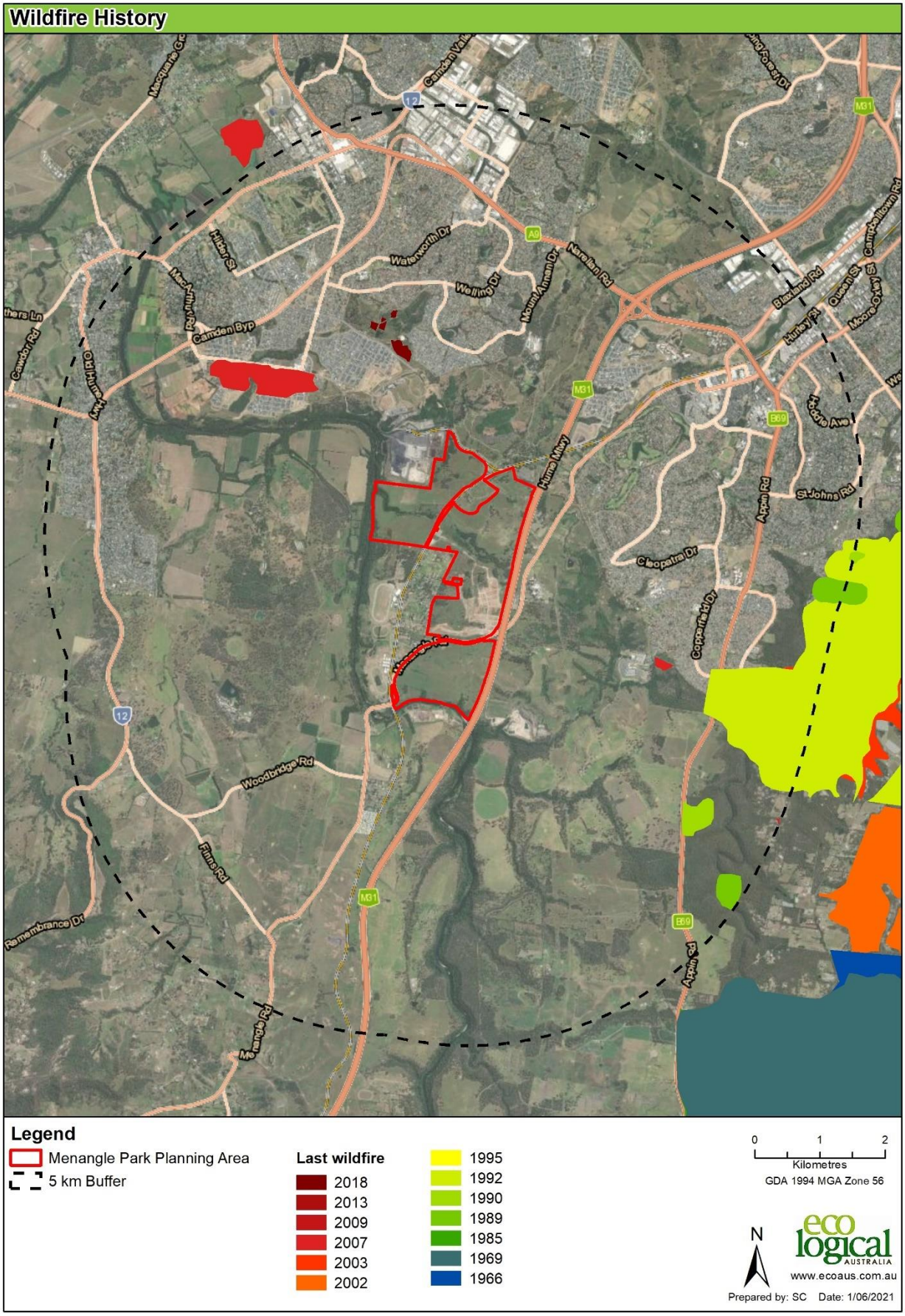


**Figure 13: Wildfire history within the study area**

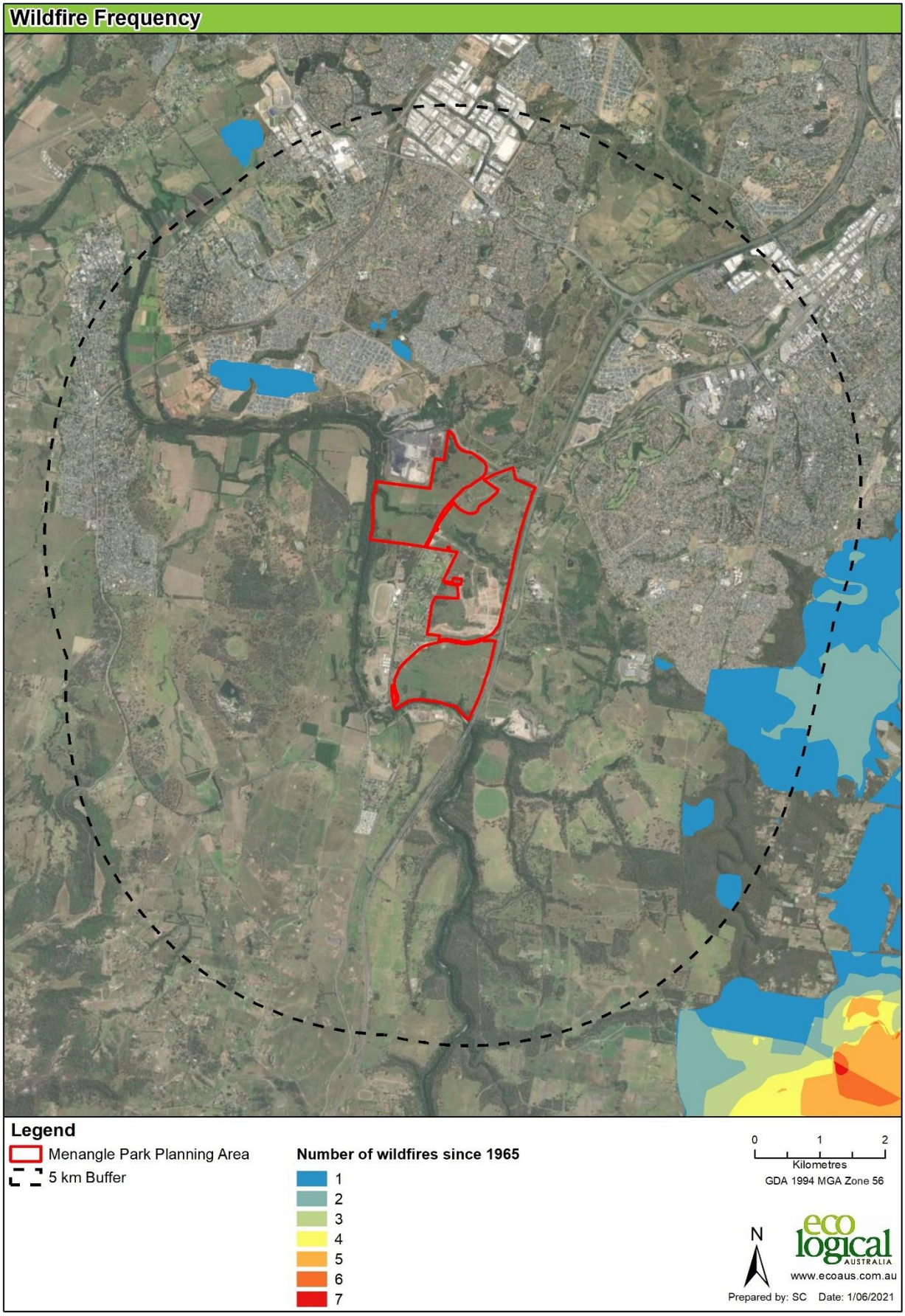


**Figure 14: Fire frequency within the study area - 1961/1962 fire season to 2019/2020 season**

## 3.4 Summary of landscape bushfire risk assessment

The landscape risk assessment for the master plan area and surrounds considered the current hazard extent, fire catchments influencing the site, bushfire weather, fire behaviour and fire history. The effective hazard may be considerably different for any future development that may occur due to continued land development within the Macarthur region.

In evaluating the landscape bushfire risk, whilst there is potential for bushfire attack to occur due to the presence of bush fire prone vegetation in the master plan area and surrounds, following mitigation, the residual bushfire attack risk is considered acceptable. This is due to a number of factors including:

- Limited connectivity to bush fire prone vegetation in the region;
- Limited fuel connectivity associated with mixed management practices of grasslands;
- Bushfire weather analysis that demonstrates lower FDIs in the SE to SW direction, corresponding to areas with the largest fire catchments, therefore promoting in a lower residual risk from this direction; and
- Fire history that supports lower residual risk.

# 4. Land Use Assessment

PBP outlines broad principles and assessment considerations for strategic planning. It also specifies that bushfire protection measures need to be considered at the strategic planning stage to ensure that the future development can comply with PBP (as specified in Chapters 5-8 of PBP). This land use assessment therefore considers the risk profile of the proposal, the suitability of proposed land uses and the feasibility of APZ requirements.

## 4.1 Risk profile

The feasibility of the Planning Proposal to comply with the bushfire protection measures identified within PBP is a fundamental consideration of the study. While Bushfire Protection Measures (BPMs) and their performance criteria are a benchmark for approval of a development, a strategic level study needs also to evaluate these measures within the landscape risk context. This SBS has therefore considered the following:

- The bushfire landscape risk context in consideration of the protection measures for future development and their potential adequacy;
- The type/s of development proposed, and their suitability given the bushfire risk context;
- The pattern and potential bushfire resilience of the bushland interface; and
- Potential cumulative risk associated with proposed development in the locality and provision of BPMs.

The feasibility of the subject land to provide for APZ, a key bushfire protection measure, is assessed in the following section. This is followed by an evaluation of the proposed land uses, bushfire risk context, APZ provision and assessed suitability.

### 4.1.1 Feasibility of Asset Protection Zones

Based on the landscape assessments of vegetation and slope, an assessment of the feasibility of PBP compliant APZs has been undertaken. The APZ dimensions listed in Error! Reference source not found. a re the minimum required APZs under the Acceptable Solutions of PBP for residential development (i.e. 29 kW/m$^2$) and SFPP development (i.e. 10 kW/m$^2$). Error! Reference source not found. shows that for b oth of these development types the PBP required APZ can be accommodated.

The following considerations and assumptions are made in relation to the mapped APZs:

- Vegetation formation in the assessment is based on internal mapping undertaken by Cumberland Ecology and OEH mapping for external areas;
- Vegetation assessment has assessed the potential future vegetation hazard for planned revegetation in environmental conservation and riparian management zones based on [insert advice from client or 3$^{rd}$ party or whatever is the case];
- As detailed design progresses with staging, site assessment may reveal slopes that are slightly (but not significantly) different to those used to plot the APZ;
- All APZs are assumed to be on land less than 18 degrees;
- Additional APZ and/or modification of the APZ in Error! Reference source not found. may be r equired if revegetation occurs beyond the vegetation hazard used to identify the APZ; and

- APZs shown in Figure 15 can generally be facilitated by the proposal or incorporated into future design iterations as detailed design progresses to the DA stage.

In addition to the compliance with provision of APZs, there is no part of the land-use assessment that suggests the Menangle Park proposal should be excluded as inappropriate development under the Strategic Planning Principles or exclusion criteria within PBP.

**Table 5: PBP APZ requirements**

| Interface | Slope | Vegetation Formation | APZ (m) | SFPP APZ (m) | Comments |
|---|---|---|---|---|---|
| 1 | <0-5° downslope | Woodland | 16 | 50 | |
| 2 | <0-5° downslope | Grassland | 12 | 40 | |
| 3a | <0-5° downslope | Woodland | 16 | 50 | |
| 3b | <0-5° downslope | Grassland | 12 | 40 | |
| 4 | <0-5° downslope | Rainforest | 14 | 47 | Potential to reduce/exclude hazard extent if vegetation management works adjacent to substation are undertaken |
| 5 | <0-5° downslope | Rainforest | 14 | 47 | |
| 6a | <0-5° downslope | Forest | 29 | 79 | |
| 6b | <0-5° downslope | Forest | 29 | 79 | |
| 6c | <0-5° downslope | Woodland | 16 | 50 | |
| 7a | <0-5° downslope | Forested wetland | 12 | 42 | |
| 7b | <0-5° downslope | Forested Wetland | 12 | 42 | Currently exotic vegetation and classified as forested wetland for the purpose of this assessment. Potential to downgrade to freshwater wetland once VMP implemented. |
| 7c | <0-5° downslope | Forest | 29 | 79 | |
| 8a | <0-5° downslope | Forested wetland | 12 | 42 | |
| 8b | <0-5° downslope | Forested Wetland | 12 | 42 | Currently exotic vegetation and classified as forested wetland for the purpose of this assessment. Potential to downgrade to freshwater wetland once VMP implemented. |
| 8c | <0-5° downslope | Forest | 29 | 79 | |
| 9a | <0-5° downslope | Grassland | 12 | 40 | |
| 9b | <0-5° downslope | Grassland | 12 | 40 | |
| 9c | <0-5° downslope | Forest | 29 | 79 | |
| 9d | <0-5° downslope | Forest | 29 | 79 | |
| 9e | <0-5° downslope | Woodland | 16 | 50 | |
| 10a | Upslope/flat land | Forest | 24 | 67 | |
| 10b | Upslope/flat land | Woodland | 12 | 42 | |

| Interface | Slope | Vegetation Formation | APZ (m) | SFPP APZ (m) | Comments |
|---|---|---|---|---|---|
| 11 | Upslope/flat land | Grassland | 10 | 36 | Potential to reduce/exclude hazard in R2 land with confirmation of ongoing land management at DA stage |
| 12 | <0-5° downslope | Grassland | 12 | 40 | Potential to reduce/exclude hazard in R2 land with confirmation of ongoing land management at DA stage/ APZ provided by road |
| 13 | Upslope/flat land | Woodland | 12 | 42 | |
| 14 | <0-5° downslope | Woodland | 16 | 50 | |
| 15 | <0-5° downslope | Tall heath | 18 | 56 | To be confirmed. Risk may be upgraded to Forest |
| 16 | Upslope/flat land | Grassland | 10 | 36 | |
| 17a | <0-5° downslope | Woodland | 16 | 50 | |
| 17b | <0-5° downslope | Grassland | 12 | 40 | |
| 18 | <0-5° downslope | Woodland | 16 | 50 | |
| 19 | <0-5° downslope | Grassland | 12 | 40 | Potential to reduce/exclude hazard in R2 land with confirmation of ongoing land management at DA stage |
| 20 | <0-5° downslope | Forest | 29 | 79 | |
| 21 | <0-5° downslope | Rainforest | 14 | 47 | |
| 22 | <0-5° downslope | Rainforest | 14 | 47 | |
| 23 | <0-5° downslope | Grassland | 12 | 40 | Potential for 50 m APZ to be provided. Potential to reduce/exclude hazard once sports grounds are operational. |
| 24 | <0-5° downslope | Woodland | 16 | 50 | |
| 25 | <0-5° downslope | Grassland | 12 | 40 | Potential for 50 m APZ to be provided. |
| 29a | <0-5° downslope | Grassland | 12 | 40 | |
| 29b | <0-5° downslope | Forest | 29 | 79 | |
| 30 | <0-5° downslope | Forest | 29 | 79 | |

[1] Table A1.12.2 from PBP 2019, [2] Table A1.12.1 from PBP

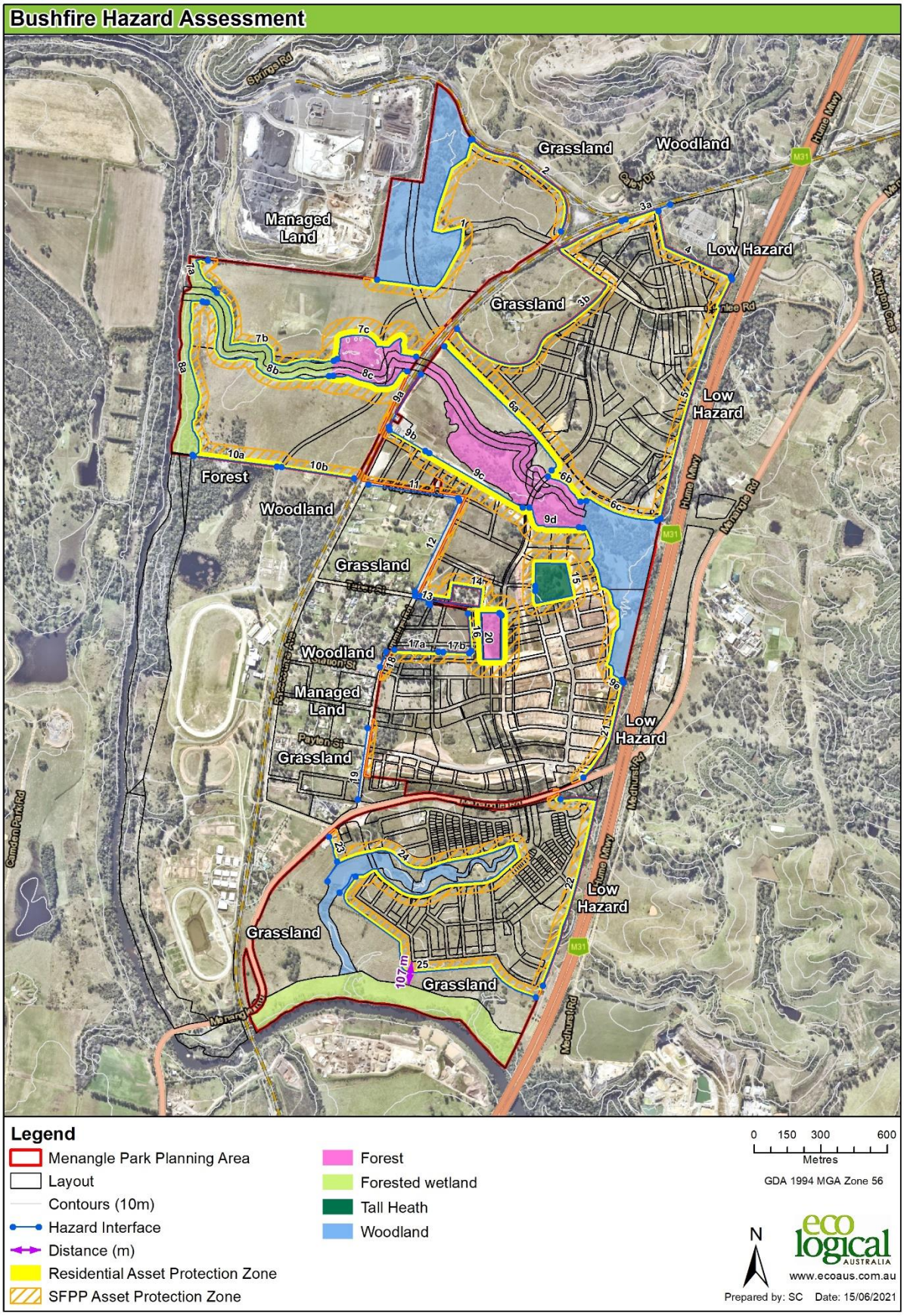


**Figure 15: Bushfire Hazard Assessment and APZ requirement**

### 4.1.2 Land use evaluation

The proposed land uses identified in the master plan will trigger various requirements under PBP when occurring on BFPL. Future development on BFPL would therefore need to satisfy the performance criteria identified in PBP. At a precinct level, it is expected that master plan design can accommodate the acceptable solutions identified in PBP to minimise reliance on performance solutions at the DA stage. A summary of these requirements is outlined below.

#### *4.1.2.1 Chapter 5 of PBP – Residential and Rural Residential Subdivision*

Much of the master plan area is planned for residential development and therefore will be subject to the requirements outlined in Chapter 5 of PBP. At the DA stage, to demonstrate the suitability of the proposed subdivision, the following provisions will need to be considered:

- Access and egress within the developable land and along the adjoining public road system shall include safety provisions for attending emergency service vehicles and evacuating residents;
- Subdivision design shall include perimeter roads separating developable lots from hazardous bushland areas;
- Access is to be ensured for maintenance of APZ and other fire mitigation activities;
- Larger APZs outside of the range prescribed in PBP and increased Bush Fire Attack Level (BAL) to proposed buildings to create a safer area.
- Firefighting water supply and associated firefighting equipment (i.e. pump and hose) for each dwelling in addition to any reticulated water supplies.
- Provision of access and infrastructure requirements according to Table 5.3b of PBP.

#### *4.1.2.2 Chapter 6 of PBP – SFPP Development*

Special Fire Protection Purposes (SFPP) provisions may be applicable to proposed schools within the proposed development along with Seniors Living, childcare centres, tourist accommodation and any other development specified as SFPP under s. 100B(6) of the RF Act or Section 46 of the RF Reg. These developments would need to meet the criteria outlined in Section 6 of PBP including:

- Provision of a Bush Fire Emergency Management and Evacuation Plan is prepared as per Table 6.8d of PBP; and
- Provision of APZ, access and utilities according to Tables6.8a-c of PBP.

#### *4.1.2.3 Section 8.3.1 of PBP - Buildings of Class 5 to 8 under the NCC/Section 8.3.10 Commercial and Industrial Development*

As per the NCC building classification system buildings such as offices, shops, factories, warehouses, and other commercial or industrial facilities on BFPL have no specific bushfire requirements and as such AS 3959-2018 and the 2014 National Association of Steel-framed Housing (NASH) standard 'Steel Framed Construction in Bushfire Areas 2014' are not deemed-to-satisfy (DTS) provisions (NASH). However, such developments would still need to meet the objectives of PBP and consider the following:

- Provision of safe access to/from the public road system for egress and evacuation;
- Provision of suitable emergency and evacuation arrangements for occupants;
- Provision of adequate water services to protect the building, and the location of gas and electricity supplies so as they do not contribute to the bushfire risk; and
- Provision for the storage of hazardous materials away from any hazards.

In meeting the objectives of PBP, best practice is for such developments to meet the requirements of BAL-29 in regard to APZ dimensions. At BALs of BAL-29 and below, no specific BAL requirements are usually placed on such development and general ember protection measures are usually the only recommendations from the RFS in relation to buildings of this development type. However, where such development is placed in areas of BAL-40 or BAL-FZ, the RFS do apply the relevant BAL requirements of AS 3959-2018 or the NASH Standard. General access and infrastructure requirements listed in Table 7.4a of PBP should also be considered.

#### *4.1.2.4 Section 8.3.11 – Public Assembly Buildings*

Where a public building has a floor space greater than 500m$^2$ it is considered an assembly building, and due to the evacuation of a large number of people, this type of development is generally treated as SFPP. This could include future facilities in the planned Neighbourhood Centre such as a community centre. To meet SFPP requirements, future developments of this nature on BFPL would need provisions for APZs that meet a maximum Radiant Heat Flux (RHF) of 10kW/m² and a construction standard of BAL-12.5.

#### *4.1.2.5 Section 8.2.2 Multi-storey residential development*

Buildings exceeding three storeys in height are considered to be multi-storey buildings and are required to comply with the performance criteria within Chapter 5, including the requirement for an APZ which meets a threshold of 29kW/m². In addition, the following issues will need to be considered as per Table 8.2.2 of PBP:

- Higher resident densities for evacuation;
- Location of high-rise buildings in higher elevations or on ridge tops;
- Increased demand on road infrastructure during evacuation;
- Higher external façade exposed to bush fire attack;
- Additional fuel loading from car and storage facilities;
- Potential for balconies and external features to trap embers and ignite combustible materials; and
- Increased exposure to convective heat due to height.

The absence of extensive forested areas surrounding/within the study area means that the risk of exposure of future multi-storey development to significant convective fire behaviour is relatively low.

# 5. Access and egress

The proposed master plan includes provision for perimeter roads adjacent to key hazards including the riparian corridors (**Figure 16**). There is further scope to finalise road design at detailed design as staging progresses, particularly in relation to employment lands in the north and rural lands to the west and other stages that are still to progress to DA.

Based on the current master plan, the proposal achieves multiple access points, including:

- Three entry and exit points onto Menangle Road for stages located south of Menangle Road;
- Access to Spring Farm Parkway to the north, Cummins Road to the West and Menangle Road to the south for stages located between Menangle Road and Spring Farm Parkway;
- Access onto Spring Farm Parkway and Glenlee Road for development north of Spring Farm Parkway, with capacity to include additional linkages in the north to the employment lands to the west; and
- Access to the slip lane onto the Hume Highway from Spring Farm Parkway.

Additionally, the Greater Macarthur 2040 Plan (see DPIE structure plan in **Figure 1**) has provision for various collector roads, sub-arterial roads, public transport corridors and the future Outer-Sydney Orbital connection. This includes the construction of Spring Farm Parkway, widening of Menangle Road and the new access ramp onto the Hume Highway (GTA 2018).

As highlighted in the traffic study conducted by GTA, the Menangle Park master plan will have the following key access points:

- Two signalised intersections on Menangle Road (one with Cummins Road and one with a new North-South Collector Road); and
- Two signalised intersections on Spring Farm Parkway (one east of the railway line to access the main precinct and one west of the railway line to access the employment lands);

Future development applications will need to address access requirements in more detail as per PBP 2019 and achieve:

- a road design that facilitates the safe access and egress for residents and emergency service personnel, including multiple access/egress options for each area; and
- a road design with adequate capacity to facilitate satisfactory emergency evacuation.

A key consideration as the master plan progresses is staging of precinct development to ensure adequate collector roads and sub-arterial roads to support the provision of proposed perimeter roads and to facilitate access and egress. As such, as discussed in the traffic study prepare by GTA, it is expected that interim road and intersection upgrades would be required, and these would be further assessed using detailed modelling.

### 5.1.1 Evacuation

There are currently no existing Neighbourhood Safer Places (NSPs) located within Menangle Park **(**Table 6**,** Figure 17**),** however there are a number of NSPs within 15 km and it is likely that access to these locations will improve with increased road connections associated with the master plan and broader development in the growth area.

It is also feasible that additional NSPs may be incorporated into the master plan area, for example within the neighbourhood centre, future employment area or playing fields, subject to meeting NSP criteria as outlined in Table 7 and Table 8 below. Additionally, Menangle Park Village is located close to the west of the site. Therefore, it is not expected that there would be a shortage of safe places to evacuate once the master plan area is developed.

**Table 6: Existing NSPs in vicinity of study area**

^ accessed from https://www.rfs.nsw.gov.au/plan-and-prepare/neighbourhood-safer-places

| Neighbourhood Safer Place | Location | Suburb | LGA | Type | Distance (km) | Travel Time by Car (min) |
|---|---|---|---|---|---|---|
| Currans Hill Community Hall Carpark | Iando Way (Tramway Drive), Currans Hill | Currans Hill | Camden | Open Space | 11 | 18 |
| Elder Reserve | Elder Way and Welling Drive, Mt Annan | Mt Annan | Camden | Open Space | 12 | 18 |
| Elizabeth Macarthur Park | Cnr Martine Avenue & Brigalow Avenue, Camden South | Camden South | Camden | Open Space | 13 | 13 |
| Hilltop Park | Meehan Terrace, Harrington Park (access by Denbigh Place & Carabeely Place) | Harrington Park | Camden | Open Space | 16 | 25 |
| Macarthur Park | Corner of Menangle Road and Park Street, Camden | Camden | Camden | Open Space | 15 | 17 |
| Macleay Reserve | Macleay Street, Bradbury | Bradbury | Campbelltown | Open Space | 9.5 | 12 |
| Oswald Reserve | Oswald Crescent, Rosemeadow | Rosemeadow | Campbelltown | Open Space | 10 | 14 |
| Woodlands Road Baseball Complex | Karrabul Road, St Helens Park | St Helens Park | Campbelltown | Open Space | 10.5 | 13 |

The criteria and principles for NSPs are documented in the RFS document 'Neighbourhood Safer Places – Guidelines for the identification and inspection of neighbourhood safer places in NSW' (RFS 2017) and NSPs are defined as follows:

> *An NSP is a building or an open space that may provide for improved protection of human life during the onset and passage of a bush fire. It is a location where people facing an immediate threat to their personal safety can gather and seek shelter from the impact of a bush fire. Their function is to provide a place of last resort for a person to seek shelter at during the passage of the bush fire front.*
>
> *NSPs are not to be confused with Fire Refuges, Recovery Centres, Assembly Areas, Evacuation Centres or Informal Places of Shelter*

**Table 7: Assessment criteria for a NSP**

| Factor | Performance Criteria | Acceptable Solution |
|---|---|---|
| Radiant Heat | Building is located and constructed to enhance the chance for survival for humans in attendance from the radiant heat of a bush fire. | Building is situated to prevent direct flame contact, material ignition and radiant heat level of 10kW/m²; or<br>Provide 139 metres separation distance from a bush fire hazard. |
| | Open Space is located to enhance the chance for survival for humans in attendance from the radiant heat of a bush fire. | Open Space is situated and maintained to prevent direct flame contact, material ignition and radiant heat levels of 2 kW/m²; or<br>Provide 310 metres separation distance from a bush fire hazard. |
| Maintenance of the Site and the Land Adjacent | Area between bush fire hazard and the site is maintained to a level that ensures the radiant heat levels at the Building/Open Space meet the Performance Criteria for Radiant Heat. | The site and land adjacent to the site between the Building/Open Space and the bush fire hazard is managed land or maintained in accordance with NSW RFS document 'Standards for Asset Protection Zones'. |

**Table 8: Principles for NSP site identification**

| Consideration | Principles |
|---|---|
| Site Selection | An NSP should provide a safer place for the community. |
| | The community should be moving away from the bush fire hazard to access the NSP over short distances where possible. |
| | NSP locations should reflect community need and bush fire risk. |
| Moving to a NSP | An NSP should not be isolated from the community. |
| | The community should not be impeded from reaching the NSP area in a bush fire situation. |
| Capacity | Additional NSPs should be sought where it is likely current or potential NSPs cannot accommodate those likely to use it. |
| | Demand for use of an NSP reflect a community's level of bush fire preparedness. |

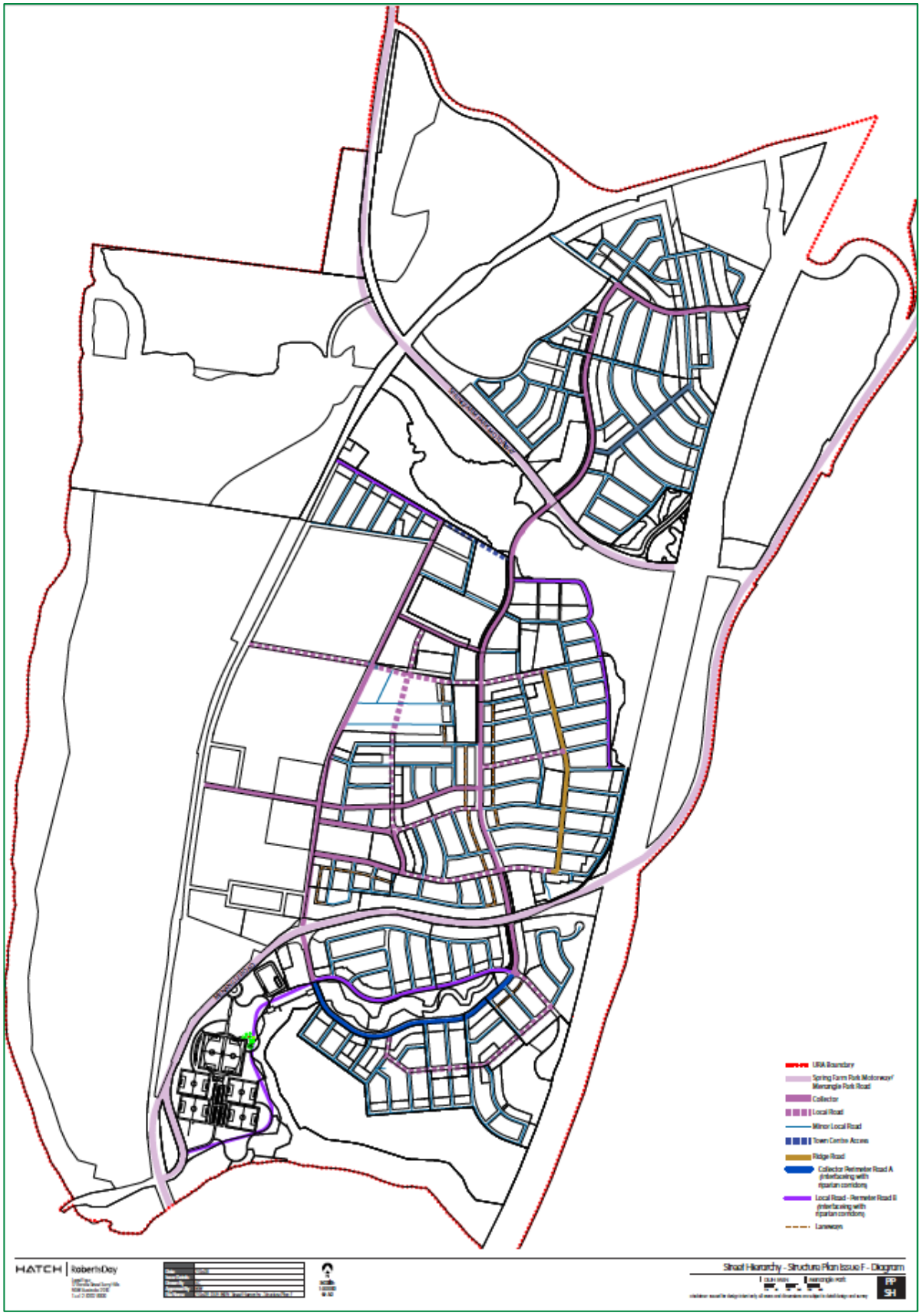


**Figure 16: Access hierarchy**


**Figure 17: Existing Neighbourhood Safer Places**

# 6. Emergency Services

To gauge the proposal's ability to meet the objectives and strategic planning principles of PBP relating to emergency management, the following aspects were reviewed:

a. Consideration of the increase in demand for emergency services;
b. Emergency evacuation planning; and
c. Evacuation adequacy assessment.

Regarding the demand for emergency services, ELA reviewed existing services in proximity to the site and note that there are several RFS Brigades close by as show in Figure 18 and **Table 9.** Additional Fire and Rescue NSW (FRNSW) resources are stationed close by at Campbelltown, north-west of the master plan area. As such, the subject lands are considered well resourced. It is also anticipated that as the broader Macarthur Growth area is activated, emergency services will be supplemented as the demand increases.

Evacuation planning and evacuation adequacy will be assessed in detail for each future proposal where relevant. However, as discussed in **Section 5. Access and egress**, there are several NSPs, and nearby town centres which could provide temporary refuge. This is considered adequate, given the residual risk of bushfire impacting the site is low and a large proportion of master plan area will not be located within BFPL as the site is progressively activated. As discussed, the site also presents with opportunities for future onsite NSPs which would provide additional benefit to the Menangle Park Village situated to the west. Therefore, no ongoing strain on evacuation services or the needs of residents would be expected.

**Table 9: Fire stations in proximity to the site**

| Station | RFS/ NSW FR | Distance Km | Time | Direction |
|---|---|---|---|---|
| Narellan Rural Fire Brigade | RFS | 15.3 | 19 min | North |
| Lynwood Park Rural Fire Brigade | RFS | 11.1 | 12 min | North-East |
| Wedderburn Rural Fire Brigade | RFS | 14.6 | 16 min | South-East |
| Menangle Park Rural Fire Brigade | RFS | 1.3 | 2 min | North- west |
| Menangle Rural Fire Brigade | RFS | 2.7 | 3 min | South-west |
| Campbelltown | FRNSW | 9.3 | 13 min | North- east |


**Figure 18: Fire brigades close to the site**

# 7. Infrastructure

Future development on the subject lands related to the amendments will need to meet the applicable requirements of PBP. The general requirements for development are discussed below and are considered achievable for this site. Specific PBP requirements for SFPP developments and subdivision are detailed in **Appendix B.**

## 7.1 Water

To comply with PBP, future development should be serviced by a reticulated water supply. Fire hydrant spacing, sizing and pressures should comply with AS 2419.1 – 2005 'Fire hydrant installations – Part 1: System design, installation and commissioning (SA 2005). Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. Fire hydrants should not be located within any road carriageway. All above ground water and gas service pipes external to any buildings are to be metal, including and up to any taps. Where reticulated water cannot be provided, a static water supply for firefighting purposes is required on site for each occupied building in accord with the capacities shown in Table 5.3d of PBP. The PBP acceptable solution requirements for water are expected to be achievable for future development within the study area.

## 7.2 Electricity and gas

It is expected that future electricity supply to the subject land will be underground where possible and compliant with PBP. If existing or future electrical transmission lines to the subject land are above ground, the following requirements apply:

- lines are installed with short pole spacing (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 accordance with the specifications in ISSC3 'Guide for the Management of Vegetation in the Vicinity of Electricity Assets' (ISSC3 2016).

Reticulated or bottled gas is to be installed and maintained in accordance with Australian Standard AS/NZS 1596:2014 'The storage and handling of LP Gas' (SA 2014) and the requirements of relevant authorities (metal piping must be used). The PBP acceptable solution requirements for these services are expected to be achievable for future development within the study area.

# 8. Adjoining land

Future development should not compromise any offsite bushfire management works. Given the adherence to PBP that will be required, any future development should also not increase the bushfire management needs for retained and/or adjoining bush fire prone vegetation and it is expected that future development would strengthen bushfire management capabilities in the broader Menangle Park study area. Additionally, there is capacity for all APZs to be wholly within Dahua owned land or provided

by public roads. Therefore, there are no concerns regarding the impact of this proposal on adjoining land.

# 9. Conclusion

In evaluating the master plan proposal against the bushfire strategic planning requirements of PBP (detailed in Section 1.3), this assessment is based on our understanding of the proposal and current hazards influencing the master plan area. The evaluation of the proposal merits in relation to PBP considers the following aspects:

- Future development will not pose or be subjected to an unacceptable risk; or provide for 'inappropriate development' outcomes;
- Future development will be consistent with the strategic planning principles of PBP;
- Adequate bushfire protection measures can be provided to reduce the residual risk to an appropriate level; and
- Future development will not adversely affect existing development or adjoining landowners and their ability to undertake bushfire management.

In considering these aspects, our assessment of landscape risk demonstrates that the residual bushfire risk influencing the master plan is not unacceptable, and therefore the proposed development outcomes are not considered inappropriate from this perspective.

After reviewing the proposed land uses, the proposal is generally consistent with the strategic planning principles of PBP and adequate bushfire protection measures can be achieved or incorporated into detailed design as the remaining stages progress to detailed design. Therefore, the proposed development outcomes resulting from the master plan proposal are not considered inappropriate.

As the site is activated, consideration to staging and access will be important factors requiring the provision of interim solutions, however as discussed in the GTA traffic study intermediate measures are feasible and therefore it is expected that suitable access for evacuation and emergency services will be appropriate until the entire site is activated.

Based on the analysis conducted for this report, no considerable barriers to achieving an acceptable level of residual risk for the site and appropriate development outcomes are anticipated as the detailed design is finalised for remaining stages and reliance on performance solutions at the DA stage can be minimised through design outcomes.

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# Appendix A – Staging Plan

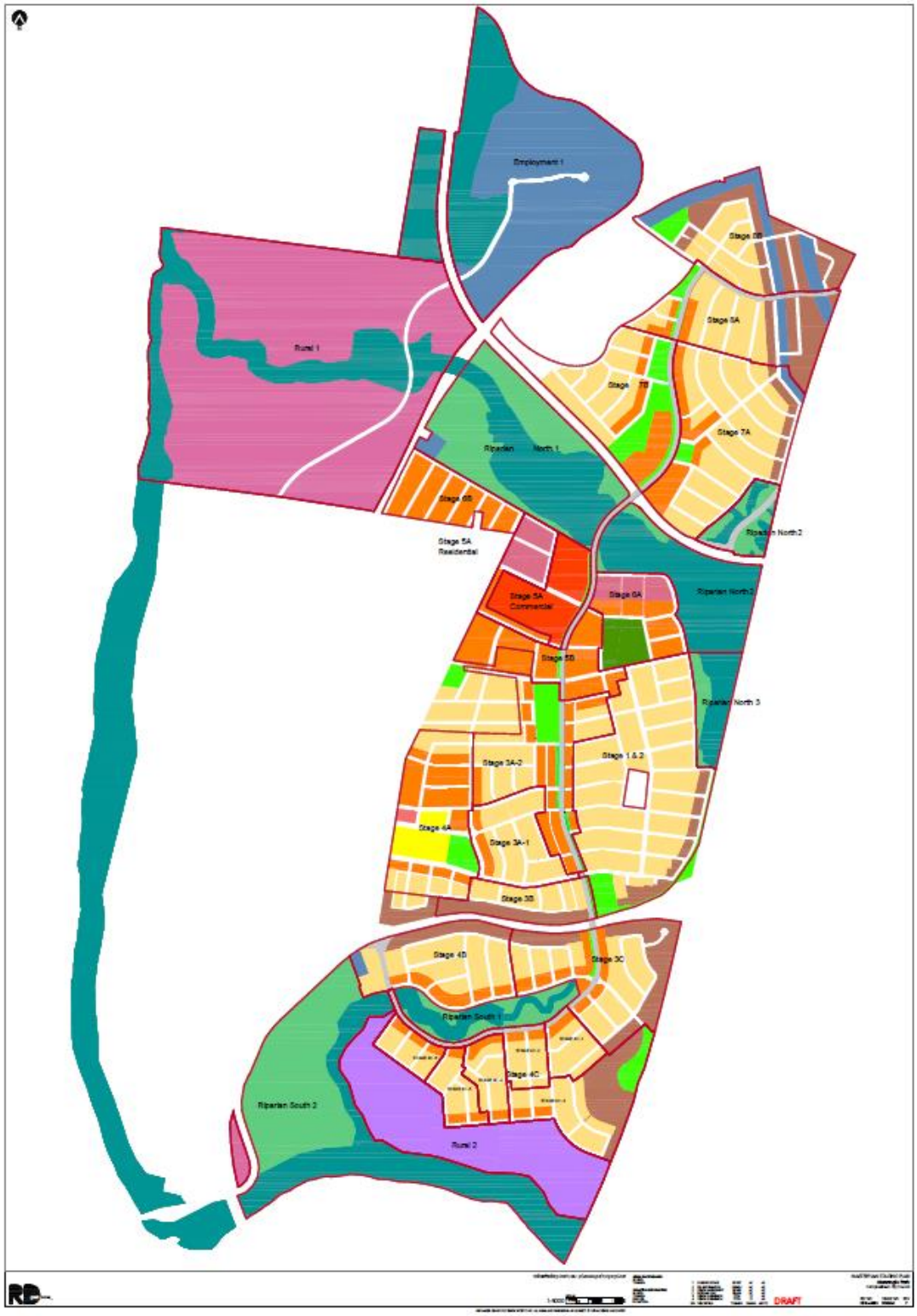


**Figure 19: Staging Plan**

# Appendix B – APZ and Services Specifications: Subdivision and SFPP Development

The following APZ and services specifications (provision of water, gas and electricity) apply to subdivision and SFPP developments and are reproduced from PBP (RFS 2019).

**Table 10: Summary of APZ and service specifications which can be found in PBP (2019)**

| Service Specifications | Residential and Rural Residential Subdivision | Special Fire Protection Purpose Developments |
|---|---|---|
| General access | Table 5.3b (pg. 44) | Table 6.8b (pg. 57) |
| Perimeter roads | Table 5.3b (pg. 44) | Table 6.8b (pg. 57) |
| Non-perimeter roads | Table 5.3b (pg. 44) | Table 6.8b (pg. 57) |
| Property access | Table 5.3b (pg. 44) | Table 6.8b (pg. 57) |
| APZ | Table 5.3a (pg. 43) | Table 6.8a (pg. 55) |
| Landscaping | Table 5.3a (pg. 43) | Table 6.8a (pg. 55) |
| Construction | | Table 6.8a (pg. 55) |
| Water supply | Table 5.3c (pg. 47) | Table 6.8c (pg. 59) |
| Electricity services | Table 5.3c (pg. 47) | Table 6.8c (pg. 59) |
| Gas services | Table 5.3c (pg. 47) | Table 6.8c (pg. 59) |
| Emergency services | Table 5.3c (pg. 47) | Table 6.8d (pg. 61) |

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