Appin (Part 2) Precinct

Strategic Bushfire Study

Walker Corporation

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Template 2.8.1

Executive Summary

This report is a supplementary study to the Appin (Part 1) Precinct Strategic Bushfire Study (precinct study) evaluating a planning proposal by Walker Corporation Pty Ltd (Walker) to facilitate rezoning of privately owned land holdings within the Greater Macarthur Growth Area. This report includes additional assessment of Lot 32 DP736923, Lot 1 DP1000355 (located within release area 3A), Lot 1 DP804375 (located in release area 4A) and Lot 3 DP804375, and is herein referred to as Appin (Part 2) Precinct. Specifically, this supplementary study considers rezoning for the purpose of urban development (i.e. low density, medium density residential and commercial), environmental conservation and associated infrastructure.

The broader precinct study (ELA, 2022a) considered the planning proposal for the Appin (Part 1) Precinct against the bushfire strategic planning requirements of *Planning for Bushfire Protection* (PBP). In consideration of the proposal with regard to the strategic planning principles of PBP, the landscape risk assessment included an assessment of the broader bushfire landscape, bushfire weather and potential fire behaviour, while the land use evaluation considered the appropriateness of future land uses and the ability for future development to comply with requirements set out in PBP. The precinct study found that the broader planning proposal was not inconsistent with the strategic planning requirements of PBP given the bushfire risk exposure context does not demonstrate an increased risk at a level that cannot be responded to by the provision of bushfire protection measures as prescribed by PBP.

The findings of this study, specifically assessing the Appin (Part 2) Precinct Structure Plan, are consistent with the Appin (Part 1) Precinct Strategic Bushfire Study, and consistent with the strategic principles outlined in Chapter 4 of PBP. As stage planning progresses to detailed design, compliance with PBP will be required, along with the recommendations outlined in this study.

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1. Introduction

1.1. The Proposal

The proponent has prepared the subject submission to rezone 100.1 hectares of land (the site) within the Appin Precinct from *RU2 Rural Landscape* to the following zones:

URBAN DEVELOPMENT ZONE

Zone 1 Urban Development (UDZ)

CONSERVATION ZONE

Zone C2 Environmental Conservation (C2)

The site is known as the Appin (Part 2) Precinct. The site directly adjoins the Appin (Part 1) Precinct – refer to Figure 1.

1.2. The Appin (Part 1) Precinct Planning Proposal (PP-2022-3979)

In November 2022, Walker Corporation Pty Ltd and Walker Group Holdings Pty Ltd (the proponent) lodged a Planning Proposal (PP-2022-3979) to rezone part of the Appin Precinct.

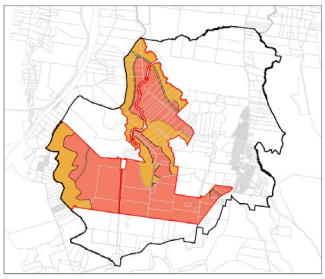
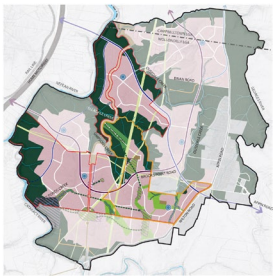
PP-2022-3979 (referred to as the Appin (Part 1) Precinct) proposes to rezone land from RU2 Rural Landscape to Urban Development Zone (UDZ), C2 Environmental Conservation and SP2 Infrastructure via an amendment to *State Environmental Planning Policy (Precincts – Western Parkland City) 2021*.

The UDZ will facilitate approximately 12,000 dwellings. The C2 zone will facilitate the conservation of 470 ha of endangered ecological community and will help implement the Office of the NSW Chief Scientist & Engineer (NSW Chief Scientist) recommendations.

The new zones are accompanied by a structure plan outlining the intended land uses. In addition, the proponent produced an Appin and North Appin Precincts Indicative Plan to illustrate how the new zones might fit within the broader precinct as land is developed. The Indicative Plan has no statutory weight and will be refined as further planning proposals are prepared.

These plans are summarised in Table 1.

Table 1: PP-2022-3979 Title and Purpose of Plans

APPIN & NORTH APPIN PRECINCTS INDICATIVE PLAN	**APPIN (PART 1) PRECINCT PLAN (*THE PRECINCT PLAN)***	**APPIN (PART 1) PRECINCT STRUCTURE PLAN (*THE STRUCTURE PLAN*)**
Broader context and for information purposes only. It has no statutory weight. It identifies: • Higher-order transport network • Centres hierarchy • School sites • Conservation areas • Residential areas • Cultural Sites and Connections	It shows the land proposed to be rezoned and incorporated into a new schedule in the Western Parkland City SEPP 2021. The precinct plan contains the development provisions (clauses and maps) applicable to the site and is used in assessing development applications.	Structure plan for the site, showing staging of release areas. Development is to be generally consistent with the structure plan. It illustrates land use components including (but not limited to): • Low and medium-density residential • Retail and employment centres • School • Open space • Drainage network/basins • Transport network
		
(21,000 dwellings)	(12,000 dwellings)	(12,000 dwellings)

1.3. Population Growth

Greater Sydney's population is projected to grow to approximately 6.1 million by 2041 – over a million more people than currently live in the Sydney region.

The NSW Government has identified Growth Areas to accommodate the population that will choose to live in greenfield areas (new suburbs). The Greater Macarthur Growth Area (GMGA) is one such growth area and is a logical extension of the urban form of south-west Sydney. The GMGA is divided into precincts. The Appin Precinct and North Appin Precinct are the southernmost land release precincts of the GMGA. The goal is to deliver 21,000 dwellings within these precincts.

The rezoning and release of land for development will achieve this goal.

1.4. The Appin (Part 2) Precinct Planning Proposal

The Appin (Part 2) Precinct Plan (the precinct plan) (Figure 1) shows the proposed new zones. The precinct plan will be incorporated into the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* and contain the provisions (clauses and maps) that will apply to the site. The precinct plan envisages the delivery of the following:

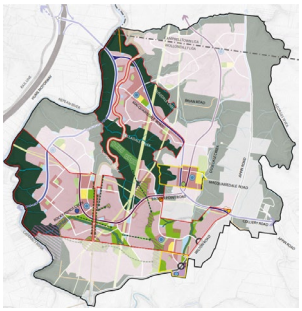
- 1,312 dwellings (as a mix of low-density, medium density and apartments)
- 30,312 sqm of gross lettable retail/commercial floor area

- 16.91 ha conservation land

The planning proposal submission is aligned with strategic land use planning, state and local government policies, infrastructure delivery and PP-2022-3979. The development potential is tempered by a landscape-based approach that protects the environment and landscape values, shaping the character of new communities. A series of residential neighbourhoods are to be delivered within the landscape corridors of the Nepean and Cataract Rivers, supported by local amenities, transit corridors and community infrastructure.

The submission includes a hierarchy of plans. The plans and their purpose are summarised in Table 2.

Table 2: The subject Planning Proposal's Plans and Proposal

APPIN & NORTH APPIN PRECINCTS INDICATIVE PLAN	**APPIN (PART 2) PRECINCT PLAN (*THE PRECINCT PLAN)***	**APPIN (PART 2) PRECINCT STRUCTURE PLAN (*THE STRUCTURE PLAN*)**
Broader context and for information purposes only. It has no statutory weight. It identifies: • Higher-order transport network • Centres hierarchy • School sites • Conservation areas • Residential areas • Cultural Sites and Connections	It shows the land proposed to be rezoned and incorporated into a new schedule in the Western Parkland City SEPP 2021. The precinct plan contains the development provisions (clauses and maps) applicable to the site and is used in assessing development applications.	Structure plan for the site, showing staging of release areas. Development is to be generally consistent with the structure plan. It illustrates land use components including (but not limited to): • Low and medium-density residential, and apartments • Retail and employment centres • School • Open space and recreation • Drainage network/basins • Transport network
		
(21,000 dwellings)	(1,312 dwellings)	(1,312 dwellings)

1.5. Purpose of the Report

Eco Logical Australia (ELA) has been engaged by the proponent to prepare a supplementary Bushfire Strategic Study to support the Appin (Part 2) Precinct Plan (the precinct plan) and Appin (Part 2) Precinct Structure Plan (the structure plan).

The Appin (Part 2) Precinct Plan zones land for conservation and urban development. It establishes the statutory planning framework permitting the delivery of a range of residential typologies, retail, education, business premises, recreation areas, and infrastructure services and provides development standards that development must fulfil.

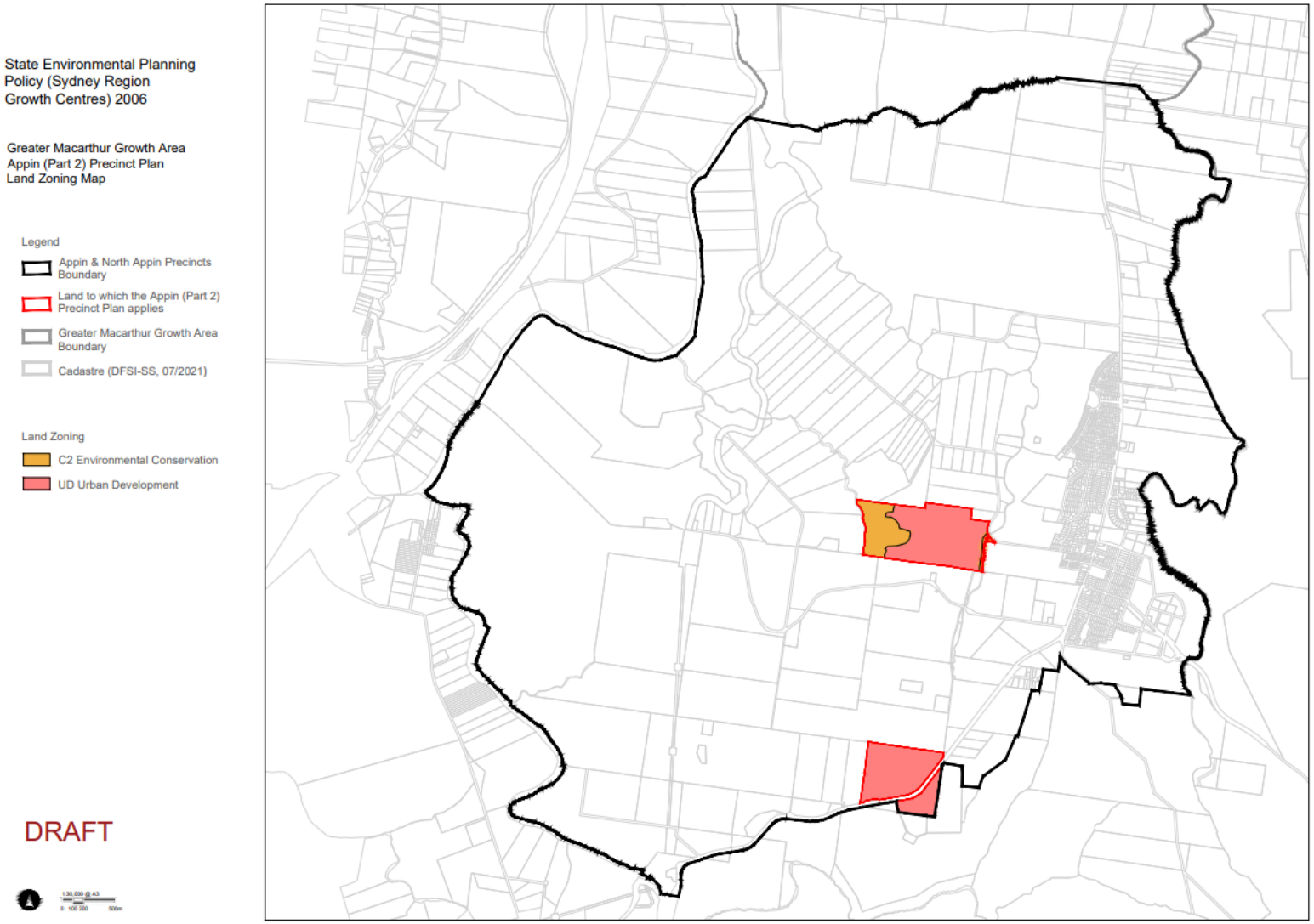
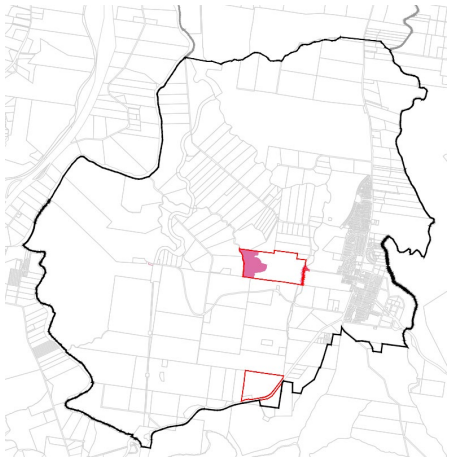


Figure 1: Boundary of the Appin (Part 2) Precinct

Table 3: Appin (Part 2) Precinct – Summary of key attributes

Location		Key Attributes	
Appin (Part 2) Precinct		Area	Total – 91.72 ha Private Ownership – 91.72 ha
		LGA	Wholly within Wollondilly LGA
		Proposed Dwellings	1,312
		Proposed retail & commercial floor space	30,000+
		Proposed Population	3,705

2. Bushfire Assessment Overview

2.1. Aims and Objectives

The aim of this study is to review the Appin (Part 2) Precinct Plan and Structure Plan in relation to the strategic planning requirements of PBP. The key objective is to supplement the existing Strategic Bushfire Study with specific consideration to Appin (Part 2) Precinct, in relation to the strategic planning principles and assessment considerations as outlined in PBP. This is the first step in the planning pathway and as the proposal progresses to the development application (DA) stage, detailed design must be finalised and further evaluated for compliance with PBP.

This report is supplementary to the Strategic Bushfire Study prepared for the Appin (Part 1) Precinct Plan (the broader precinct study) (ELA, 2022a) and should be read in conjunction with the 2022 report. The planning and assessment framework guiding this study is outlined in Section 1.5 of the broader precinct study (ELA 2022), with key aspects outlined below.

2.2. Assessment Approach

As highlighted in the broader precinct study, Section 9.1 (2) of the *Environmental Planning and Assessment Act (EP&A)* 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. Chapter 4 of PBP prescribes the completion of a Strategic Bushfire Study, 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.

Future development will also need to consider the 2022 Addendum to PBP (RFS, 2022), which prescribes additional bushfire protection measures for certain Class 9 SFPP buildings (including schools, aged care, hospitals) located on bushfire prone land. This aligns with National Construction Code 2022 provisions (Part G5, Specification 43) enacted 1 May 2023.

Table 4: Summary of PBP assessment considerations for a Strategic Bushfire Study (RFS 2019)

Issue	Summary of Assessment Considerations
Bushfire landscape assessment	A bushfire landscape assessment considers the likelihood of a bushfire, 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 Appin/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 bushfire management.

2.3. Study Area

The broader precinct is situated approximately 70 km south-west of the Sydney CBD and 42 km north-west of Wollongong. The Appin (Part 2) Precinct Plan consist of four lots adjacent to the Appin (Part 1) Precinct, as shown in Figure 2. The northern two lots of the Appin (Part 2) Precinct are situated to the west of Macquariedale Road, while the southern lots of the Appin (Part 2) Precinct are located off Wilton Road, which bisects Lot 3 (DP804375).

The Appin (Part 2) Precinct is surrounded by areas identified for future urban land within the broader structure plan, with proposed urban development within and external to the Appin (Part) Precinct (see Appendix A). Activation of the broader precinct, including the Appin (Part 2) Precinct will be staged (see Appendix B), with the northern lots of the Appin (Part 2) Precinct located within Release Area 3A, and the southern lots within Release Area 4A.

2.4. Future Land Uses Contemplated

The planning proposal seeks to rezone the land parcels to Urban Development (UDZ) and Environmental Conservation (C2) as shown in Figure 3. Future land uses considered by the Structure Plan (Figure 4) would be subject to various aspects of PBP, when occurring on BFPL.

Table 5 below outlines key PBP considerations for a variety of land uses and associated facilities that future development may be subject to.

Table 5: PBP Considerations for future land uses

Proposed Land Use Zone	Future Land Use Activities	Key PBP Considerations for future development
UDZ – Urban Development	Residential Development (Approximately 1312 low and medium residential dwellings)	Chapter 5 of PBP outlines the bushfire protection requirements for residential subdivision, including performance criteria identified for Asset Protection Zones (APZ), access and infrastructure. Where medium density residential exceeds three storeys, then additional considerations outlined in Section 8.2.2 of PBP (Multi-storey residential development) would apply.
	Commercial Development (e.g. Retail and Employment Centres)	Section 8.3.10 of PBP (Commercial and Industrial Development) applies to this type of development. Relevant protection measures to meet the aim and objectives of PBP will need to be considered. Section 8.3.1 Buildings of Class 5 to 8 under the NCC (offices, shops, factories, warehouses, public car parks and other commercial and industrial facilities) also applies, and the aim and objectives of PBP should be met, with consideration to safe access, water supply and services and emergency and evacuation planning.
	SFPP Land uses (e.g. School)	Chapter 6 of PBP outlines the bushfire protection requirements for this type of development, including performance criteria identified for APZs, access and infrastructure.

Proposed Land Use Zone	Future Land Use Activities	Key PBP Considerations for future development
	Open Space	Section 8.3.8 of PBP (Outdoor Events) may apply, otherwise the aims and objective of PBP should be addressed by future development on BFPL.
C2 – Environmental Conservation	Conservation Lands	n/a
SP2 – Infrastructure	Infrastructure	n/a

As described in Section 1.7 of the broader precinct study (ELA 2022), during investigation of the suitability for the above development types, it is necessary to contemplate the prioritisation of first principle bushfire risk considerations including:

- Residual risk;
- Risk to life versus property;
- Life protection and evacuation;
- Emergency services response; and
- Adjoining lands.

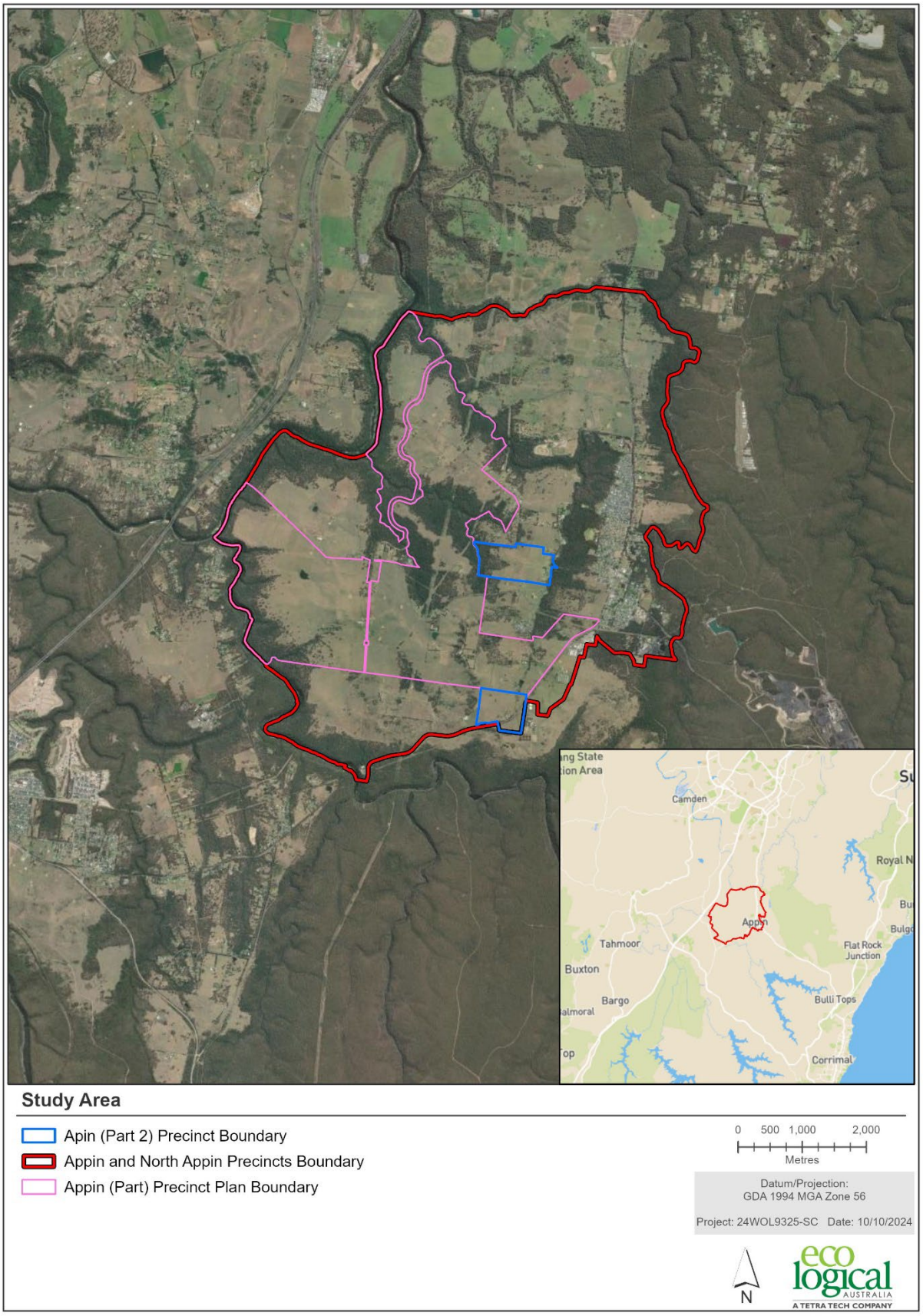


Figure 2: Locality of Appin (Part 2)

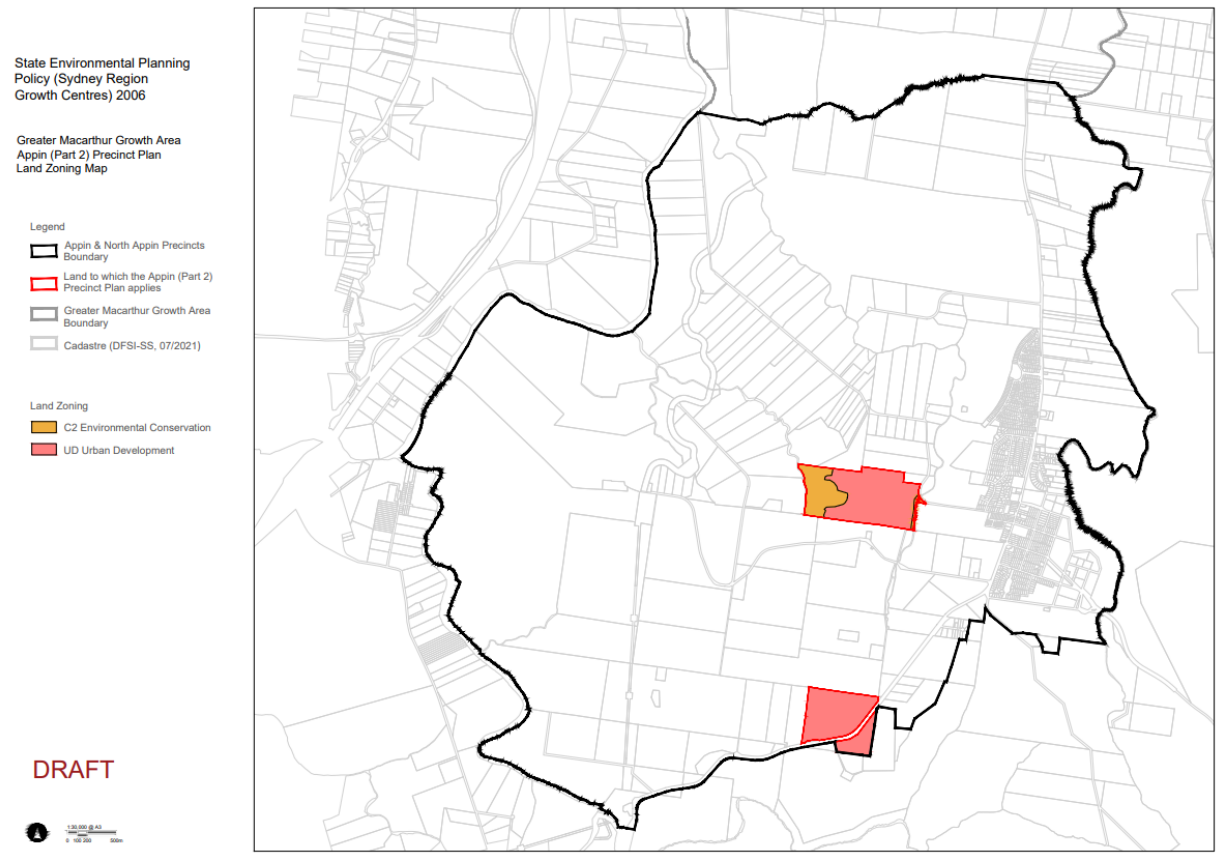


Figure 3: Proposed Land use Zones for Appin (Part 2) Precinct

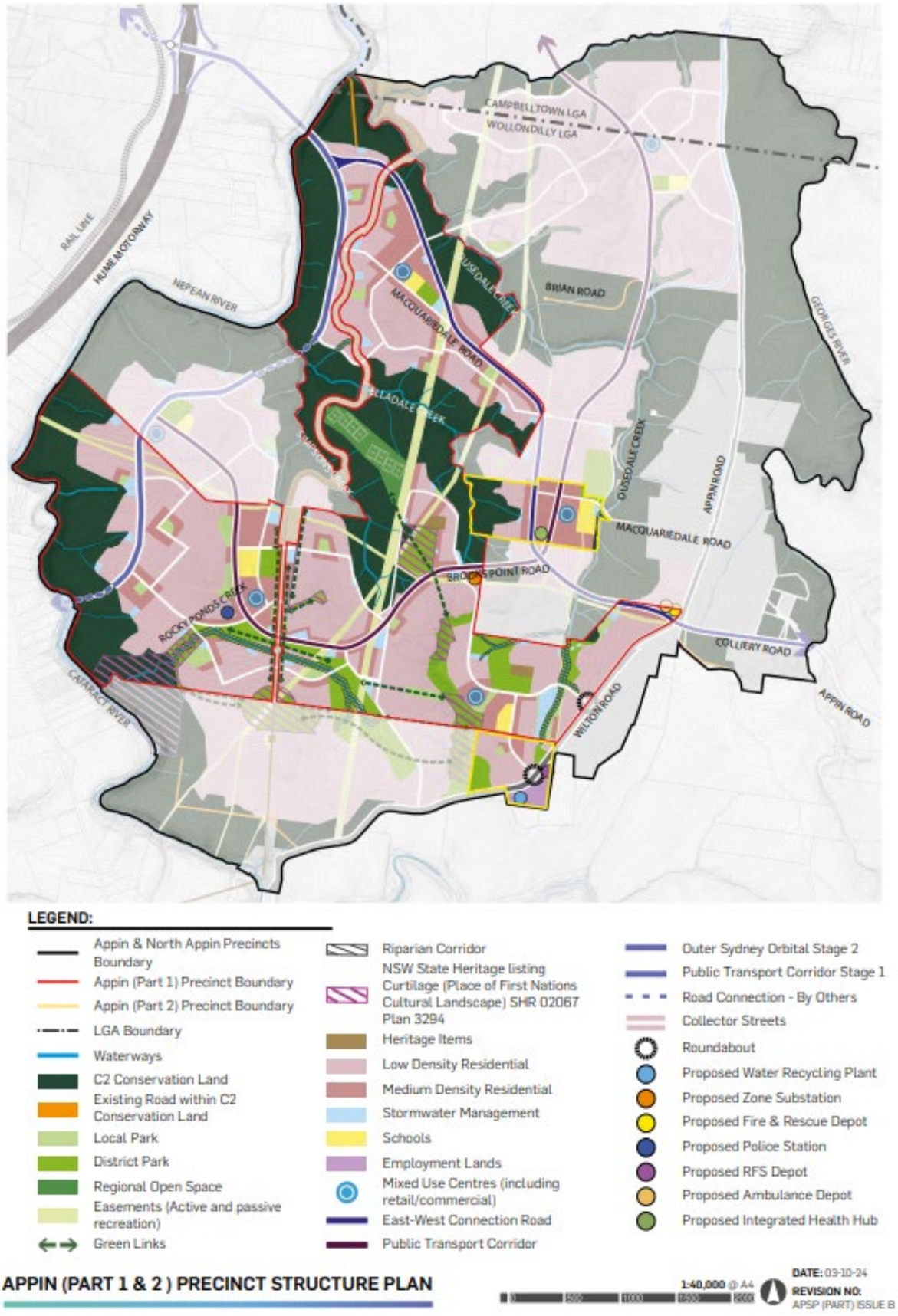


Figure 4: Appin (Part 2) Precinct Structure Plan (Source: Walker Corporation 2024)

3. Bushfire Landscape Risk Assessment

Consideration to the landscape bushfire risk for the Appin (Part 2) Precinct includes assessment of the bushfire hazard, potential fire behaviour and bushfire history within the broader landscape. These outcomes are detailed below, and where appropriate references to the broader precinct study included.

3.1. Bushfire Hazard

The proposed development is located within a wider bushfire landscape containing Bush Fire Prone Vegetation (BFPV). Assessment of the bushfire hazard is considered below, including details of the hazard assessment, classified using the PBP methodology, through assessment of vegetation, slope and bushfire weather.

3.1.1. Vegetation

Vegetation across the broader precinct and surrounds has been classified into Keith Formations and Keith Class (Keith 2004), as per Table A1.12.8 from PBP, documented in Section 2.1 of the broader precinct study (see Figure 6 and Table 7; ELA 2022).

Desktop review of various mapping datasets including internal vegetation data provided by the client (Walker Corporation, 2020), State Vegetation Type Maps (SVTM) (2022), Vegetation of the Cumberland Plain mapping (OEH, 2013) and Woronora Vegetation Mapping (NPWS, 2003). Site inspections were conducted in 2020 and again in 2022 to confirm mapping of both vegetation structure and management, to assist the establishment of a bushfire vegetation hazard dataset for the preliminary bushfire hazard assessment.

As discussed in the broader precinct study (ELA, 2022), the Appin Precinct and surrounds are generally situated within a rural pastoral landscape to the north and north-west, combined with remnant canopy vegetation that closely aligns to riparian corridors associated with the Nepean River and its tributaries to the west, expanding east within the central precinct area.

With specific consideration to the Appin (Part 2) Precinct, the northern lots are predominantly adjacent to woodland vegetation to the east and west, with smaller pockets of forest to the north-west. Rural grassland is predominant to the north and south. For the southern lots, fragmented woodland is present as small patches amongst a broader grassland context (Figure 5). Once the Proposed Urban Land, as shown in Figure 4, is activated, the grassland hazard will be significantly reduced, along with the removal of woodland vegetation and the smaller pockets of forest vegetation to the northwest of the northern lots.

The final extent and formation of vegetation is dependent on various factors such as the final extent of riparian corridors, areas of retained vegetation, and the extent of any revegetation and vegetation management. These factors will be subject to more detailed analysis at the subdivision stage of the planning process, along with further site inspection. Therefore, bushfire protection measure requirements recommended are indicative (i.e. Asset Protection Zones).

3.1.2. Slope

Slope has been identified from a Digital Elevation Model (DEM) generated from 2m contours and classified into PBP slope categories (Figure 6).

With consideration to the slope of vegetated areas influencing the Appin (Part 2) Precinct, steeper slopes are present along the western boundary of the northern lots, within the conservation area, along with undulating land in the central lot area. The southern lots are more gently sloped, with steeper land present externally to the west, associated with the riparian corridor.

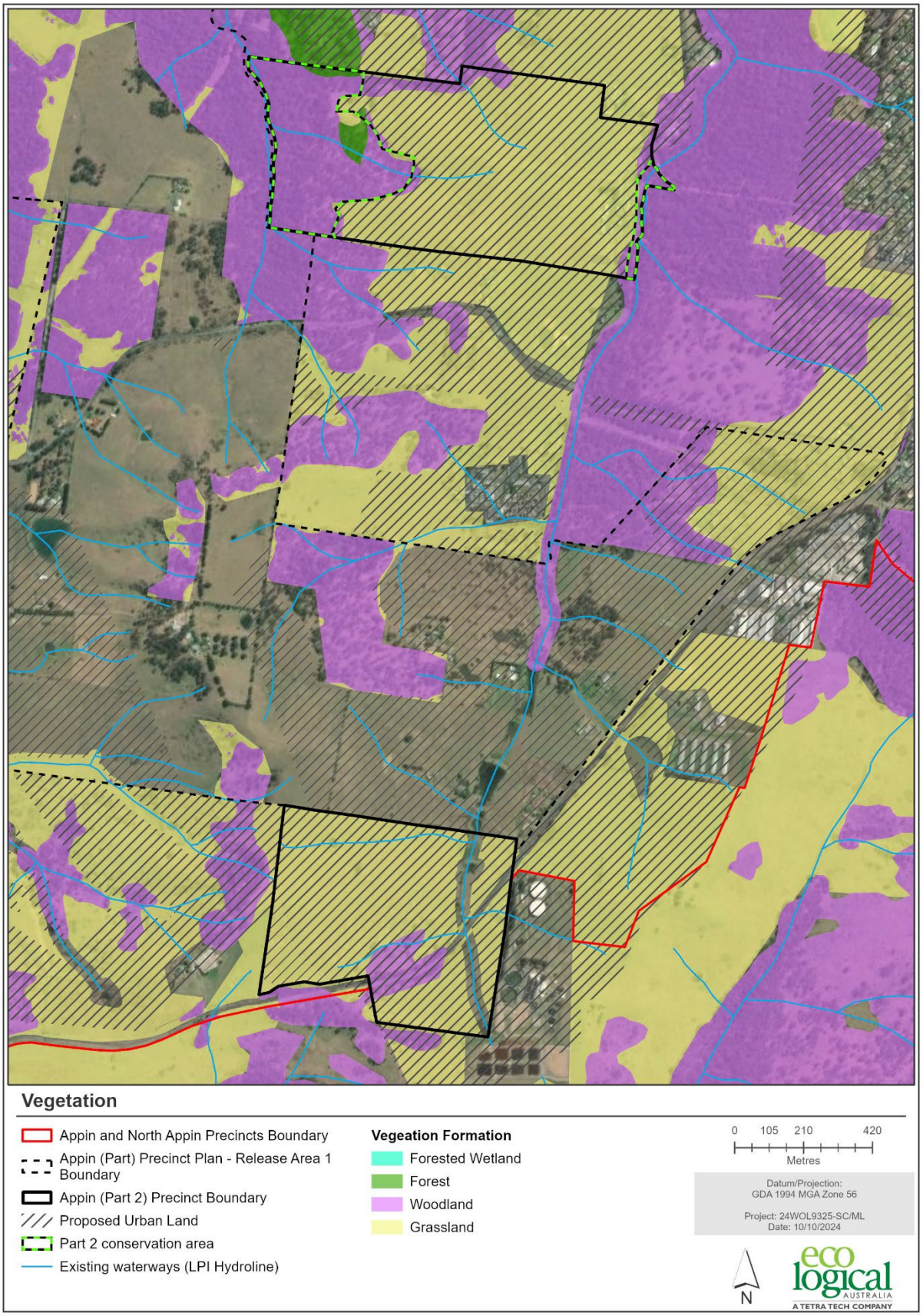


Figure 5: Vegetation Formation

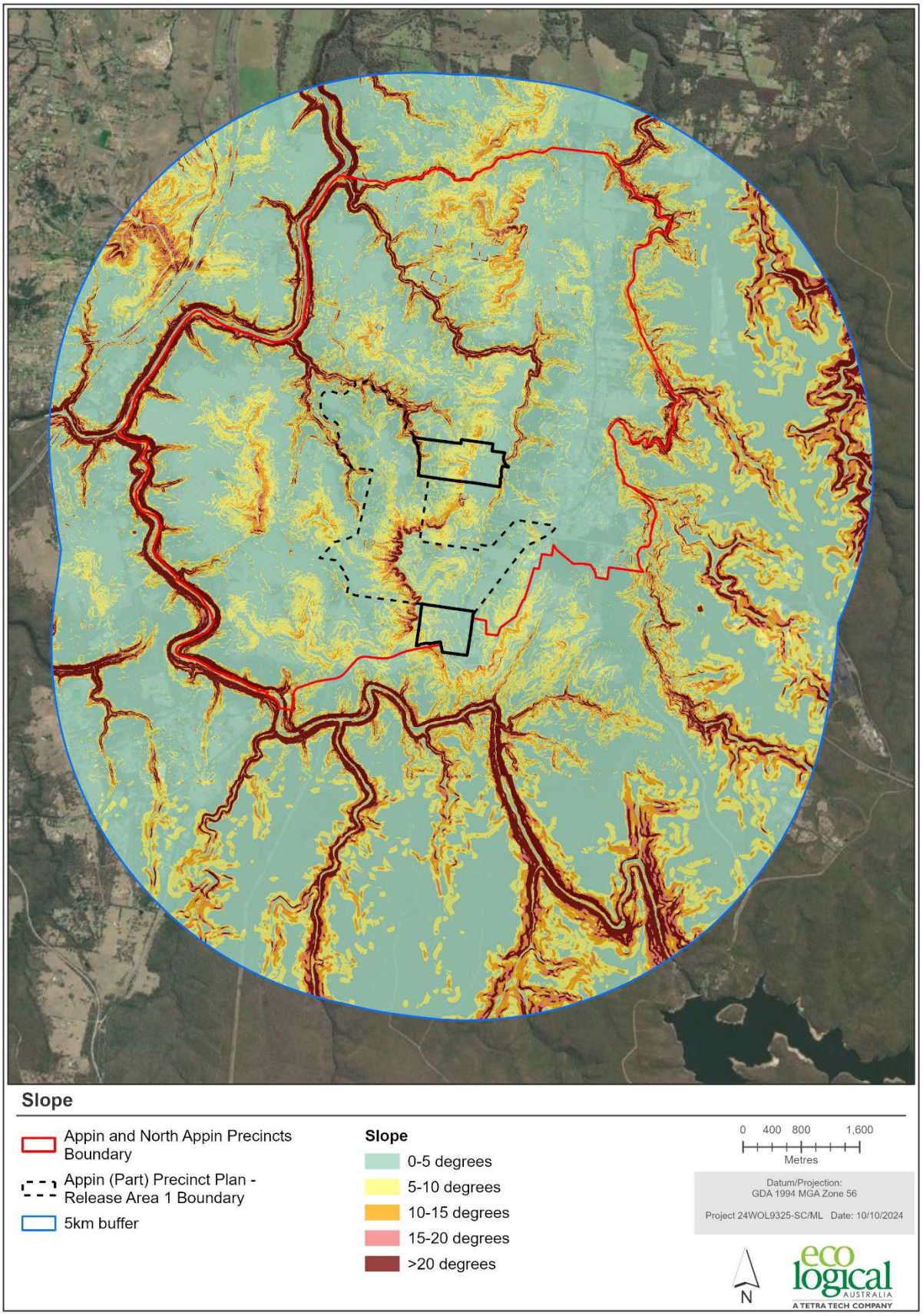


Figure 6: Slope

3.2. Bushfire Risk Considerations

Section 2.2 of the broader Precinct Study (ELA, 2022) evaluated the bushfire risk exposure of the precinct through analysis of bushfire weather and potential fire behaviour, consideration of bushfire catchments, potential fire pathways, and bushfire history. Table 6 below summarises the outcomes of the broader precinct study with specific consideration to the Appin (Part 2) Precinct.

Table 6: Bushfire risk assessment

Aspect	Assessment	Evaluation
Bushfire Weather and Potential Fire Behaviour		
Forest Fire Danger Index Analysed through GEV analysis of the historic weather records (1972 to 2020; Lucas 2010) for Sydney Airport to determine maximum 1 in 50-year event See Precinct Study: Figure 9	The following outcomes were revealed 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 116.	For the Appin precinct, including the Appin (Part 2) Precinct, exposure to hazards situated to the south-west to north (SW-N) are more likely to be subject to higher FFDI conditions, whilst other directions are likely be exposed to lower FFDIs. For the Appin (Part 2) Precinct, the bushfire risk to the SW-N will be moderated by planned development within release area 1 and 2 (see Appendix B), while the bushfire risk to the N-SE is moderated by the presence of Appin township to the east and rural lands to the south-east.
Directional Fire Intensity Analysed through potential head fire intensity modelled using fire intensity formulae of McArthur (1967) and Cheney et. al. (2012). See Precinct Study: Figure 10 (SW-N, FFDI 116), Figure 11 (NS-E, FFDI 63) and Figure 12 (SE-SW, FFDI 46).	The fire intensity models predict potential fire intensities, however, the probability of these occurring is not considered. It was modelled using directional FFDI for the Precinct utilising outcomes from the bushfire weather analysis: • NS-E: FFDI 63 • SE-SW: FFDI 46 • SW-N: FFDI 116	Modelling outcomes form the broader study indicate higher fire intensities are most likely to occur under FFDI 116 associated with N-SW conditions, and while there is potential for higher intensity fires to be most prevalent to the east, these are likely to be experienced under westerly influenced winds, spreading away from the site. For the Part 2 Precinct, the southern lots are situated within a highly fragmented rural setting, with minimal remnant vegetation adjacent. Coupled with the transition of much of this adjacent land to urban development, the potential for higher intensity fires spreading to the site is significantly moderated. For the northern lots of Part 2 Precinct, while there is potential for fires of moderate intensity, burning under elevated FFDI's, there are mitigation opportunities to moderate fire behaviour. To the east, natural advantages associated with the creeklines in this area provide assist in reducing the length and direction of the fire run toward the site. In addition, there is potential to provide increased separation from the hazard through the careful placement of opportunities for open space and recreation.

Aspect	Assessment	Evaluation
Bushfire Catchment and Spread Scenarios		
Fire Catchment and Pathways Determined from future vegetation profile. See Precinct Study: Figure 13, and Figure 6 below.	For the southern lots, fire spread along both the southern boundary is the primary potential pathway. However south-eastern boundary is moderated by existing infrastructure to the east/southeast. Potential pathways to the west, east and north will be disconnected by urban development. For the northern lots, potential fire pathways from the north and south will be disconnected by urban development. Pathways from the west are associated with riparian corridors and are somewhat convoluted. While to the east, pathways are generally disconnected buy urban development from larger hazards in the broader landscape.	For the southern lots of Appin (Part 2) Precinct, further management of internal land south of Wilton Road would further reduce opportunity for fire pathways. For the northern lots, remaining pathways are situated to the north-west (associated with Elladale Creek) and north-east (adjacent to Appin township). As these areas will be surrounded by future developed land, the risk profile associated with these pathways is increasingly moderated as the broader precinct is activated. However additional mitigation opportunities can be adopted, including the prioritisation for open space and low density residential outcomes adjacent to the northern conservation area, to compliment the appropriate sitting of land use typologies with regard to the residual hazard.
Ignition Determined from Wollondilly/Wingecarribee Bush Fire Risk Management Plan (BFRMP). See Precinct Study: Section 2.2.4	Key sources of ignition in BFMC area include: • Lightning strikes associated seasonal summer storms; • Arson, including the dumping of cars in bushland; and • Pile burns escaped private hazard reduction.	Ignition within the broader precinct and the Appin (Part 2) Precinct is not considered to be an elevated concern given much of the rural area will transition to urban development, reducing the capacity for lightning strikes /escaped pile burns igniting rural grassland. Therefore, there is not a perceived increased risk for future development beyond which bushfire protection measures cannot adequately mitigate.
Fire History		
Wildfire Occurrence and Frequency Determined from fire history record (NPWS and NSW RFS). See Precinct Study: section 2.2.4.	Fire history over the past 20 years is present within the broader precinct and surrounds; however, most fires have occurred within the vegetated catchment area and National Parks estate to the east and southeast, with mapped fire activity limited within the precinct. The mapped fire history also indicates areas outside of the catchment lands and National Parks estate are not subject to large landscape scale fire or repeated wildfire.	Appin (Part 2) Precinct has been subject to limited fire activity impacting the site, with no significant fires recorded within the site since 2000. Fire activity east of the site is generally contained within the catchment lands and National Parks estate and fire frequency outside of this area is low. This further supports analysis of fire weather and pathways, indicating the bushfire risk profile can be effectively moderated.

3.3. Summary of Landscape Bushfire Risk

The landscape bushfire risk analysis indicates there is currently potential for bushfire attack within the broader study area given the existing presence of BFPV in adjoining areas. The likelihood of landscape scale bushfire attack is however decreased to the north, west and south-west due to convoluted pathways, limited connectivity to BFPV and limited fuel continuity associated with mixed management practices of rural residential lands. The area to the south and east of the precinct was identified to pertain the largest consolidated area of higher bushfire hazard, however given the expected predominant easterly movement of fires under elevated bushfire weather and wind conditions in the region, the risk to the site is also reduced, along with mitigation advantages, for any lower intensity fire that does approach in this direction.

The residual risk further decreases for the Appin (Part 2) Precinct with broader activation of the precinct and adjoining lands. This is of note as this increased disruption of an already fragmented hazard landscape increases the bushfire resilience from bushfire attack and limits the exposure of the precinct to landscape scale bushfire.

Given the above, the Appin (Part 2) Precinct will predominately be exposed to local scale bushfire hazard and bushfire attack scenarios.

The risk assessment identified that the area adjacent to the conservation area should be prioritised for open space and low density residential outcomes to ensure the appropriate sitting of land use typologies with regard to the residual hazard in this portion of the Appin (Part 2) Precinct.

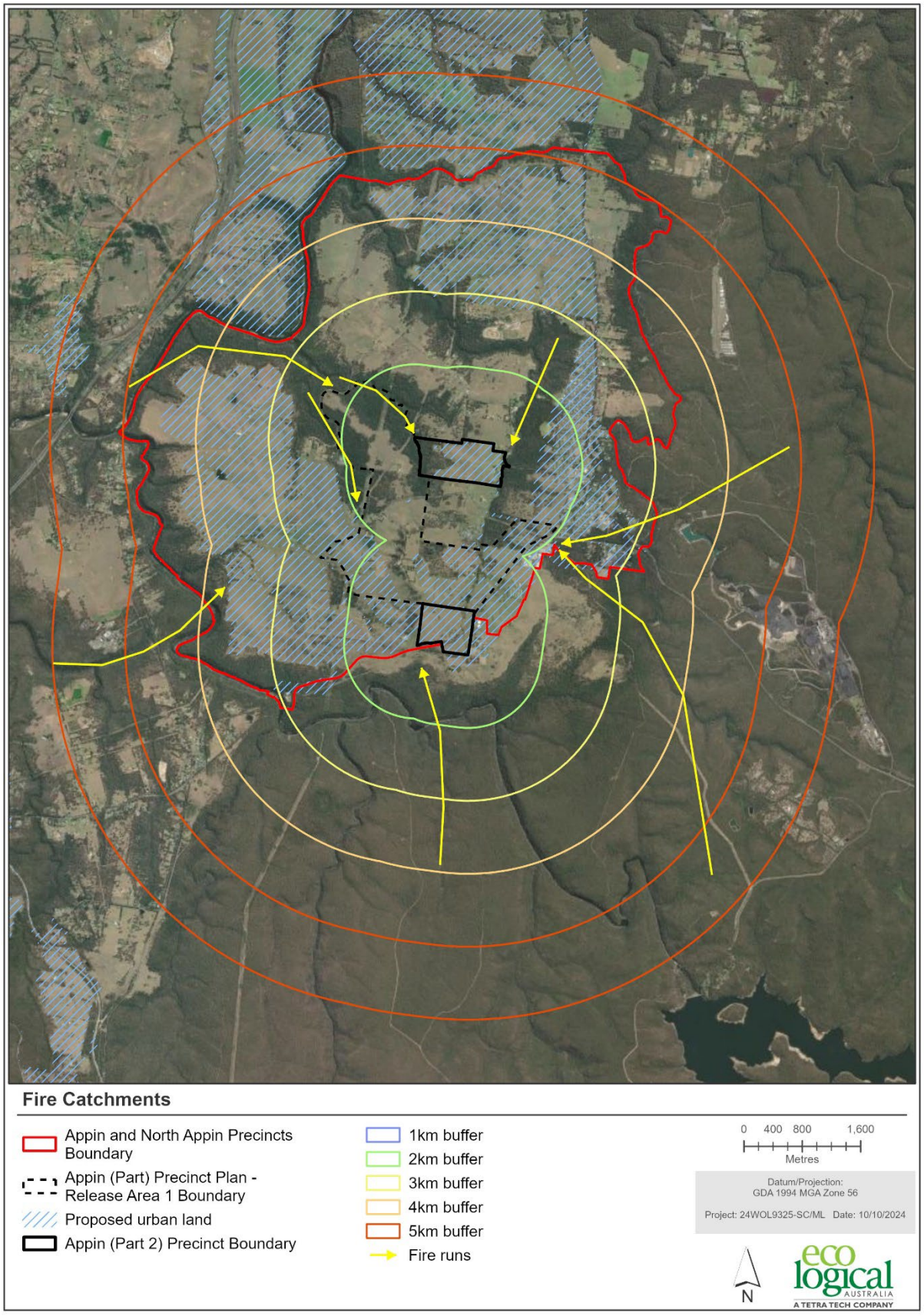


Figure 7: Fire Catchments influencing Appin (Part 2) Precinct

4. Land Use Assessment

While 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. Therefore the capacity for bushfire protection measures (as specified in Chapters 5-8) are considered in this section, with regard to the risk profile and the overall aim and objectives of PBP (RFS 2019)

4.1. Risk Profile

The feasibility of the proposal to comply with the bushfire protection measures identified within PBP is a fundamental consideration of the study. Whilst bushfire protection measures and their performance requirements are a benchmark for approval of a development, a strategic level study needs also to evaluate these measures within the landscape risk context. This addendum study has therefore considered specifically in relation to the Appin (Part 2) Precinct the following aspects:

- 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.

The feasibility of the site to provide for Asset Protection Zones (APZ), a key bushfire protection measure, is assessed in the following section. This is followed by an evaluation of the proposed land uses.

4.2. Feasibility of Asset Protection Zones

Based on the bushfire hazard assessment, an assessment of the feasibility of PBP compliant APZ has been undertaken. The indicative APZ requirements are shown in Figure 8 and Table 7 includes the minimum dimensions required by the acceptable solutions of PBP for residential development (i.e. 29 kW/m^2) and SFPP development (i.e. 10 kW/m^2). Final APZ dimensions are to be determined based on the final design, proposed land use, vegetation configuration and topography.

Asset protection zones will need to be managed in perpetuity and it is recommended where an APZ is to be positioned in open space zones, a management plan is established to ensure ongoing APZ maintenance can be achieved. A vegetation management plan will also assist in hazard management along the hazard / APZ interface. Future legislative provisions to achieve management of open space areas should be considered, including the requirement of community title where Council will not be the managing authority.

In undertaking this assessment, the following assumptions are made in relation to the proposed APZs:

- Vegetation formation in the assessment is derived from validated vegetation data provided by Walker Corporation, Vegetation of the Cumberland Plain mapping (OEH, 2013) and Woronora Vegetation Mapping (NPWS, 2003), State Vegetation Type Maps, accompanied by rapid site inspection as shown in Figure 9 of the precinct study.

- All APZ's can be contained within the developable area. As precinct development is activated by adjoining and adjacent landowners, it is expected that the APZ requirement may be reduced or removed in some areas of the site.
- All APZ within the site are assumed to occur on land exhibiting a slope less than 18 degrees as per PBP. This will need to be reviewed as the final site topography is determined.
- The indicative APZ widths are based on PBP (2019), which requires that residential buildings are subject to a maximum heat exposure of no more than 29 kW/m^2. Best practice is that all residential subdivisions meet this standard. SFPP APZ requirements are determined in Table 7 and will be assessed as the site design progresses, however there is scope for the required separation distances to be achieved within the developable area.
- The addition or rehabilitation of any vegetation within the site (such as for unmanaged public open space and riparian corridors) will influence APZ requirements. The final configuration of these aspects at detailed design will need to be assessed for future development applications.
- Temporary APZs as indicated in Figure 8 are subject to the activation of surrounding urban development.
- For the Southern lot, APZ's are based on the assumed management of the portion of internal land, south-east of Wilton Road. Additional APZ's may be required if the management of this land is not feasible, however it is likely the required APZ can be provided by Wilton Road. Alternatively, a plan of management for the ongoing management (slashing and/or mowing to meet APZ requirements) of this area should be considered
- Vegetation that is introduced through landscaping or restoration can avoid the need for further APZs if:
    - Individual patches of vegetation within 100 m of properties are <0.25 ha per patch;
    - The perpendicular width of linear strips of vegetation is <20 m when measured perpendicular to structures;
    - Any vegetation within 100 m of properties meets the definition of 'managed vegetation' under PBP. In general, this means that the vegetation has low flammability, low fuel loads and is structured in a way that avoids the spread of fire.

Based on the assessment of vegetation and slope, preliminary APZs have been identified to indicate the indicative separation distance required between a structure and the vegetation hazard. These have been determined to be feasible for the proposed Part 2 Structure Plan.

Table 7: Indicative APZs Applicable to the site

Vegetation Formation	Slope Class	Residential APZ (BAL-29)[1]	Special Fire Protection Purpose (SFPP) APZ[1]
Woodland	All upslope and flat	12 m	42 m
	>0-5° downslope	16 m	50 m
	>5-10° downslope	20 m	60 m
	>10-15° downslope	25 m	72 m
	>15-20° downslope	32 m	85 m
Grassland	All upslope and flat	10 m	36 m
	>0-5° downslope	12 m	40 m
	>5-10° downslope	13 m	45 m

Vegetation Formation	Slope Class	Residential APZ (BAL-29)[1]	Special Fire Protection Purpose (SFPP) APZ[1]
	>10-15° downslope	15 m	50 m
	>15-20° downslope	17 m	55 m

[1] ASSESSMENT ACCORDING TO TABLE A1.12.1 (SFPP)/A1.12.2 (RESIDENTIAL) OF PBP 2019.

4.3. Land Use Evaluation

Future development on BFPL will need to satisfy the performance criteria identified in PBP for various land uses. Under the planning pathway identified in PBP and as legislated, the Complying Development Certificate (CDC) pathway is not possible for subdivision, SFPP development and where the acceptable solutions of PBP cannot be met. However, the location and type of land uses included in the proposal are considered appropriate for the site, given the level of bushfire risk, the nature of the site, and the ability for bushfire protection measures to be provided. It is assumed that detailed design work and further bushfire assessment will be undertaken to ensure appropriate staging and implementation, in order to meet or exceed the requirements of PBP.

Table 8 below provides a summary of the land use evaluation for differing development types proposed by the structure plan along with comment on suitability and recommendations.

Table 8: Future land use evaluation

Development Type	Assessment Considerations	Suitability
Residential Subdivision	The land use evaluation has considered potential land uses enabled by the rezoning and with consideration to: • The risk profile of the site • Proposed land use zones and permitted uses • The most appropriate siting for different land uses based on the risk profile • The impact of the siting of these uses on APZ provision	Preliminary analysis indicates differing residential typologies can comply with PBP. However, in considering the most appropriate sitting for increased density, or the placement of vulnerable occupants, with consideration to the hazard context, it is recommended that areas adjacent to the conservation area within the northern lots is prioritised for open space opportunities and lower density residential typology, as such further iterations of the structure plan should adopt these recommendations along with consideration to relevant DCP controls, if necessary.
Buildings of Class 5 to 8 under the NCC / Commercial and Industrial Development		No specific requirements apply however the aims and objectives of PBP can be achieved for future land uses. Where ground floor retail occurs in conjunction with residential development, then PBP requirements for residential development should apply.
SFPP Development		Requirements for SFPP development have been considered and the position of the proposed school and mixed-use centre between the Connection Road and Brooks Point Road is generally suitable with capacity for development in areas outside of the SFPP APZ.
Open Space		Future Open Space activities are likely to comply with PBP. Where future land uses such as outdoor events are to occur, compliance with Section 8.3.8

Development Type	Assessment Considerations	Suitability
		of PBP is required. Along with a bushfire risk management plan, consideration to the timing of events should be evaluated, to avoid days of elevated bushfire risk, along with consideration to evacuation capacities subject to staged activation of egress routes.

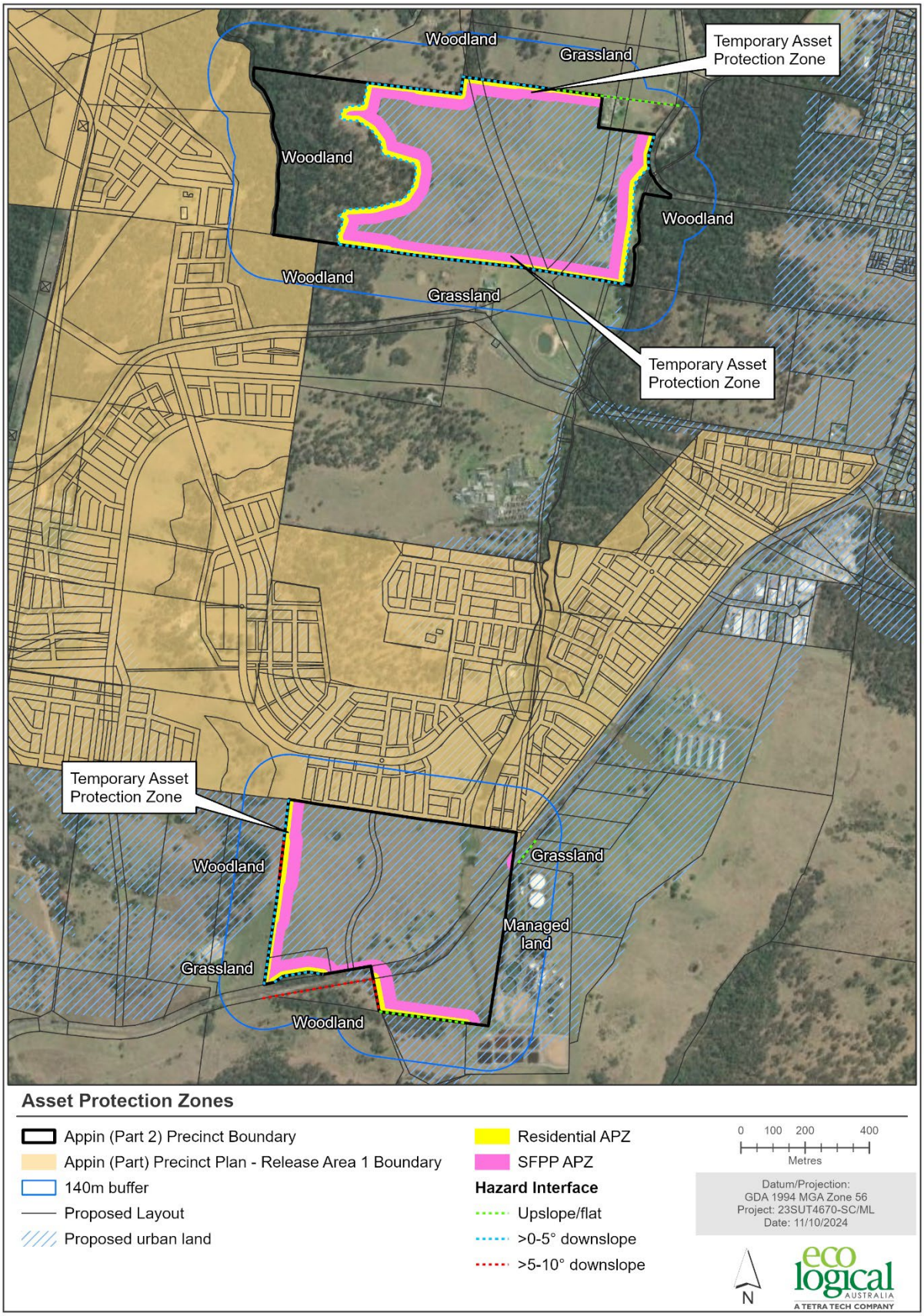


Figure 8: Preliminary Asset Protection Zones

TEMPORARY ASSET PROTECTION ZONES ARE SUBJECT TO THE FUTURE DEVELOPMENT OF ADJOINING LAND

5. Access, Egress and Evacuation

As outlined in Chapter 4 of PBP (2019), consideration to the provision of adequate infrastructure emergency evacuation and firefighting operations is required. This includes:

- Capacity of the proposed road network for evacuating residents and responding emergency services, based on the existing and proposed community profile;
- The location of key access routes and direction of travel and; and
- The potential for development to be isolated in the event of a bushfire.

These aspects are detailed in Section 4 of the broader precinct study and summarised below with regard to the Appin (Part 2) Precinct Plan.

5.1. Access

Appin and North Appin Precincts are planned growth areas under the *Greater Macarthur 2040* (see DPIE, 2018 structure plan in Figure 3 of ELA, 2022) which has planned provision for various collector roads, sub-arterial roads, public transport corridors and the future Outer-Sydney Orbital connection (see Figure 17 of ELA, 2022). Future development applications will need to address access requirements as per PBP 2019 (Table 5.3b) including the provision of:

- 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.

Specifically, for the Appin (Part 2) Precinct, there is capacity for perimeter roads to be included in the Structure Plan as planning progresses, meeting the requirements set out in Table 5.3b of PBP and as shown in Figure 9 there will be access points to future road connections. As discussed in the broader precinct study, staged upgrades and connections will be in place for Release area 3A and 4A, which the Appin (Part 2) Precinct falls within (see Table 9, Section 4, ELA, 2022).

As highlighted in the WSP report (2023), the two northern lots will have a high level of access via two higher-order roads (Transit Corridor and East-West Connection) as well as local connections to Stages 1 and 2, and east to the existing Appin township. For the southern lots located on Wilton Road, there is existing access to the road network. In the future, development within Lot 3 DP 804375 will also connect to Wilton Road via a new intersection and local access road.

Therefore, the provision of compliant perimeter roads and access is not considered a constraint.

5.2. Evacuation

Section 4 of the precinct study (ELA, 2022) explores in detail the Appin (Part 1) Precinct Plan and its capacity to provide:

- Early offsite evacuation with multiple options;
- Safe on-site refuge capacity;
- Low risk development outcomes.

These aspects are summarised in Table 9 below, with consideration to traffic modelling undertaken by WSP (2022 and 2023). As concluded in the WSP 2023 report, the 2022 assessment undertaken for the Appin and North Appin Precinct (WSP, 2022), determined that the transport network can accommodate the proposed development within the Appin and North Appin Precinct and the Greater Macarthur Growth Area with an appropriate set of transport improvements and upgrades. This assessment included the Appin (Part 2) Precinct lots, and therefore in the WSP 2023 review, it was identified that the proposed network and upgrades were appropriate for the level of development as proposed for the Appin (Part 2) Precinct.

Table 9: Appin (Part 2) Precinct Access and Evacuation Considerations

Considerations	Assessment	Evaluation
Early offsite evacuation Consideration to WSP Traffic Modelling for Bushfire Evacuation.	Outcomes of WSP 2022 assessment and subsequent evaluation of Appin (Part 2) Precinct (WSP 2023).	Early off-site evacuation is achievable based on a conservative approach to traffic modelling, and with the timing of key upgrades enabling network capacity to align with anticipated development activation. The need for entire stage evacuation is lessened by the bushfire risk profile and on-site refuge capability. Further there is opportunity to reduce evacuation travel times for early off-site evacuation with consideration to the inclusion of additional available route options.
Safe on-site refuge capacity Considered on site capacity for safe refuge, primarily through NSP capacity (see ELA, 2022)	Capacity for provision of neighbourhood safer places (NSP) demonstrated in Section 4.4 of the broader precinct study (ELA, 2022)	Opportunity for planned community spaces within the Appin Precinct to be established as additional NSPs, (built and open space). Therefore, the site can provide additional bushfire resilience, beyond the minimum requirements of PBP. Analysis indicates that this form of occupant movement would provide a relatively quick timeframe for relocation to a safer place, demonstrating the potential value of planning for the provision of onsite safe refuge locations, in the context of rapid onset bushfire attack, where offsite evacuation may be unavailable or unsafe.
Low risk development outcomes Considered Statutory requirements in relation to bushfire see ELA, 2022)	Figure 21 of the precinct study maps a 100 m buffer from the bushfire hazard interface, with 100 m being the statutory distance that bushfire protection measures are applied to	There is opportunity for low risk development outcomes, in urban land greater than 100 m from the closest bushfire hazard and thus not considered bushfire prone and therefore developments and

Considerations	Assessment	Evaluation
	development within PBP and AS 3959 (i.e. bushfire prone property).	occupants not expected to be exposed to significant bushfire attack. As such, these areas will have a low risk from bushfire, which diminishes with distance from the hazard. Therefore, the evacuation or refuge need is primarily considered to be those occupants within 100 m of the hazard interface.

5.3. Evaluation of Access, Egress and Evacuation

The WSP study (2022) concludes, that *subject to timely decisions to commence the evacuation, the proposed road network has sufficient capacity to facilitate the evacuation of the number of residents planned in the Appin Development*. Therefore, with consideration to the outcomes highlighted in Table 9 in relation to early offsite evacuation and capacity for the road network to facilitate access to on-site refuge (i.e. potential future NSP), along with achievable low risk development outcomes, the access/egress and evacuation capacity facilitated by the Appin (Part 2) Precinct Structure Plan is not considered a limiting constraint to the proposal.

Opportunities to include provision of NSP's (Figure 10) or the like in perpetuity through planning mechanisms such as development control plans (DCP) should be explored where practical, as planning progresses.

Further, for any planned uplift to the level of emergency services provided should align with precinct activation and it recommended that discussion around this should be undertaken with the relevant authorities as planning progresses.

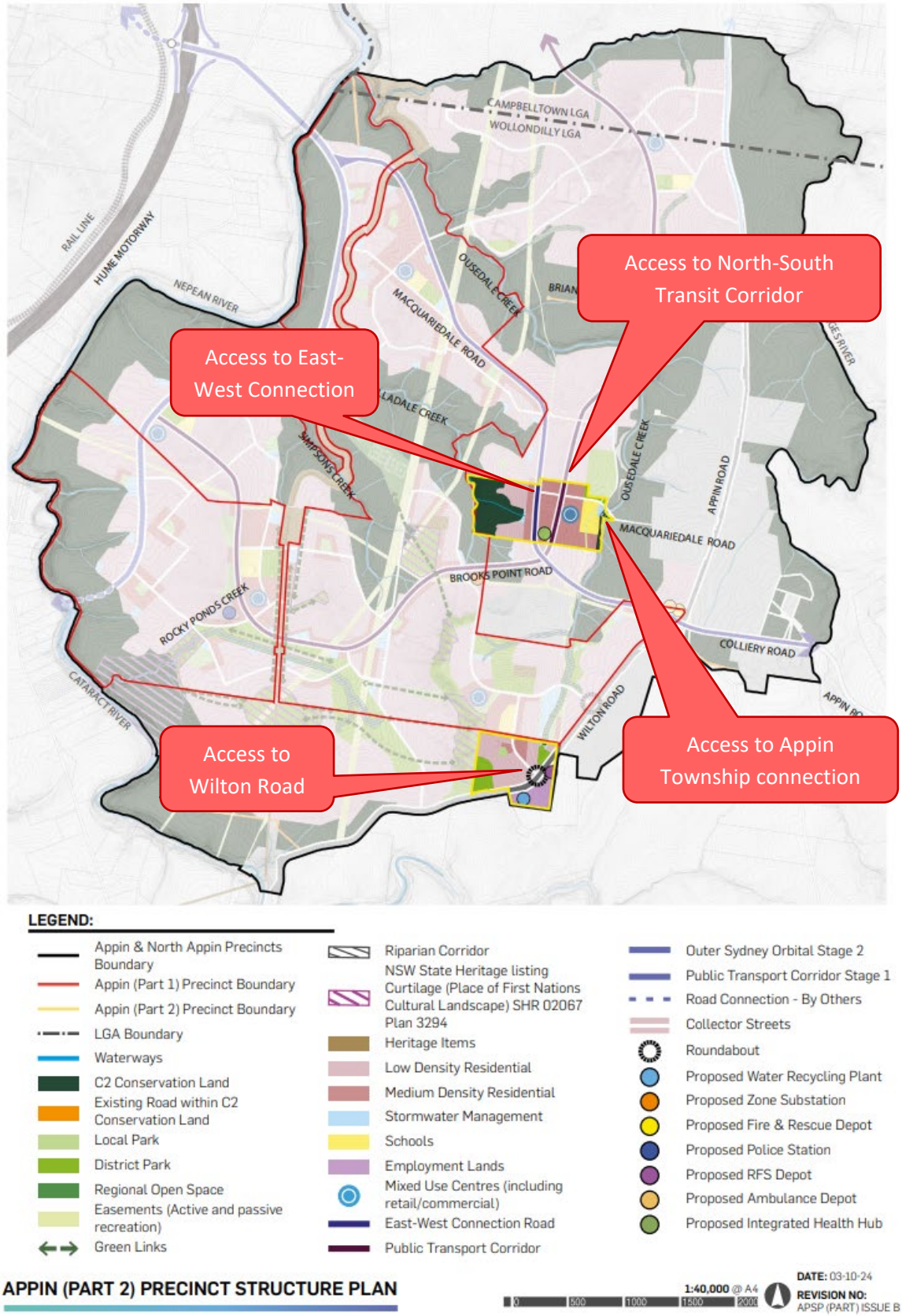


Figure 9: Appin (Part 2) Precinct Access Points (Source WSP 2024, Walker Corporation 2024)

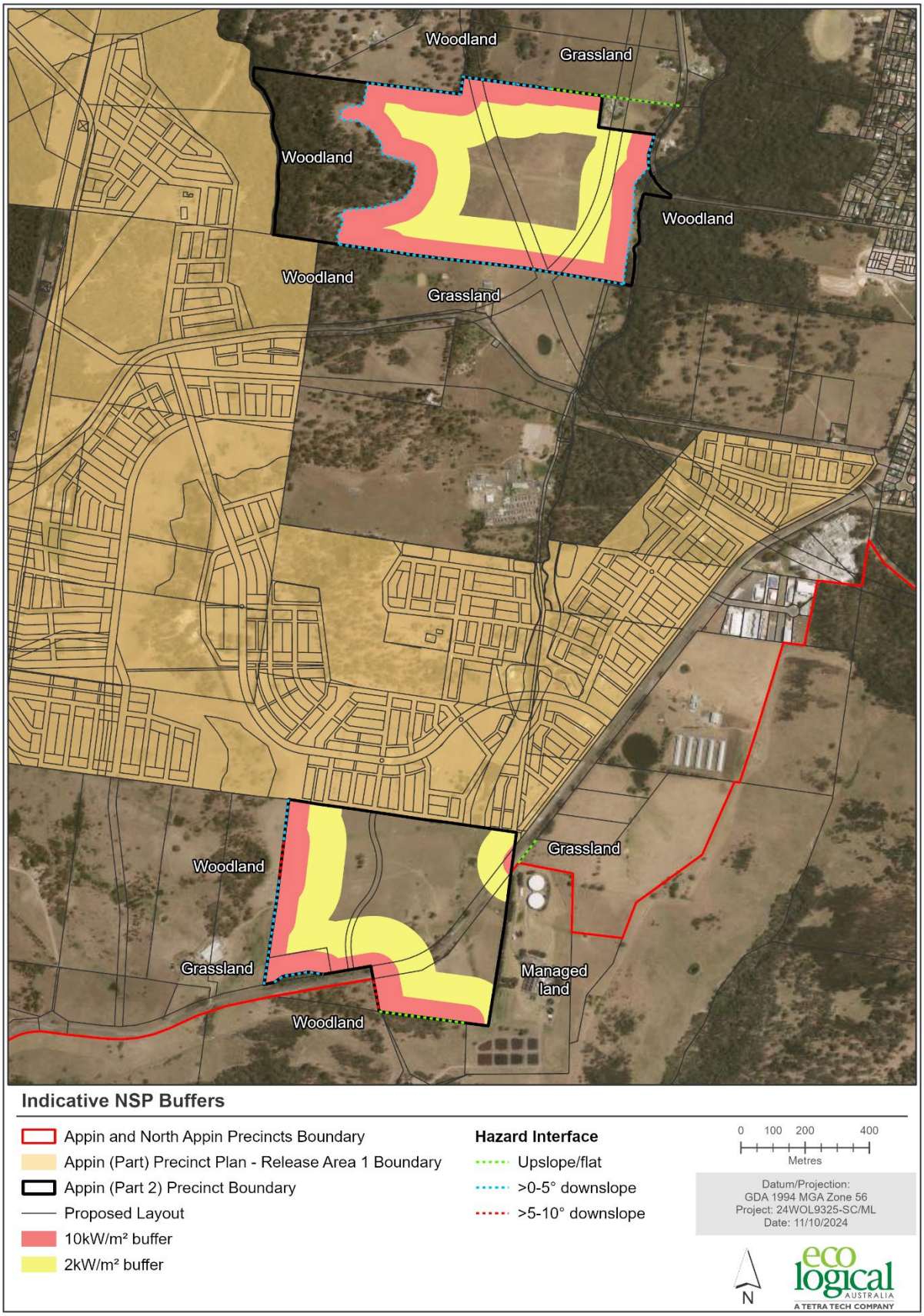


Figure 10: Indicative NSP capacity within Appin (Part 2) Precinct

5.4. Infrastructure

Future development within the Appin (Part 2) Precinct will need to meet the applicable requirements of PBP relating to infrastructure provision. The general requirements for development are discussed and explored in the broader precinct study (Section 5) and are considered achievable for this site. Specific requirements for SFPP developments and subdivision are detailed in PBP.

Strategic planning requirements seek to identify any potential issues associated with infrastructure and the provision of utilities. For this development, there are no known issues in regard to the provision of these aspects compliant with the acceptable solution requirements detailed in Table 5.3 and Table 6.8 of PBP (2019).

5.5. Adjoining Land

Future development should not require a change to the bushfire management practices for retained and/or adjoining bushfire prone vegetation. As there is capacity for all APZ within the Appin (Part 2) Precinct Structure Plan to be contained wholly within the stage or provided by public roads, there are no concerns regarding the impact of the proposal on adjoining land.

6. Evaluation

The bushfire risk assessment for the proposal demonstrates that the residual bushfire risk context is not considered inappropriate for urban development, with significant capacity for bushfire protection measures and site resilience. Future development on BFPL can meet the requirements of PBP, and once activated, low risk development outcomes are achieved. The acceptable solutions of PBP by way of provision of APZ, access, infrastructure, and water supply, can be accommodated for as detailed design progresses, minimising reliance on performance-based solutions.

Table 10 evaluates the Appin (Part 2) Precinct proposal, with consideration to the assessment framework and recommendations for further planning.

Table 10: Considerations and Recommendations for Appin (Part 2) Precinct

Consideration	Evaluation	Recommendation
Residual risk - the level of residual risk after the application of bushfire protection measures	Appin (Part 2) Precinct is subject to risk from bushfire. However, this is moderated through the capacity of the site to afford bushfire protection measures, evacuation capacity (offsite and onsite), and the decreasing hazard profile. Specifically: • APZs requirements are achievable • Perimeter roads are achievable • Evacuation capacity is achievable • On-site refuge can be afforded and • Resilient development outcomes can be achieved	Ensure bushfire protection measures are adequately provisioned during detailed design, including temporary measures required until surrounding development is activated. This includes the provision of perimeter roads and APZ adjacent to all hazards. Ensure evacuation capacity as modelled is achievable during staging. It is recommended that future hazards (including the conservation area) are managed under a plan of management. APZ management within public spaces (e.g. district open space) should also have mechanisms in place for management in perpetuity. Future iterations of the ILP should limit proposed land use typologies adjacent to the proposed conservation area to open space and low density residential outcomes as recommended in this study.
Risk to life - an appropriately low residual risk to human life is fundamental.	The residual risk to life is not inappropriate given the ability for the site to provide: • adequate access for early off-site evacuation, • on site safe refuge capacity; and • low risk development outcomes, Much of the development will be located outside of land implicated by bushfire	As staging progresses, the provision of road infrastructure for the Appin (Part 2) Precinct should align with stage activation, as considered in this assessment, to support early offsite evacuation. Onsite evacuation facilities should be established under an appropriate planning mechanism.
Risk to property – the residual risk to property	The acceptable solutions of PBP in relation to property protection measures will be assessed at the DA stage, however there are no known	Ensure bushfire protection measures are adequately provisioned at all stages of the planning pathway and

Consideration	Evaluation	Recommendation
should meet the Acceptable Solutions within PBP;	constraints to the provision of protection measures including: • APZ requirements • Requirements for services and infrastructure • Access requirements, subject to recommended upgrades • BAL-29 residential construction outcomes Once fully activated, the majority of the urban area will not be encumbered by BFPL.	compliant provisions are in place at the DA stage.
Emergency service response - the acceptability of proposed development should not be reliant on emergency service response / intervention.	As part of broader regional planning, additional emergency services will need to be provisioned for the development of the broader Greater Macarthur Growth Area. This is led by NSW Government emergency management planning	Timeframes for emergency service provision should complement activation of development and Walker Corporation should engage with NSW Government on this issue.
Adjoining lands – future development should not be reliant on fuel management on adjoining lands or effect those landowners' ability to undertake such works	Future development is not reliant on adjoining lands, rather development outcomes will result in a lower residual risk for neighbouring properties	Any temporary APZ or access provisions should be contained on Walker Lands, unless in agreeance with interested party.

7. Conclusion

This strategic study represents an assessment of the Appin (Part 2) Precinct Structure Plan that has been developed with consideration to the *Greater Macarthur 2040 implementation plan.* The study has assessed the bushfire risk based on the Part 2 Structure Plan and concludes that the site is in a bushfire landscape that has mitigation advantages, a decreasing risk profile, capacity for the provision of appropriate bushfire protection measures, capacity for early offsite evacuation and onsite refuge opportunities, along with low risk development outcomes.

Therefore, this study has determined that the Planning Proposal can meet the strategic planning principles outlined in PBP, subject to the recommendations of this study. Further, the Appin (Part 2) Precinct proposal is consistent with Ministerial Direction 4.3 (Planning for Bushfire Protection) issued under section 9.1(2) of the *EP&A Act* and the requirements of PBP.

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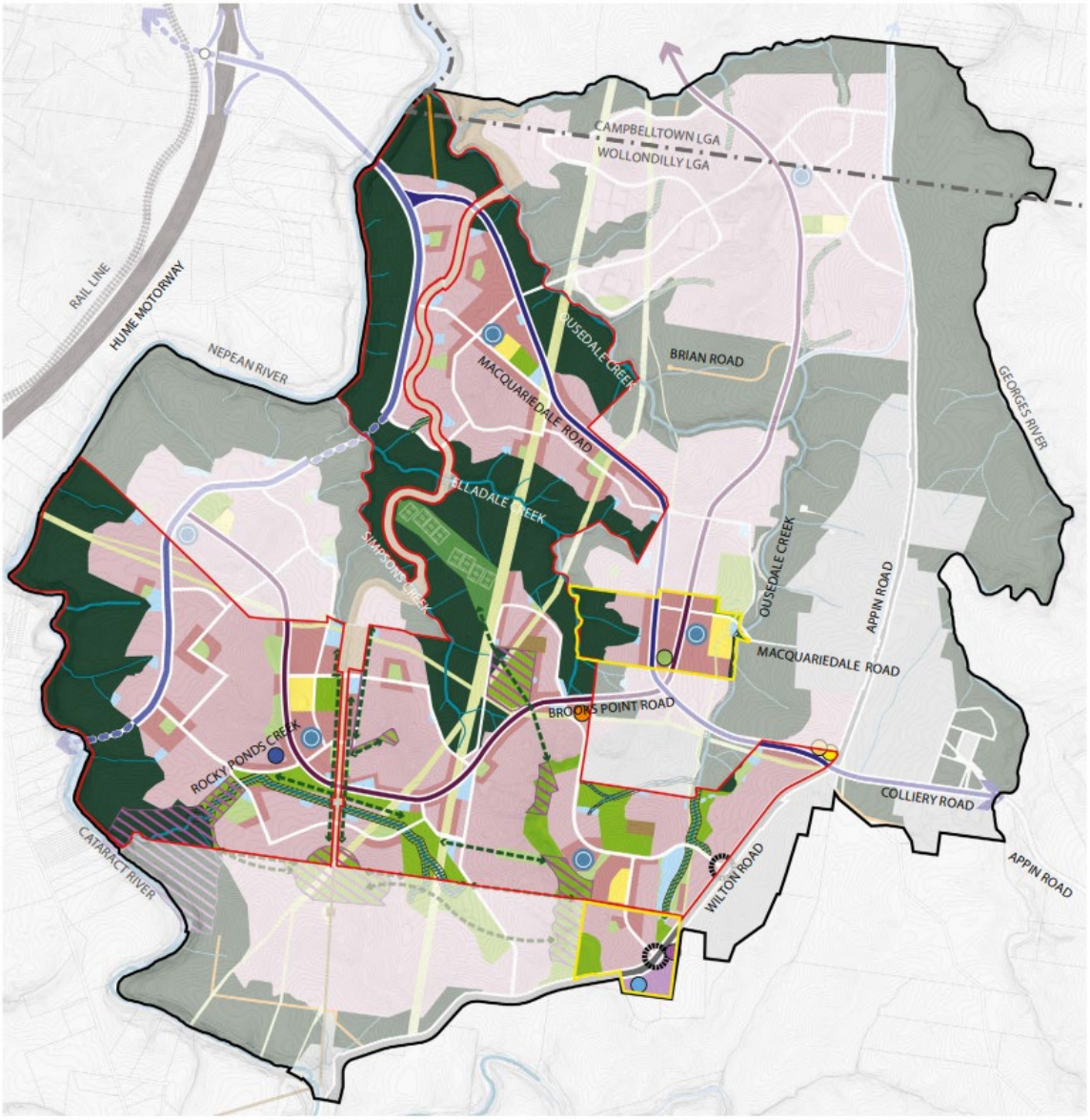
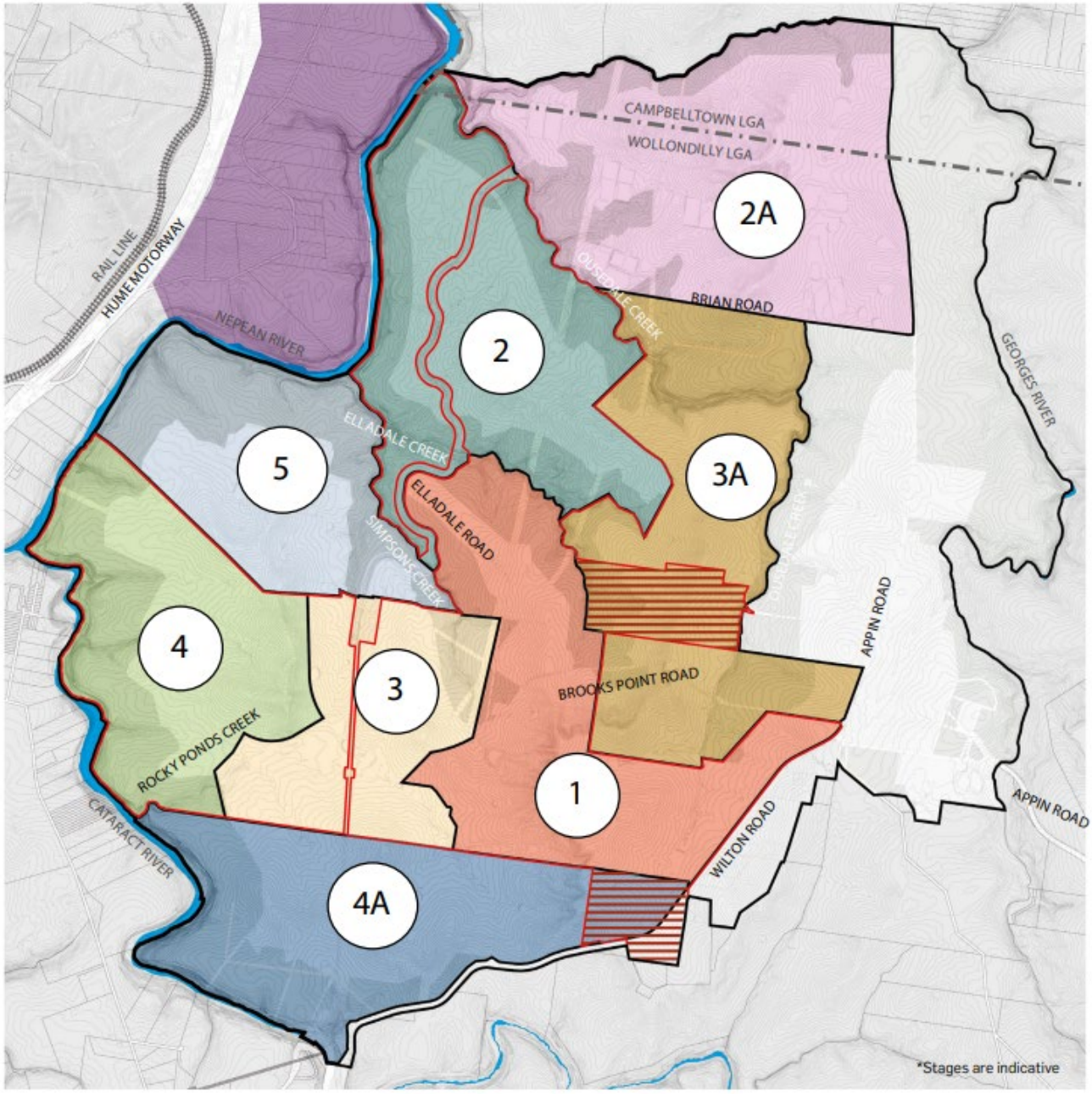
Appendix A Appin and North Appin Structure Plan



Appendix B Staging



LEGEND:

- Appin & North Appin Precincts Boundary
- Appin (Part) Precinct Boundary
- Appin (Part 2) Precinct Boundary
- Existing Rivers
- Release Area 1
- Release Area 2
- Release Area 2A
- Release Area 3
- Release Area 3A
- Release Area 4
- Release Area 4A
- Release Area 5
- Future Employment Zone

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