

Appin (Part) Precinct Plan Release Area 1
Addendum Strategic Bushfire Study

Walker Corporation

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Template 2.8.1

Executive Summary

This report is an addendum study to the Appin (Part) Precinct strategic bushfire study (precinct study) evaluating a planning proposal by Walker Corporation Pty Ltd (Walker) to facilitate rezoning of land owned by Walker within the Greater Macarthur Growth Area. The proposed rezoning relates primarily to land use zone changes for the purpose of urban development (i.e. low density and medium density residential) along with neighbourhood centres, schools, open space and infrastructure.

The precinct study considered the planning proposal 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 planning proposal is not considered “inappropriate development” as per the exclusion 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 and that bushfire protection measures as prescribed by PBP can be readily achieved.

This study is an addendum to the precinct study, assessing Release Area 1 in further detail, specifically considering the Appin (Part) Precinct Structure Plan for Release Area 1 against the requirements of PBP. The landscape risk assessment and land use evaluation reveal that the bushfire risk context does not present an inappropriate residual risk and that with further design iterations, bushfire protection measures are not unachievable for Release Area 1. Therefore, the findings of this study are consistent with the precinct study and determine that the Appin (Part) Precinct Release Area 1 proposal is consistent with strategic planning principles PBP. As stage planning progresses to detailed design, further evaluation for compliance with PBP will be required, including implementation of recommendations outlined in this study. This includes prioritising appropriate development outcomes, sensitive to the adjoining risk profile, however the general structure plan is not considered inappropriate for rezoning in line with the recommendations from this study.

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1. Introduction

This study evaluates the Appin (Part) Precinct Structure Plan for Release Area 1, contemplated for land owned by Walker Corporation Pty Ltd located within the Appin (Part) Precinct of the Greater Macarthur Growth Area.

This assessment is an addendum to the Strategic Bushfire Study prepared for the Appin (Part) Precinct (ELA, 2022) and should be read in conjunction with this Precinct study. This study considers the Release Area 1 proposal against the bushfire strategic planning requirements of *Planning for Bushfire Protection* (PBP; RFS 2019), specifically the requirements set out in Chapter 4 (*Strategic Planning*). This is the first step in the planning pathway and as the proposal progresses to the development application (DA) stage, where detailed design will be finalised and further evaluated for compliance with PBP.

1.1. Background

This addendum bushfire study considers the Appin (Part) Precinct Structure Plan Release Area 1, within the Appin and North Appin Precinct Plan of the Greater Macarthur Growth Area (Figure 1). The site is situated within Wollondilly Local Government Area (LGA).

The technical assessment compiled for this report draws on the assessment outcomes from the broader bushfire landscape and risk profile as presented in the forementioned precinct study (ELA 2022). It is envisaged that the precinct will be activated in a series of stages (Figure 2) and therefore this study presents a land use evaluation specifically considering the structure plan presented for Appin (Part) Precinct Release Area 1 (Figure 3). This assessment considers the appropriateness of future land uses proposed by the structure plan, and the ability for future development to comply with requirements set out in PBP, including the provision of bushfire protection measures.

1.2. Aims and Objectives

The aim of this study is to review the APP 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) Precinct Release Area 1, and with regard to the strategic planning principles, 'inappropriate development' exclusions and assessment considerations outlined in PBP. The planning and assessment framework guiding this study is outlined in Section 1.5 of the Precinct Study (ELA 2022), with key aspects included in section 1.4 below.

1.3. Study Area

The Appin and North Appin Precincts is approximately 70 km south-west of the Sydney CBD and 42 km north-west of Wollongong, with Appin (Part) Precinct Release Area 1 situated to the south-east of the Appin (Part) Precinct, bordering Wilton Road to the east (Figure 1). The site is surrounded by areas identified for future urban land, with proposed urban development within and external to the broader precinct. Appin Village is situated to the east of the precinct boundary and the Nepean River to the west, with Douglas Park located further west. The Appin and North Appin Precincts joins the planned Gilead Releases 3, 4 and 5 are situated to the west, Releases 3A and 2A to the north, Release 2 to the north-west and immediately south, proposed Release 4a.

Once fully activated, the broader precinct will be home to eight planned neighbourhoods (Figure 2). The Appin (Part) Precinct Release Area 1 structure plan considered in this study is show in Figure 3.

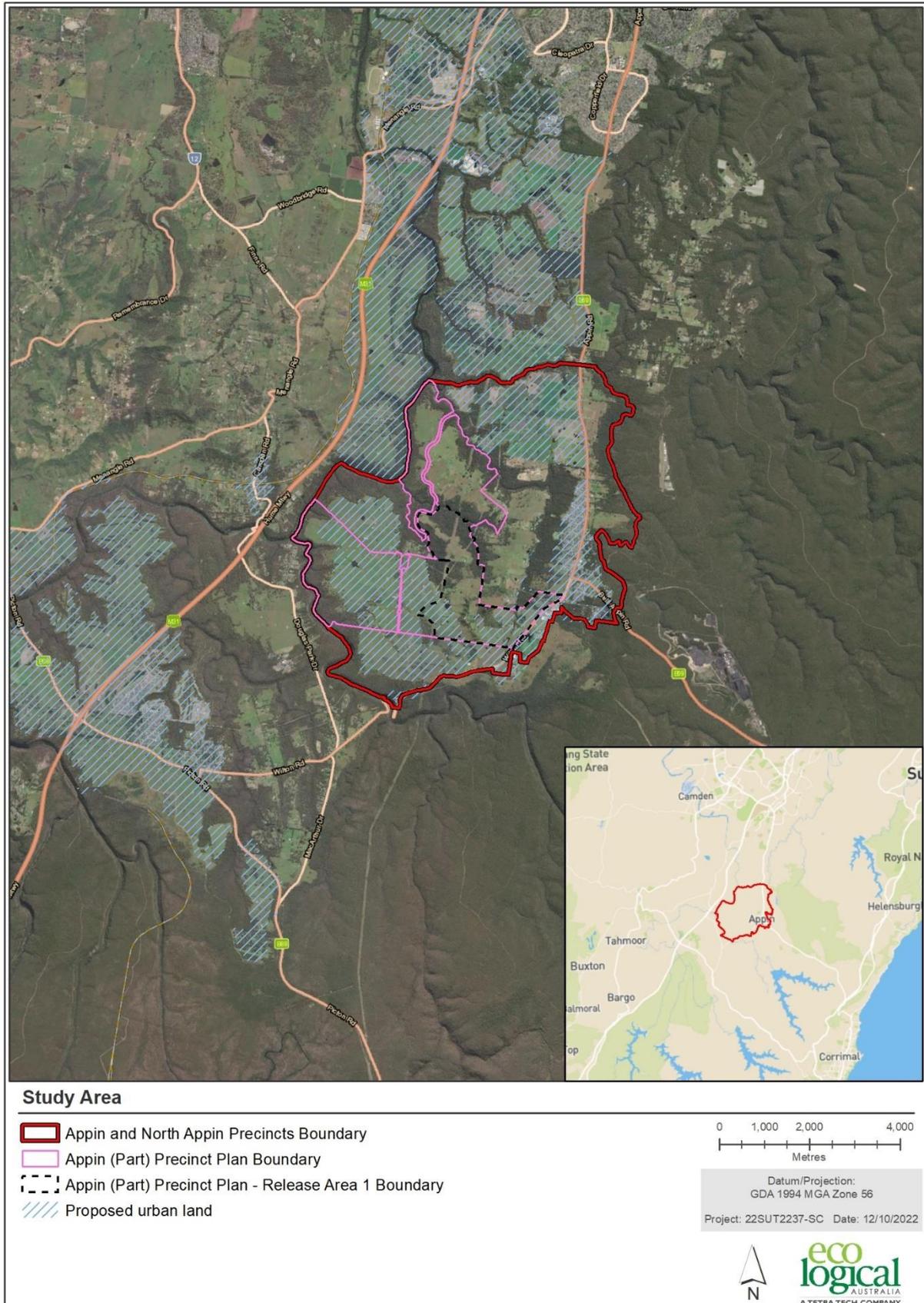
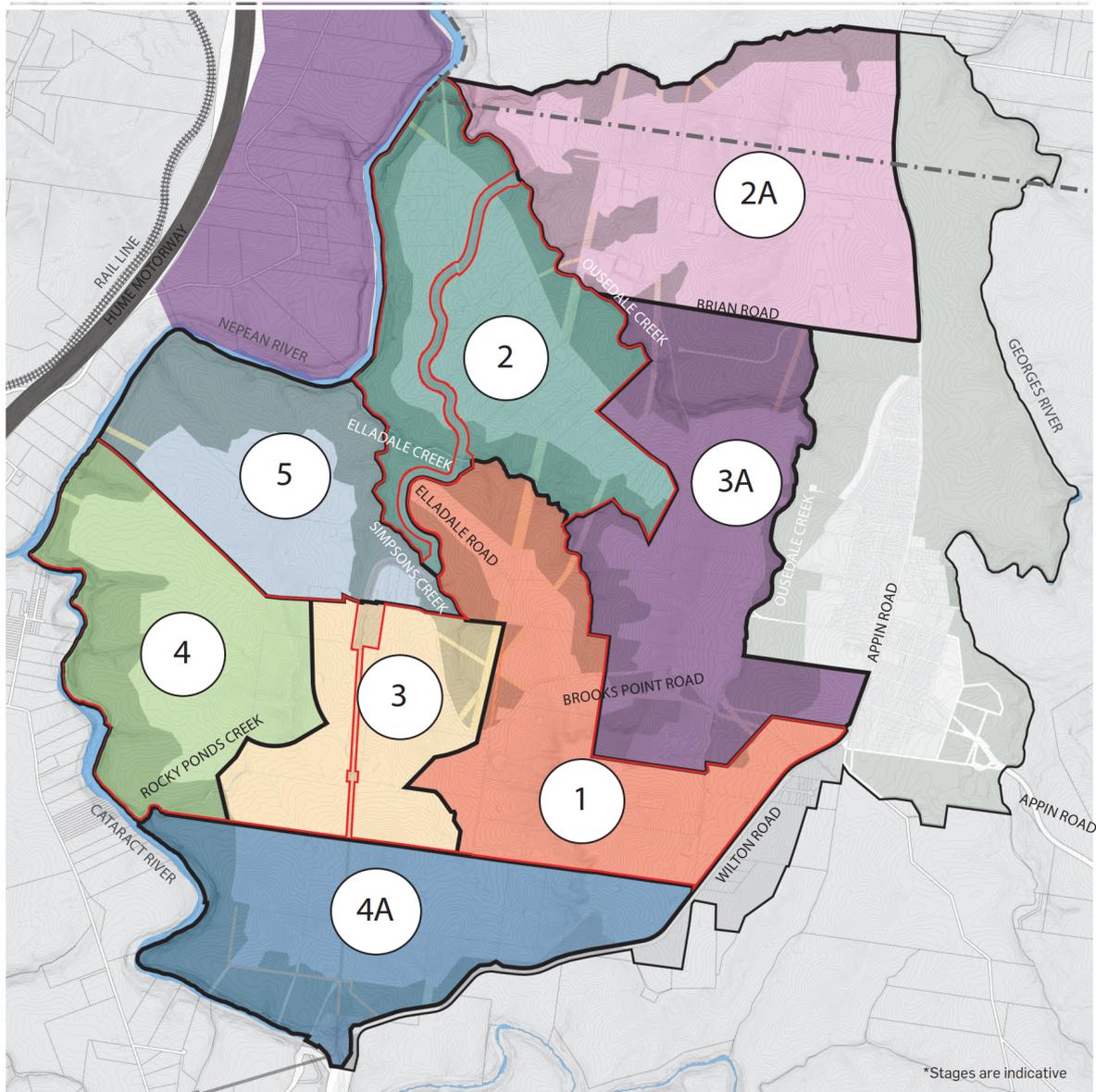


Figure 1: Release Area 1 Locality



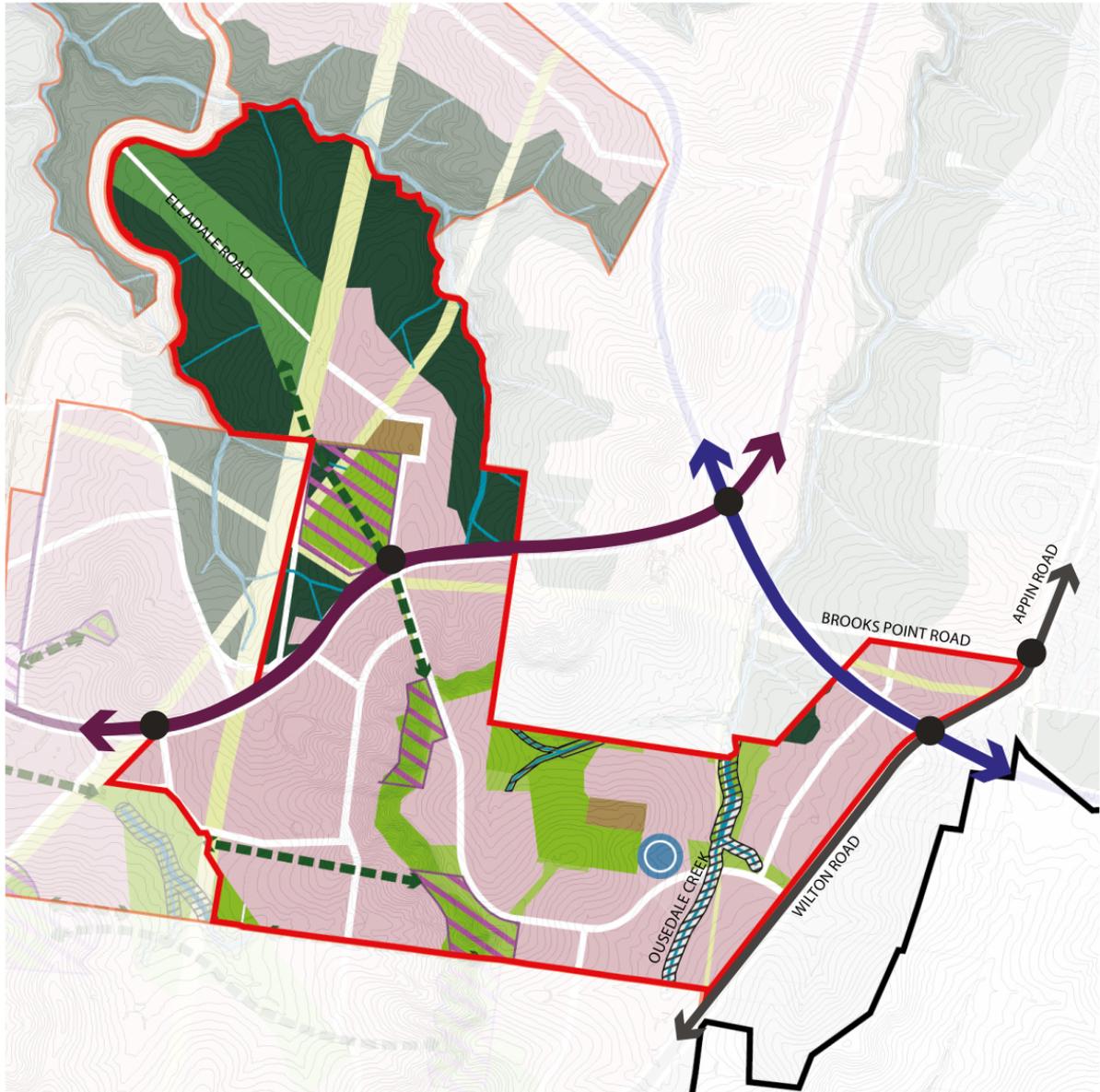
LEGEND:

- Appin and North Appin Precincts Boundary
- Existing Rivers
- Release Area 1
- Release Area 2
- Release Area 2A
- Release Area 3
- Release Area 3A
- Release Area 4
- Release Area 5
- Future Employment Zone

APPIN AND NORTH APPIN PRECINCTS - STAGING PLAN

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Figure 2: Appin Staging Plan (Source: Walker Corporation 2022)



LEGEND:

- | | | |
|---|---|---------------------------|
| Appin (Part) Precinct - Release Area 1 Boundary | Green Links | East-West Connection Road |
| Appin & North Appin Precincts Boundary | Riparian Corridor | Public Transport Corridor |
| Appin (Part) Precinct Boundary | Planned State Heritage Listing Sites | Collector Roads |
| Waterways | Heritage Items | Signalised Intersection |
| C2 Conservation Land* | Residential | |
| District Open Space | Excluded Land | |
| Regional Open Space | Mixed Use Centres (including retail/commercial, schools and open space) | |
| Easements (Potential for active and passive recreation) | | |

* Where located outside Appin (Part) Precinct Boundary this represents Strategic Conservation Planning SEPP - Avoided Land (August 2022).

APPIN (PART) PRECINCT STRUCTURE PLAN - RELEASE AREA 1

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Figure 3: Release Area 1 Structure Plan

1.4. Assessment Approach

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 Appin. 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. The strategic planning principles of PBP are:

- *Ensuring land is suitable for development in the context of bushfire risk;*
- *Ensuring new development on Bush Fire Prone Land (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 bushfire, 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 bushfire;*
- ii provide for a defensible 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 bushfire 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 bushfire prone areas, where:

- *the development area is exposed to a high bushfire risk and should be avoided;*
- *the development is likely to be difficult to evacuate during a bushfire due to its siting in the landscape, access limitations, fire history and/or size and scale;*
- *the development will adversely affect other bushfire protection strategies or place existing development at increased risk;*
- *the development is within an area of high bushfire 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 addendum study assesses Appin (Part) Precinct Structure Plan - Release Area 1 in the context of the PBP strategic planning principles, 'inappropriate development' exclusions as well as the assessment considerations identified in Table 4.2.1 of PBP, summarised in Table 1 below.

Table 1: 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.

Future land uses considered by the structure plan would be subject to various aspects of PBP, when occurring on BFPL. Table 2 below outlines key PBP considerations for a variety of land uses and associated facilities that future development may be subject to.

Table 2: PBP Considerations for future land uses

Future Land Use	Associated Facilities and/or Activities	Key PBP Considerations for future development
<u>Residential Land Use</u>		
Low Density Residential	Low density residential dwellings	Chapter 5 of PBP outlines the bushfire protection requirements for residential subdivision, including performance criteria identified for APZs, access and infrastructure.
Medium density & multi-storey residential	Walk-up apartments, mid-rise apartment, mixed use residential and retail	Chapter 5 of PBP outlines the bushfire protection requirements for residential subdivision, including performance criteria identified for APZs, access and infrastructure. There are also additional considerations outlined in Section 8.2.2 of PBP (Multi-storey residential development) for residential buildings exceeding three storeys.
Special Fire Protection Purpose (SFPP)	Independent Living and Aged Care Childcare facilities, Hospitals Education facilities	Chapter 6 of PBP outlines the bushfire protection requirements for this type of development, including performance criteria identified for APZs, access and infrastructure.

Non-Residential Land Use

Future Land Use	Associated Facilities and/or Activities	Key PBP Considerations for future development
Commercial	Retail and specialised retail including food services	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.
Public Assembly Buildings	Buildings used for public assembly with a floor space area of greater than 500 m ²	Section 8.3.11 (Public Assembly Buildings) applies to this type of development. Relevant developments will be treated as SFPP

As described in the Section 1.7 of the broader Precinct Study (ELA 2022), 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.

2. Bushfire Landscape Risk Assessment

Consideration to the landscape bushfire risk for Appin (Part) Precinct Release Area 1 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.

2.1. Bushfire Hazard

The proposed development is located within a wider bushfire landscape containing Bush Fire Prone Vegetation. 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.

2.1.1. Vegetation

Vegetation across the broader precinct and surrounds has been classified into Keith Formations and Keith Class (Keith 2004) and assigned a potential total fuel load (tonnes/hectare) using Table A1.12.8 from PBP, as represented in Section 2.1 of the Precinct Study (see Figure 5 and Table 4; ELA 2022).

Desktop review of various mapping datasets including internal vegetation data provided by the client (Walker Corporation, 2020), Vegetation of the Cumberland Plain mapping (OEH, 2013) and Woronora Vegetation Mapping (NPWS, 2003). In addition, 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, 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. For Appin (Part) Precinct Release Area 1, this includes Elladale and Simpsons Creeks, situated to the north of the stage. To the south and east, is a consolidated vegetation hazard, associated with land within the Sydney Drinking Catchment and National Parks estate, however this area is situated west of Wilton Road and separated from Appin (Part) Precinct Release Area 1 by existing development and reduced hazard in the form of rural lands.

The final extent and formation of vegetation within riparian corridors, retained areas of vegetation and areas to be rehabilitated will be subject to more detailed analysis at the subdivision stage of the planning process, however preliminary mapping is demonstrated in Figure 4 below to inform the risk profile and indicative bushfire protection measure requirements (i.e. Asset Protection Zones).

2.1.2. Slope

Slope has been identified from a Digital Elevation Model (DEM) generated from 2 m contours and classified into PBP slope categories (Figure 5).

With consideration to the slope of vegetated areas influencing Appin (Part) Precinct Release Area 1, areas exhibiting steeper slopes are generally linked to drainage features including Elladale and Simpsons Creeks to the north. Located just west of the central stage region is an undulating area where the slope is marginally greater than 20 degrees. This hazard is upslope for development situated to the west, and

to the east the effective slope has determined from 2 m contours to be 22 degrees downslope. This is discussed further in section 3.

2.2. 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 and potential fire pathways, and bushfire history. Table 3 below summarises the outcomes of the broader study with specific consideration to Appin (Part) Precinct Release Area 1.

Table 3: Bushfire risk assessment

Aspect	Assessment	Evaluation
Bushfire Weather and Potential Fire Behaviour		
<p>Forest Fire Danger Index</p> <p>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</p> <p>See Precinct Study: Figure 9</p>	<p>The following outcomes revealed from the analysis:</p> <ul style="list-style-type: none"> • 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. 	<p>For the Appin precinct, including Appin (Part) Precinct Release Area 1, 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 bushfire attack at lower FFDIs.</p> <p>For Appin (Part) Precinct Release Area 1, the bushfire risk to the SW-N is moderated by the presence of rural lands to the west and south, dominated by mixed management rural grassland. Once adjoining stages are developed, this risk would be further mitigated.</p>
<p>Directional Fire Intensity</p> <p>Analysed through potential head fire intensity modelled using fire intensity formulae of McArthur (1967) and Cheney et. al. (2012).</p> <p>See Precinct Study: Figure 10 (SWN, FFDI 116), Figure 11 (NS-E, FFDI 63) and Figure 12 (SE-SW, FFDI 46).</p>	<p>The fire intensity model is predicting potential fire intensities, the probability of these occurring is not considered. It modelled directional FFDI for the Precinct utilising outcomes from the bushfire weather analysis:</p> <ul style="list-style-type: none"> • NS-E: FFDI 63 • SE-SW: FFDI 46 • SW-N: FFDI 116 	<p>Outcomes of modelling indicate higher fire intensities are most likely to occur under FFDI 116. Mapped outputs indicate these will be most prevalent in the WaterNSW catchment lands and National Parks estate to the south and east, where there is contiguous forest vegetation. However, based on the weather analysis conducted for this study, FFDI 116 conditions are experienced under westerly influenced winds. Therefore, potential fires within lands to the east of the site, burning under higher FFDI conditions are more likely to be associated with SW-N winds and spreading away from the site. Therefore, under these conditions fire transfer from the catchment lands to the east into the Precinct and Appin (Part) Precinct Release Area 1 is unlikely, with fire attack from these areas likely to be under less severe FFDI conditions.</p>
Bushfire Catchment and Spread Scenarios		
<p>Fire Catchment and Pathways</p> <p>Determined from future vegetation profile.</p>	<p>Potential fire spread along both the southern boundary is temporary, with vegetation to be removed/reduced with future development.</p>	<p>Remaining fire pathways are associated with riparian corridors and remaining remnant vegetation within the broader precinct. The</p>

Aspect	Assessment	Evaluation
<p>See Precinct Study: Figure 13, and Figure 6 below.</p>	<p>Fire pathways from the south-east to east are mitigated from transfer into the precinct by Wilton Road and existing proposed land uses.</p> <p>Fire pathways from the east to north-east are mitigated by Appin Road and the Appin township itself (to the northeast).</p> <p>Fire pathways from the west are convoluted and decreasing, with future planned development west of Appin (Part) Precinct Release Area 1.</p>	<p>pathways are narrow and do not connect to larger hazards in the broader landscape.</p> <p>For Appin (Part) Precinct Release Area 1, these pathways are situated to the north-west (associated with Simpsons and Elladale Creek) and north-east (adjacent to Appin township). Many of these areas will be surrounded by future developed land and therefore the risk profile associated with these narrow pathways will be further moderated as the broader precinct is activated.</p> <p>However, Appin (Part) Precinct Release Area 1 is straddled by the Elladale and Simpsons Creek corridors (north of the transit corridor) should be prioritised for open space and low density residential outcomes, to compliment the appropriate sitting of land use typologies with regard to the residual hazard.</p>
<p>Ignition</p> <p>Determined from Wollondilly/Wingecarribee Bush Fire Risk Management Plan (BFRMP).</p> <p>See Precinct Study: Section 2.2.4</p>	<p>Key sources of ignition in BFMC area include:</p> <ul style="list-style-type: none"> • Lightning strikes associated seasonal summer storms; • Arson, including the dumping of cars in bushland; and • Pile burns escaped private hazard reduction. 	<p>Ignition within the Precinct and Appin (Part) Precinct Release Area 1 is not considered to be elevated, and therefore not considered at an increased risk for future development beyond which bushfire protection measures cannot adequately mitigate.</p>

Fire History

<p>Wildfire Occurrence and Frequency</p> <p>Determined from fire history record (NPWS and NSW RFS). See Precinct Study: section 2.2.4.</p>	<p>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.</p> <p>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.</p>	<p>Appin (Part) Precinct Release Area 1 subject to limited fire activity impacting the site. 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 is effectively moderated.</p>
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2.3. Summary of Landscape Bushfire Risk

The landscape bushfire risk analysis indicates there is current potential for bushfire attack within the broader study area given the existing presence of BFPV in adjoining areas. The likelihood of potential bushfire attack is however decreased to the north, west and south-west due to 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 easterly movement of fires under elevated bushfire weather and wind conditions in the region, the risk to the subject land is also reduced, along with mitigation advantages, for any lower intensity fire that does approach in this direction.

The residual risk further decreases for Appin (Part) Precinct Release Area 1 with broader activation of the precinct and adjoining lands (to the north (Gilead), west (Douglas Park and Menangle), southwest (Wilton), and east (Appin)). This is of note as this increased disruption of an already fragmented hazard landscape increases the bushfire resilience from bushfire attack and limiting exposure of the precinct and Appin (Part) Precinct Release Area 1 to landscape scale bushfire. However, the area north of the transit corridor should be prioritised for open space and low density residential outcomes, that compliment the appropriate sitting of land use typologies with regard to the residual hazard in this portion of Appin (Part) Precinct Release Area 1.

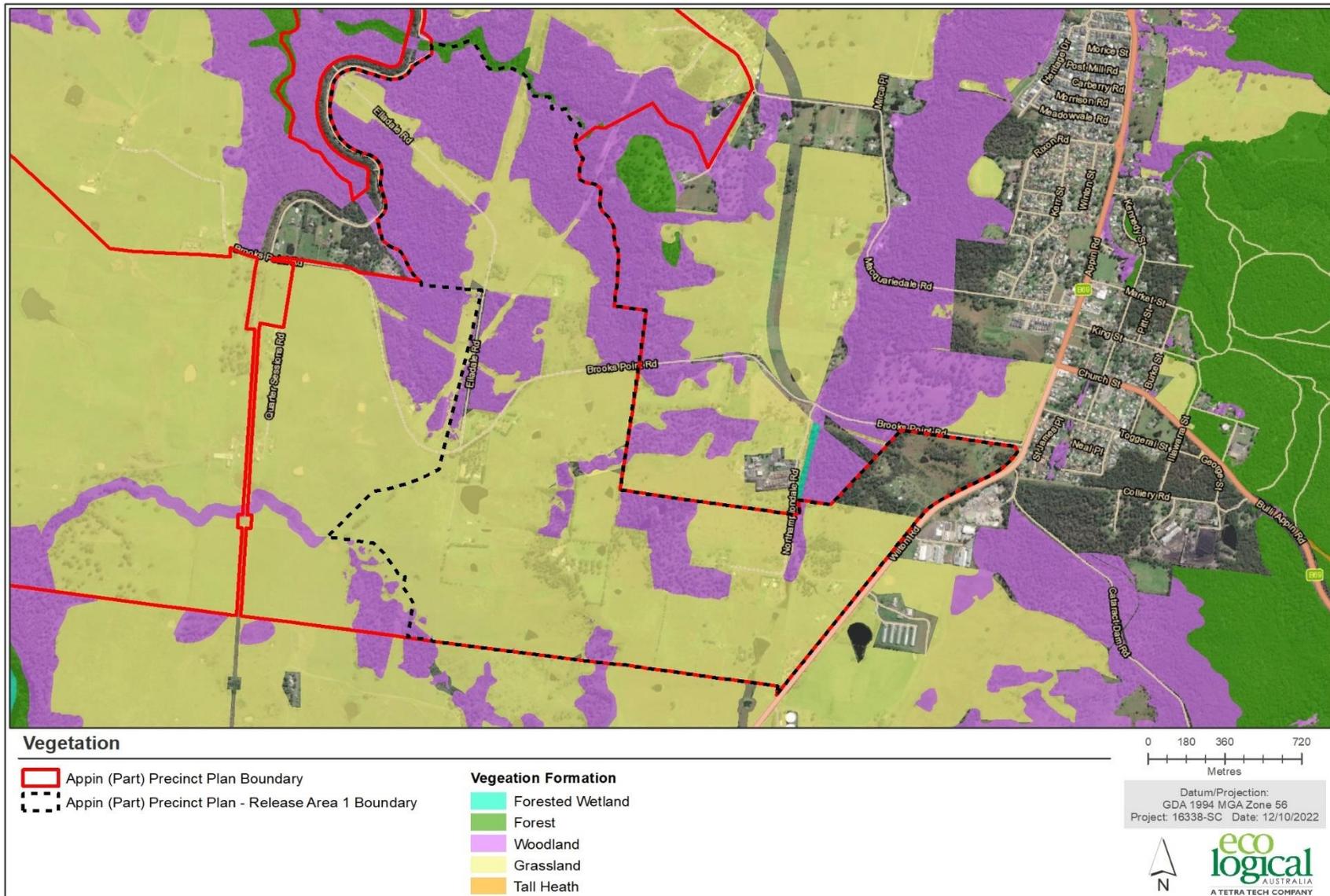


Figure 4: Vegetation Formation

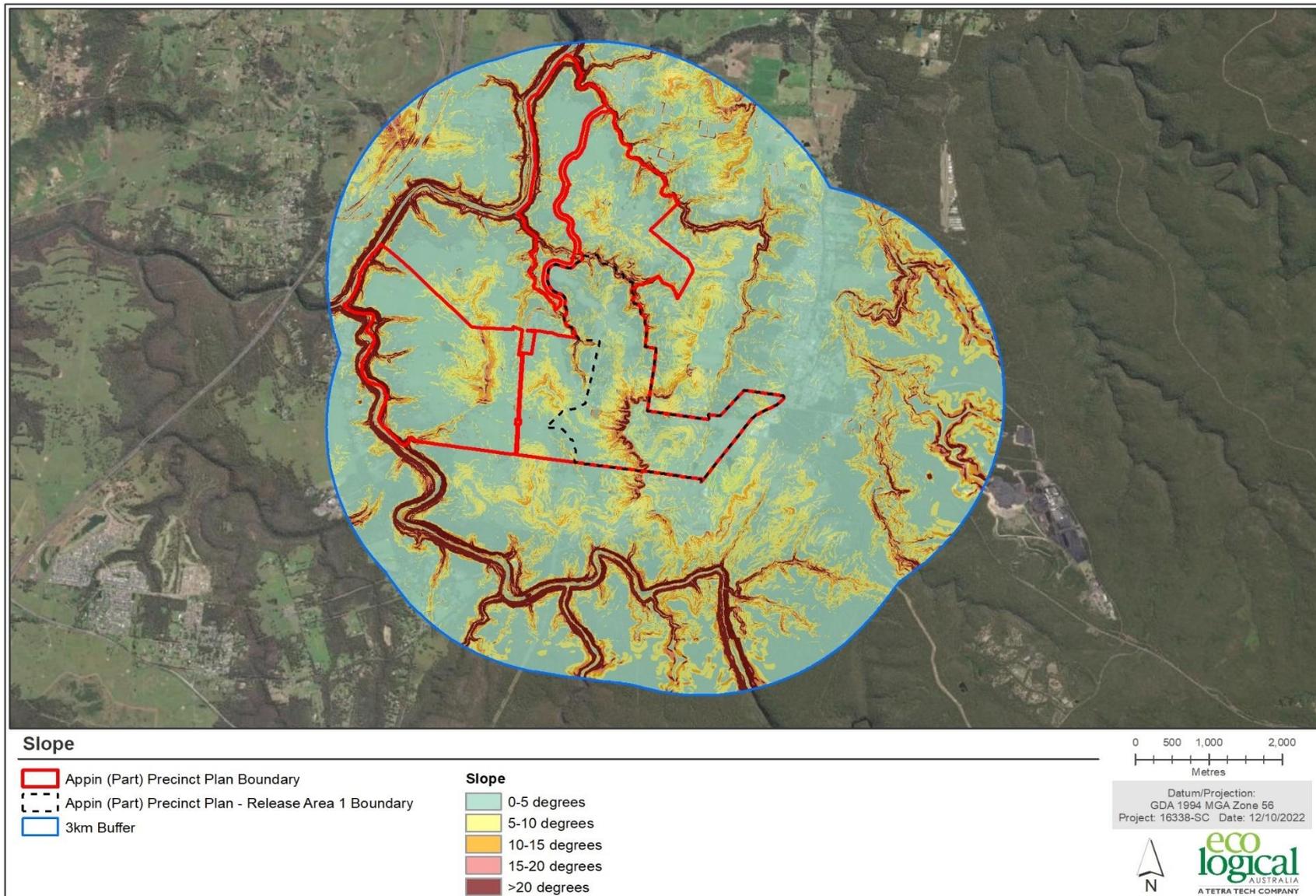


Figure 5: Slope

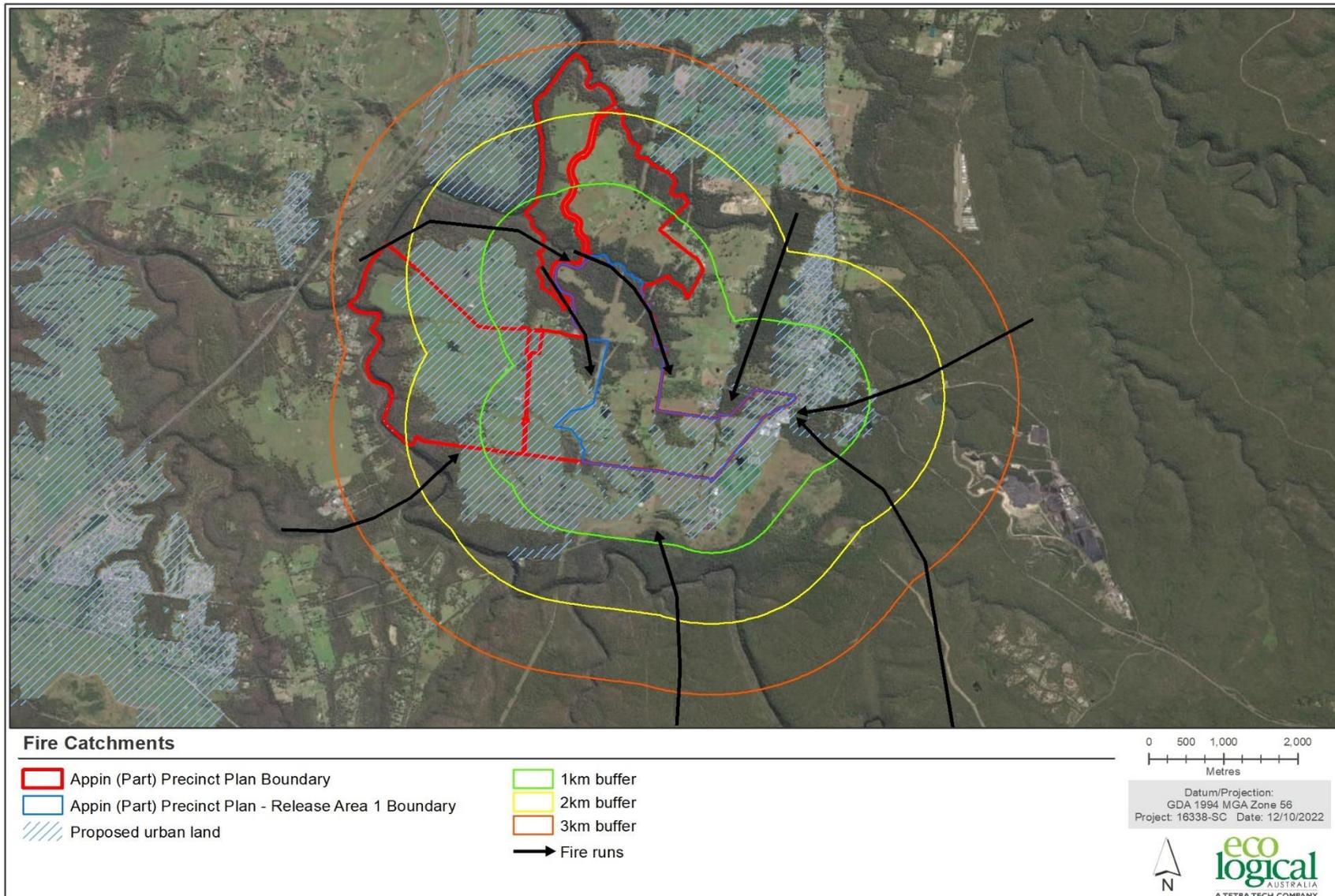


Figure 6: Fire Catchments influencing Appin (Part) Precinct Release Area 1

3. Land Use Assessment

The aim and objectives of PBP (RFS 2019) below provide additional guidance for land use assessment within a Strategic Bushfire Study:

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 defensible 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.*

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).

3.1. 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 in relation to Appin (Part) Precinct Release Area 1, the:

- 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 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.

- 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 7.

- Table 4 includes the minimum dimensions required by the Acceptable Solutions of PBP for residential development (i.e. 29 kW/m²) and SFPP development (i.e. 10 kW/m²).
- 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. There is opportunity within the subject land to locate APZ and other bushfire protection measures to meet the acceptable solutions within PBP 2019;
- Multiple access and egress points and perimeter roads are feasible within the developable area and there is scope to finalise these through stage planning;
- Complementary and consistent risk management through landscape controls and building design is also feasible; and
- Slopes greater than 20 degrees are present within the hazard assessment area and subject land, however there is capacity for these constraints to be resolved with design progression to avoid the increased fire behaviour impacts associated with these slopes.

3.2. Land use evaluation

Future development on BFPL will need to satisfy the performance criteria identified in PBP for various land uses, as summarised in Table 5 below. Under the planning pathway identified in PBP and as legislated, the CDC pathway is not possible for subdivision, SFPP development and where the acceptable solutions of PBP cannot be met. Therefore, it is expected that a variety of future land uses will be assessed against the requirements of PBP following the DA pathway including:

- Residential and Rural Residential Subdivision;
- SFPP Development;
- Multi-storey residential development;
- Commercial and Industrial Development; and
- Section 8.3.11 – Public Assembly Buildings

The requirements for these development types are explored in more detail in the Precinct Study (see Section 3.2), and are evaluated in Table 5 below.

3.3. Feasibility of Asset Protection Zones

Based on the landscape assessment of vegetation and slope, preliminary APZ have been determined to indicate the separation distance required between a structure and the vegetation hazard. This analysis considers the existing vegetation within and adjoining the site. APZ dimensions are provided in Table 4 and represent the required minimum setback detailed in PBP (2019). Indicative APZ identified in Figure 7 are for residential development and for special fire protection purposes (SFPP). Final APZ dimensions will be determined based on the final design, proposed land use, vegetation configuration and topography.

The subject land is surrounded by forest, woodland and grassland vegetation with varied management practices. 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), accompanied by rapid site inspection as shown in Figure 9 of the precinct report.
- All APZ 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 subject land.
- All APZ within the subject land 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 proposed are based on PBP 2019, which requires that residential buildings are subject to a maximum heat exposure of no more than 29 kW/m². Best practice is that all residential subdivisions meet this standard. SFPP APZ requirements are determined in Table 4 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.
- 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.

Table 4: Indicative APZs Applicable to the Subject Land

Vegetation Formation	Slope Class	Residential APZ (BAL-29) ¹	Special Fire Protection Purpose (SFPP) APZ ¹
Forest	All upslope and flat	24 m	67 m
	>0-5° downslope	29 m	79 m
	>5 -10° downslope	36 m	93 m
	>10-15° downslope	45 m	100 m
	>15-20° downslope	56 m	100 m
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

Vegetation Formation	Slope Class	Residential APZ (BAL-29) ¹	Special Fire Protection Purpose (SFPP) APZ ¹
	>0-5° downslope	12 m	40 m
	>5-10° downslope	13 m	45 m
	>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.

*Note a slope of 22° downslope was determined for land sloped >20° (see **Figure 7**), resulting in indicative residential APZ requirement of 40 m (for woodland vegetation) in this area.

3.3.1. Hazard on Slopes Greater than 20 degrees

As indicated in Figure 7, there is a small area of hazard where the slope has been measured to be greater than 20 degrees. PBP requires that where 'Effective slopes are to be assessed on hazards on slopes in excess of 20 degrees will require a detailed performance assessment. This may include a consideration of the potential flame length and its impact on the proposed development'. Therefore, the approach to determining an appropriate APZ in this area to afford future development a radiant heat exposure of less than 29 kW/m² will need to be approved by the RFS. However preliminary assessment of the slope has determined the effective slope to be 22° downslope and indicative APZ requirements modelled. As shown in Figure 7, indicative APZ requirements determined from modelling can be accommodated by future development. Given this relates only to a narrow remnant area of vegetation, which will be surround by urban land with capacity for bushfire protection measures, it is not considered to elevate the risk profile of the precinct.

3.4. Summary of land use evaluation

The proposed land uses included in the Appin (Part) Precinct Release Area 1 structure plan are generally considered appropriate for the site, given the level of bushfire landscape risk, the nature of the subject land, the characteristics of the land uses proposed which follows broader precinct planning principles, and the ability for bushfire protection measures to be provided.

Table 5 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 5: Future land use evaluation

Development Type	Assessment Considerations	Suitability
Residential Subdivision	<p>The land use evaluation has considered potential land uses enabled by the rezoning and with consideration to:</p> <ul style="list-style-type: none"> 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 	<p>Preliminary analysis indicates differing residential typologies can comply with PBP. However, in considering the most appropriate siting for increased density, or the placement of vulnerable occupants, with consideration to the hazard context, it is recommended that area north of the transit corridor within Appin (Part) Precinct Release Area 1 is prioritised for open space opportunities and lower density residential living, with higher residential densities (including multi-storey development) situated in suitable areas south of the transit corridor. As such further</p>

Development Type	Assessment Considerations	Suitability
<p>SFPP Development</p>	<p>Buildings of Class 5 to 8 under the NCC /Section 8.3.10 Commercial and Industrial Development</p>	<p>iterations of the Appin (Part) Precinct Release Area 1 structure plan should adopt these recommendations along with consideration to relevant DCP controls, if necessary.</p> <p>Requirements for SFPP development have been considered and the position of the proposed school and village centre are generally suitable with capacity for development in areas outside of the SFPP APZ.</p> <p>It is recommended that SFPP development is excluded from the area north of the transit corridor within Appin (Part) Precinct Release Area 1.</p> <p>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.</p>
<p>Public Assembly Buildings</p>	<p>Multi-storey residential development</p>	<p>Requirements for SFPP development have been considered and there are suitable areas outside of the required SFPP APZ, particularly within the proposed village centre where this development is most likely to occur.</p> <p>As recommended for SFPP development, public assembly buildings should also be excluded from the area north of the transit corridor within Appin (Part) Precinct Release Area 1.</p> <p>Future multi storey residential development is feasible outside of the 29 kW/m² APZ, however further iterations of the Appin (Part) Precinct Release Area 1 Structure plan should consider the requirements of section 8.2.2 of PBP. Of note for this site are the following considerations:</p> <ul style="list-style-type: none"> • Higher residential densities for evacuation • Increased demand on road infrastructure during evacuation; <p>As recommended for medium density development, it is multi-storey development is excluded from the area north of the transit corridor within Appin (Part) Precinct Release Area 1.</p>

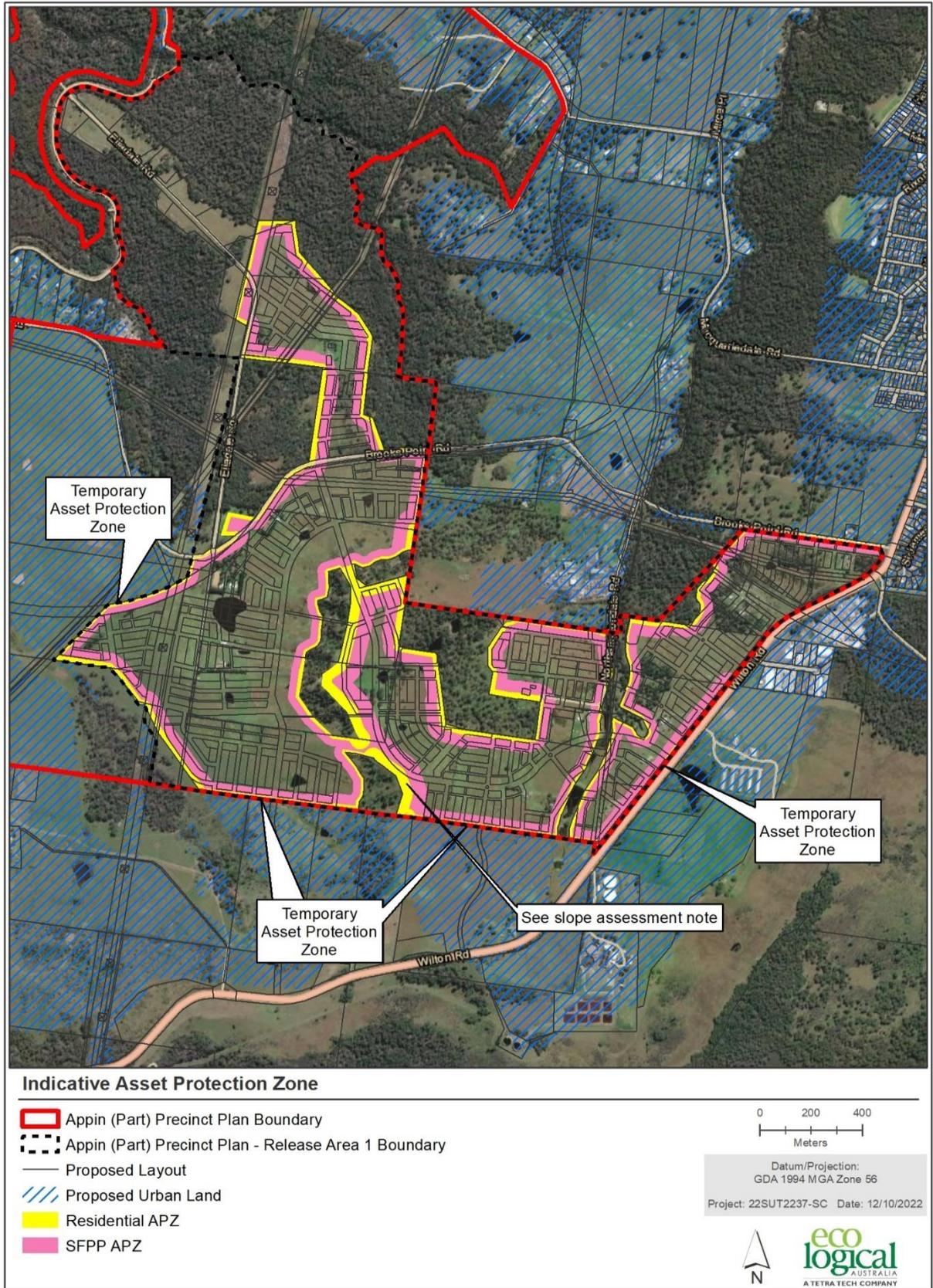


Figure 7: Preliminary Asset Protection Zones.

SLOPE ASSESSMENT NOTE SEE SECTION 3.3.3.

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

4. Access, Egress and Evacuation

Key to this study is the strategic planning criteria as outlined in Chapter 4 of PBP, which requires consideration to the provision of adequate infrastructure emergency evacuation and firefighting operations. 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 considered in the sub sections that follow and further detailed in the broader Precinct Study (see section 4).

4.1. Access

Appin and North Appin Precincts are planned growth areas under the *Greater Macarthur 2040* (see DPIE structure plan in Figure 2 of Precinct Study; DPIE 2018) which has planned provision for various collector roads, sub-arterial roads, public transport corridors and the future Outer-Sydney Orbital connection (Figure 9). Given the scale of the precinct, there is ample capacity for perimeter roads to be refined as planning progresses, perimeter access meeting the requirements set out in Table 5.3b of PBP is not considered a constraint to the feasibility of the proposal.

Future development applications will need to address access requirements in more detail as per PBP 2019 (see Table 9 Appendix A) 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.

Table 6 and Figure 9 below highlight the delivery of key road infrastructure in relation to indicative timing for activation within Appin (Part) Precinct Release Area 1. These timings are best estimates for the expected operational capacity of proposed roads and road upgrades, and have been considered in preliminary traffic analysis undertaken by WSP (2022) (Figure 8). As stage planning progresses, timeframes and traffic modelling should be re-evaluated.

The WSP report summarises the interim access scenarios for each stage which have been used during traffic modelling to test evacuation adequacy. This is further discussed below in relation to Appin (Part) Precinct Release Area 1, with section 4 of the broader Precinct Study also considering future stages and a fully activated precinct.

Table 6: Indicative Road Infrastructure Delivery timeframes.

Stage	Timing	Road Delivery
Appin (Part) Precinct Release Area 1	2026	Spring Farm Parkway Extension Appin Rd Upgrade north of Gilead Appin Rd upgrade (South Gilead- Gilead)
	2027	Appin Rd & Church St signalised intersection
	2029	Appin Rd upgrade (North Appin - South Gilead) & N-S Transit Corridor (Neighbourhood 1-2A)

4.2. Evacuation

The broader Precinct Study (Section 4) explores in detail the Appin (Part) 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 7 below in relation to Appin (Part) Precinct Release Area 1, with consideration to traffic modelling undertaken by WSP (2022). Due to the potential for bushfire impact on some evacuation routes (albeit a lower likelihood), the timing and capacity of the road network for evacuation during a bushfire has been conservatively evaluated as highlighted below.

Table 7: Appin (Part) Precinct Release Area 1 Access and Evacuation Considerations

Considerations	Assessment	Evaluation
Early offsite evacuation Consideration to WSP Traffic Modelling for Bushfire Evacuation.	Outcomes of WSP assessment Option 1b Evacuating Appin (Part) Precinct Release Area 1 dwellings within 100 m of APZ 65 minutes to evacuate (via Appin Rod north to Campbelltown) Option 2b Evacuating Whole of Appin (Part) Precinct Release Area 1 (see Figure 8) <i>Appin Road only:</i> 7 hours AM peak; 6 hours PM peak <i>Appin Road north and East</i> 3.8 hours AM peak; 2.5 hours PM peak	Early off-site evacuation is achievable based on a conservative approach to traffic modelling (i.e. only via Appin road north to Campbelltown). 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	Capacity for provision of neighbourhood safer place is shown in Figure 8. Traffic modelling (Option 1) suggest Stage evacuation to NSP between 5 and 10 minutes to evacuate to safer place.	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, 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

Considerations	Assessment	Evaluation
Low risk development outcomes	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 development within PBP and AS 3959 (i.e. bushfire prone property).	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.
Considered Statutory requirements in relation to bushfire		<p>There is opportunity for low risk development outcomes, in urban land will be greater than 100 m from the closest bushfire hazard and thus not considered bushfire prone and therefore developments and occupants not expected to be exposed to significant bushfire attack.</p> <p>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.</p>

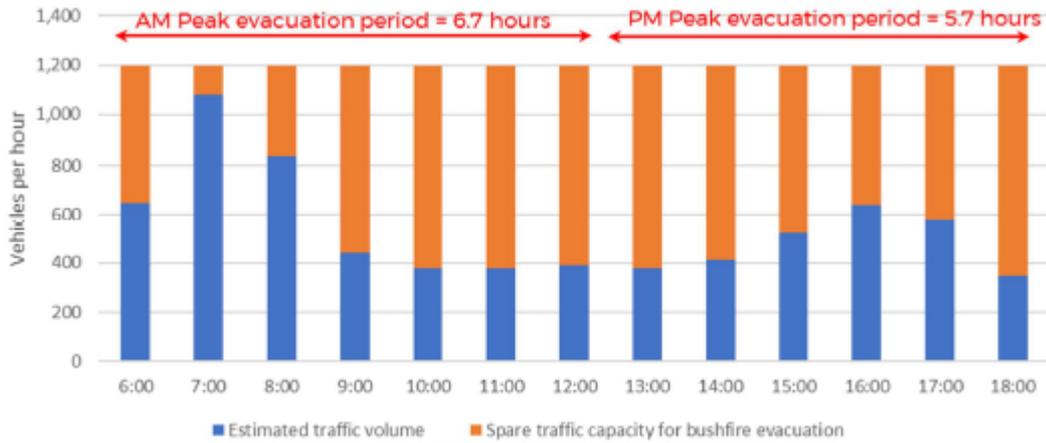


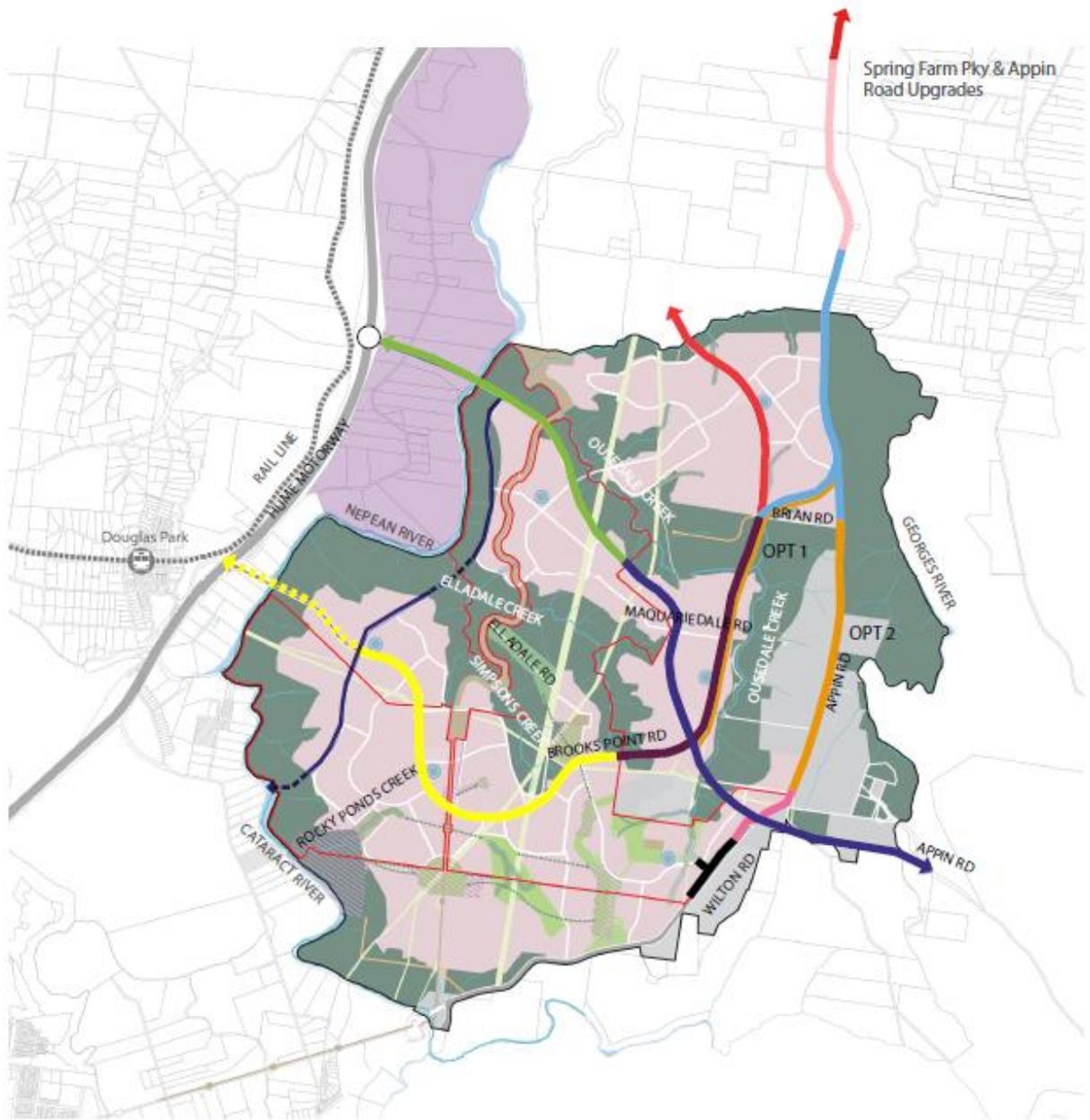
Figure 8: Estimated traffic volume and spare capacity for bushfire evacuation of Appin (Part) Precinct Release Area 1 (source WSP, 2022: Figure 4.1 option 2a)

4.3. Evaluation of Access, Egress and Evacuation

The WSP study 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 7 in relation to early offsite evacuation and capacity for the road network to facilitate on site refuge to a NSP, along with achievable low-risk development outcomes, urban development facilitated by the Appin (Part) Precinct Release Area 1 Structure Plan is not considered a limiting constraint to the proposal.

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

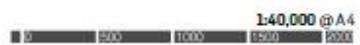
As the Appin (Part) Precinct Release Area 1 is part of broader regional planning, the provision of emergency services will be addressed as part of regional planning.



LEGEND:

- Appin & North Appin Precincts Boundary
- Appin (Part) Precinct Boundary
- Appin Road Upgrade (Sth Gilead- Nth Appin)
- Transit Corridor (St 3A & St S2)
- Transit Corridor (St 1 & St S2)
- Transit Corridor (St 5 & Moreton Pk)
- East-West Connection Rd (Hume Hwy & St 2)
- East-West Connection Rd (St 2 & Appin Rd)
- North-South Connection Road
- Road Connection (by others)
- Spring Farm Parkway & Appin Road Upgrade (North of Appin - by others)
- Appin Road Upgrade / Bypass Options
- Wilton Road Upgrade - Bypass Option
- Wilton Road Intersection Upgrade
- Hume Highway Interchange

**APPIN & NORTH APPIN PRECINCTS
STRATEGIC ROAD NETWORK UPGRADES**



DATE: 07-10-22
REVISION NO: 8

Figure 9: Road Infrastructure Network (source; Walker Corporation, 2022)

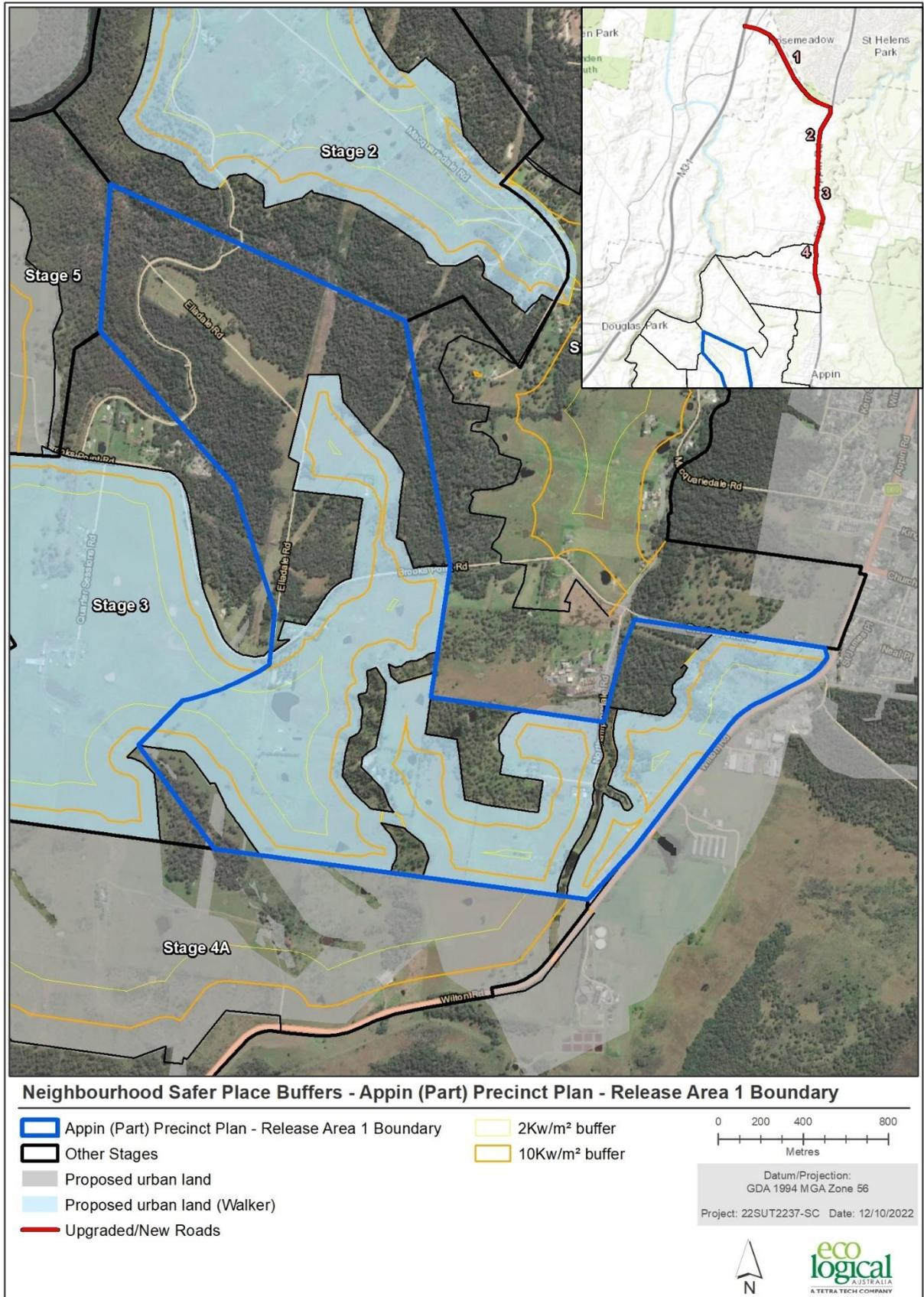


Figure 10: Indicative NSP capacity within Appin (Part) Precinct Release Area 1

4.4. Infrastructure and Adjoining Land

Future development within Appin (Part) Precinct Release Area 1 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. Key considerations on suitability of infrastructure to meet the requirements of PBP include the ability of the reticulated water system to deal with a major bushfire event in terms of pressures, flows, and spacing of hydrants and life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines, etc. These aspects and acceptable solution requirements are summarised in Appendix C (adapted from Table 5.3 and Table 6.8 of PBP).

Future development should also 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) Precinct Release Area 1 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.

5. 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, including substantial opportunity for onsite safe refuge, and low risk development outcomes which further moderate bushfire risk.

New development on BFPL can meet the requirements of PBP, and once activated, low risk development outcomes, located greater than 100m from the hazard interface are further achievable. The acceptable solutions of PBP by way of provision of APZ, access, infrastructure and water supply, can be accommodated for in detailed design, minimising reliance on performance-based solutions.

Table 8 evaluates the Appin (Part) Precinct Release Area 1 proposal, with consideration to the assessment framework and recommendations for further planning, including minor amendments to the preliminary indicative layout plan are outlined below.

Table 8: Considerations and Recommendations for Appin (Part) Precinct Release Area 1

Consideration	Evaluation	Recommendation
Residual risk - the level of residual risk after the application of bushfire protection measures	<p>Appin (Part) Precinct Release Area 1 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:</p> <ul style="list-style-type: none"> • APZs requirements are achievable • Perimeter roads are achievable • Evacuation capacity is achievable 	<p>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.</p> <p>Ensure evacuation capacity as modelled is achievable during staging.</p> <p>Confirmation of modelled APZ dimensions and approach for hazard on slope greater than 20° is required.</p> <p>It is recommended that future hazards are managed under a vegetation plan and APZ management within public spaces.</p> <p>Future iterations of the ILP should limit proposed land use typologies north of the transit corridor to low density residential outcomes as recommended in this study.</p>
Risk to life - an appropriately low residual risk to human life is fundamental.	<p>The residual risk to life is not inappropriate given the ability for the site to provide:</p> <ul style="list-style-type: none"> • adequate access for early off-site evacuation, • on site safe refuge capacity; and • low risk development outcomes, <p>Much of the development will be located outside of land implicated by bushfire</p>	<p>As staging progresses, the provision of road infrastructure for Appin (Part) Precinct Release Area 1 should align stage activation, as considered in this assessment, to support early offsite evacuation.</p> <p>Onsite evacuation facilities should be established under an appropriate planning mechanism.</p>

Consideration	Evaluation	Recommendation
Risk to property – the residual risk to property should meet the Acceptable Solutions within PBP;	<p>The acceptable solutions of PBP in relation to property protection measures will be assessed at the DA stage, however property measures are not constrained by the proposal:</p> <ul style="list-style-type: none"> • APZ requirements are achievable • Requirements for services are achievable • Access requirements are achievable • BAL-29 construction is achievable <p>Once fully activated, the majority of the urban area will not be encumbered by BFPL.</p>	Ensure bushfire protection measures are adequately provisioned at all stages of the planning pathway and 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.	Precinct part of NSW regional planning and 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 provisions 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.

6. Conclusion

This strategic study represents an assessment of the Appin (Part) Precinct Release Area 1 structure plan that has been developed with consideration to the *Greater Macarthur 2040 implementation plan*. The study has assessed the bushfire risk to early planning of the Appin (Part) Precinct Release Area 1 indicative layout 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. Therefore, it has determined that the Appin (Part) Precinct Release Area 1 proposal for the Appin (Part) Precinct, can meet the strategic planning principles outlined in PBP, subject to the recommendations of this study.

The Appin (Part) Precinct Release Area 1 proposal is generally consistent with Ministerial Direction 4.4 (Planning for Bushfire Protection) issued under section 9.1(2) of the *EP&A Act* and the requirements of PBP, however agreeance regarding the assessment of land exhibiting slopes greater than 20 degrees should be confirmed before detailed design for Appin (Part) Precinct Release Area 1 progresses.

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Appendix A Access Specifications

The following access specifications are reproduced from PBP (RFS 2019).

Intent of measures: To provide safe operational access to structures and water supply for emergency services while residents are evacuating an area.

Table 9: Performance criteria for access for residential and rural residential subdivisions

Performance Criteria	Acceptable Solutions
The intent may be achieved where:	
firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation	<p>property access roads are two-wheel drive, all-weather roads, and</p> <p>perimeter roads are provided for residential subdivisions of three or more allotments; and</p> <p>subdivisions of three or more allotments have more than one access in and out of the development; and</p> <p>traffic management devices are constructed to not prohibit access by emergency services vehicles; and</p> <p>maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; and</p> <p>all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; and</p> <p>where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; and</p> <p>where access/egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.</p>
the capacity of access roads is adequate for firefighting vehicles	the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.
there is appropriate access to water supply	<p>hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;</p> <p>hydrants are provided in accordance with AS 2419.1:2005;</p> <p>there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.</p>
access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface	<p>perimeter roads are two-way sealed roads; and</p> <p>8m carriageway width kerb to kerb; and</p> <p>parking is provided outside of the carriageway width; and</p> <p>hydrants are located clear of parking areas; and</p> <p>there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and</p> <p>curves of roads have a minimum inner radius of 6m; and</p> <p>the maximum grade road is 15° and average grade is 10°; and</p> <p>the road crossfall does not exceed 3°; and</p>

Performance Criteria	Acceptable Solutions
	a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating	<p>minimum 5.5m width kerb to kerb; and</p> <p>parking is provided outside of the carriageway width; and</p> <p>hydrants are located clear of parking areas; and</p> <p>roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and</p> <p>curves of roads have a minimum inner radius of 6m; and</p> <p>the road crossfall does not exceed 3°; and</p> <p>a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</p>
firefighting vehicles can access the dwelling and exit safely	<p>No specific access requirements apply in an urban area where a 70 metre unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply).</p> <p>In circumstances where this cannot occur, the following requirements apply:</p> <p>minimum carriageway width of 4m;</p> <p>in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay; and</p> <p>a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and</p> <p>provide a suitable turning area in accordance with Appendix 3; and</p> <p>curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; and</p> <p>the minimum distance between inner and outer curves is 6m; and</p> <p>the crossfall is not more than 10°; and</p> <p>maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads; and</p> <p>a development comprising more than three dwellings has formalised access by dedication of a road and not by right of way.</p> <p>Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. the gradients applicable to public roads also apply to community style development property access roads in addition to the above.</p>

Appendix B NSP Criteria

Table 10: Assessment Criteria for a Neighbourhood Safer Place (RFS 2017)

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/m ² ; or 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 2kW/m ² ; or 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 11: Principles for Site Identification (RFS 2017)

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.

Appendix C Services Specifications

The following services specifications (provision of water, gas and electricity) are reproduced from PBP (RFS 2019).

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

Table 12: Performance criteria for services provision for residential and rural residential subdivisions

Performance Criteria	Acceptable Solutions
The intent may be achieved where:	
a water supply is provided for firefighting purposes	reticulated water is to be provided to the development, where available; a static water supply is provided where no reticulated water is available.
water supplies are located at regular intervals	fire hydrant spacing, design and sizing comply with the Australian Standard AS 2419.1:2005;
the water supply is accessible and reliable for firefighting operations	hydrants are not located within any road carriageway; reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
flows and pressure are appropriate	fire hydrant flows and pressures comply with AS 2419.1:2005.
the integrity of the water supply is maintained	all above-ground water service pipes external to the building are metal, including and up to any taps.
location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings	where practicable, electrical transmission lines are underground; where overhead, electrical transmission lines are proposed as follows: lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.
location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used; all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; connections to and from gas cylinders are metal; polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not used; above-ground gas service pipes are metal, including and up to any outlets.

Table 13: Water supply requirements for non-reticulated developments or where reticulated water supply cannot be guaranteed (Table 5.3d of PBP)

Development Type	Water Requirements
Residential lots (<1000m ²)	5000L/lot
Rural-residential lots (1000-10,000m ²)	10,000L/lot
Large rural/lifestyle lots (>10,000m ²)	20,000L/lot
Multi-dwelling housing (including dual occupancies)	5000L/dwelling

