



Derriwong & Old Northern Road Dural Bushfire Strategic Study

Legacy Property

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Template 2.8.1

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1. Introduction

1.1 Background

This report was prepared to support a Planning Proposal developed by Legacy Property to The Hills Shire Council (Council) that seeks to rezone land at Old Northern Road and Derriwong Road, Dural. The site has an area of 12.879 hectares and comprises five existing lots.

The Planning Proposal seeks to rezone the site from RU6 Rural Transition to R2 Low Density Residential and SP2 Infrastructure (Local Road), facilitating the delivery of 110 residential lots and a new local park. The proposal also seeks to amend the maximum height of buildings from 10 metres to 9 metres. The Planning Proposal request is accompanied by a site-specific Development Control Plan and an offer to enter into a Voluntary Planning Agreement to secure public benefits associated with the proposal.

The indicative layout submitted with the Planning Proposal provides a mix of larger residential lots ranging from 600sqm to 3,400sqm. This will contribute additional housing supply, diversity and choice in the local area, and support the viability of the Dural village centre.

This assessment considers the masterplan area as shown in Figure 1 and Figure 2 and includes the following lots:

- 21 Derriwong Road - Lot 2 DP 567995;
- 27 Derriwong Road - Lot 9 DP 237576;
- 626 Old Northern Road - Lot 2 DP 541329
- 618 Old Northern Road - Lot X DP 501233, and
- 614 Old Northern Road - Lot Y2 DP 91653.

The gateway determination (IRF No 19/6216) issued by the Department of Planning, Industry and Environment (DPIE) for this Planning Proposal therefore requires consultation with the RFS. The assessment detailed in this Study seeks to outline how the Planning Proposal can adhere to the requirements of *Planning for Bushfire Protection* (PBP) (RFS 2019) and is to accompany a Gateway Review application, following feedback received from DPIE on the earlier Gateway application. This Study updates previous assessments (ELA 2016, ELA 2019, ELA 2021) prepared for earlier Gateway applications.

1.2 Planning Framework

The NSW *EP&A Act* is the principal planning legislation for the state, providing a framework for the overall environmental planning and assessment of development proposals. Various legislation and instruments are integrated with the *EP&A Act*, including the *RF Act*. Section 10.3 of the *EP&A Act* requires the identification of BFPL and development of BFPL maps, which act as a trigger for bushfire assessment provisions for strategic planning and development. When investigating the capability of BFPL in relation to land use changes, consent authorities must have regard to 9.1 (2) Direction 4.3 – ‘Planning for Bushfire Protection’ of the *EP&A Act*. The objectives of Direction 4.3 are:

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

- *To encourage sound management of bushfire prone areas.*

Direction 4.3 instructs the consent authority on the bushfire matters which need to be addressed with respect to master planning. This includes:

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

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

- Division 3.3 (3.29) of the *EP&A Act* relates to the development of State Environmental Planning Policies (SEPPs) and within these policies, bushfire considerations may apply for example:
 - Codes SEPP (Exempt and Complying Development Codes)
 - Clause 3.4 (2) specifies complying development standards that prescribe compliance with PBP.
 - Housing SEPP
 - Clause 57 related to complying development specifies complying development standards that prescribe compliance with PBP and must not be carried out on land that within BAL-40 or flame zone.
 - Clause 96 states *A consent authority must not consent to development under this Part on bush fire prone land unless the consent authority is satisfied the development complies with the requirements of Planning for Bushfire Protection.*
 - Transport and Infrastructure SEPP
 - Clause 2.16 requires consideration to PBP for development on BFPL
- Section 4.14 relates to infill and other development.
 - Requires that all development on BFPL conforms to the specifications and requirements outlined in PBP, i.e., the specific requirements for residential infill in Chapter 7; and
 - The consent authority should be satisfied that the development conforms to PBP, or otherwise consult with the RFS Commissioner.
- Section 4.46 relates to integrated development and triggers Section 100B of the *RF Act* and Clause 45 to 47 of the *Rural Fires Regulation 2022* (RF Reg):
 - Applicable to subdivision, with specific requirements in Chapter 5 of PBP.
 - Applicable to SFPP developments, with specific requirements in Chapter 6 of PBP; and
 - Requires a bushfire safety authority under Section 100b of the *RF Act*.
- Section 3.1 relates to strategic or local planning.
 - Applicable to land use planning that covers large areas and may include a variety of land uses and longer-term development objectives. Specific requirements are outlined in chapter 4 of PBP.

1.2.1 Rural Fires Act 1997 (RF Act)

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

- *Prevention, mitigation and suppression of bush and other fires;*
- *Co-ordination of bushfire fighting and bush fire prevention;*
- *Protection of persons from injury or death, and property from damage, arising from fires;*
- *Protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires; and*

Protection of the environment by requiring certain activities to be carried out having regard to the principles of ecologically sustainable development.

1.3 Aims and Objectives

The aim of this study is to review the rezoning proposal in relation to the strategic planning requirements of PBP. The key objective is to undertake a Strategic Bush Fire Study as per the strategic planning principles, ‘inappropriate development’ exclusion requirements and assessment considerations outlined in PBP.

1.4 Study Area

The subject land is located in north-western Sydney, within the suburb of Dural, approximately 14km north of Parramatta CBD (Figure 1). It is approximately 5km north of Castle Hill and 6.5km west of Hornsby. The study area is dominated by a rural residential landscape, with remnant forest vegetation found in adjoining areas within the O’Hara’s Creek corridor, situated to the west and south of the site. The subject land has been previously cleared of most wooded vegetation and the retained grassland, utilised for rural pursuits.

1.5 Bushfire Prone Land Status

The Subject Land is currently mapped as bushfire prone land on The Hills Shire Council Bush Fire Prone Land (BFPL) map **Figure 3** as published by the Department of Planning and Environment (DPE) on the NSW planning portal (DPE, 2022).

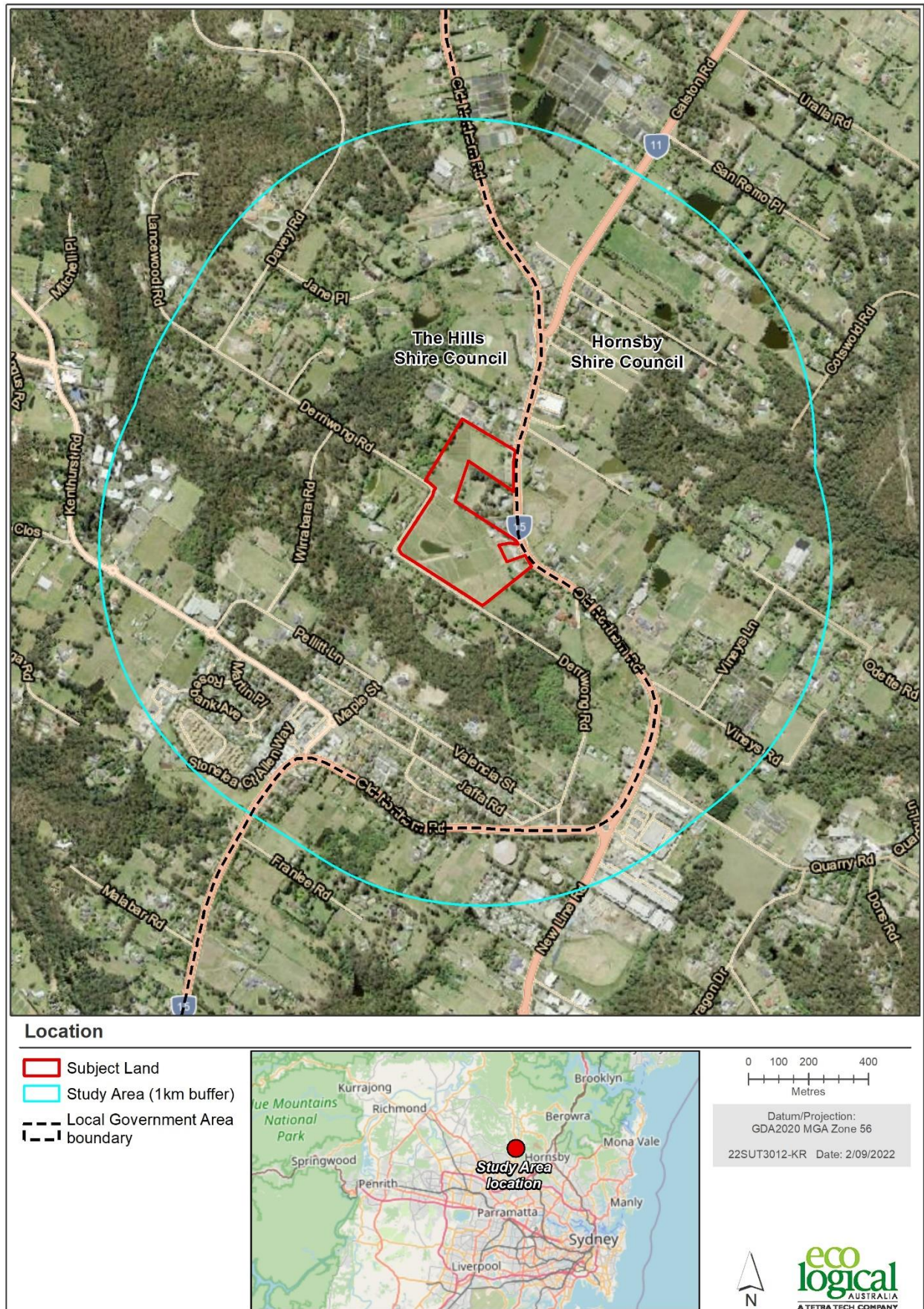


Figure 1: Study Area

LANDSCAPE MASTERPLAN

KEY

- Site boundary
- Proposed trees
- Road
- Pedestrian path
- Turf verge
- Open Space / Access
- Storm water Basin
- Indicative location of playground
- Standard Lot Av. 600–700sqm
- Large Lot Av. 1,000sqm
- Extra Large Lot Av. 2,000sqm



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Landscape Masterplan
Derriwong Road Dural

DRAFT

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Figure 2: Indicative future layout (Place Design Group Pty Ltd 2022)

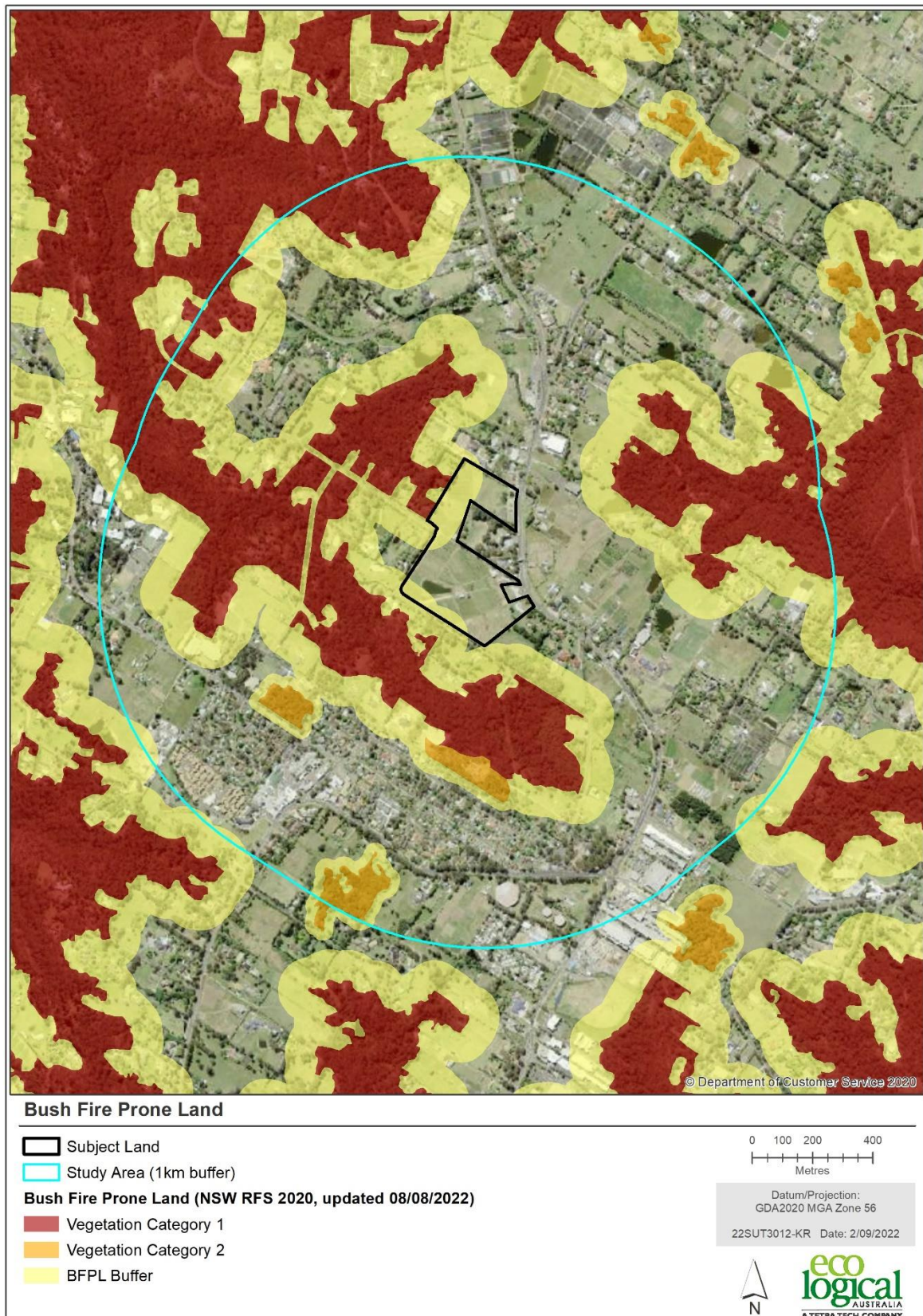


Figure 3: Bush fire prone land

1.6 Assessment Approach

Section 9.1 (2) of the *EP&A Act* triggers consideration of PBP for strategic planning. Chapter 4 of PBP contains strategic planning principles, ‘inappropriate development’ exclusions and assessment considerations required for strategic studies. 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 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 study therefore assesses the proposal 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 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. Bushfire Landscape Risk Assessment

The landscape bushfire risk includes assessment of bushfire hazard, potential fire behaviour and bushfire history within a 1 km radius of the Subject Land, herein called the 'study area'.

2.1 Bushfire Hazard

The subject land falls within the vegetation buffer on the BFPL maps and is located within a wider landscape containing pockets of fragmented bushfire prone vegetation (BFPV) in amongst residential, rural residential and rural land uses. Situated amongst a broader landscape cleared for rural residential land uses, the O'Hara Creek corridor to the northwest and west and south of the subject land is mapped as Vegetation Category 1 and presents a continuous enough matrix of BFPV to potentially allow the spread of bushfire under suitable conditions. To the east and south of the study area, the Tunks Creek and Georges Creek corridors have also been mapped as Vegetation Category 1, however these areas are separated from the subject land by developed lands, lands containing managed vegetation and Old Northern Road.

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

2.1.1 Vegetation

The study area presents within a generally cleared rural residential landscape, combined with vegetated riparian corridors. On review of The Hills Shire and Hornsby Shire vegetation maps, these corridors are generally mapped as Sandstone Gully Forest to the west and Blackbutt Gully Forest to the east (Figure 4). Smaller areas of Shale Sandstone Transition Forest (shale) and Sydney Turpentine Ironbark Forest are mapped in the north-west sector of the study area. Based on The Hills Shire and Hornsby Shire vegetation maps, the relationship between vegetation community, class and formation within the study area is summarised in Table 2.

Table 2: Vegetation formation and class and fuel allocation for the study area

Vegetation Formation	Keith Class	Vegetation Community
Forest	North Coast Wet Sclerophyll Forests	Blackbutt Gully Forest; Blue Gum High Forest, Blue Gum Shale Forest;
	Northern Hinterland Wet Sclerophyll Forests	Duffys Forest; Turpentine-Ironbark Forest
	Cumberland Dry Sclerophyll Forests	Shale Sandstone Transition Forest (Shale)*
	Sydney Coastal Dry Sclerophyll Forests	Sandstone Gully Forest; Sandstone Ridgetop Woodland

*TRANSITIONS FROM FOREST TO WOODLAND

The vegetation hazard influencing the subject land is highly modified and following desktop review, rapid site inspections were undertaken to examine both vegetation structure and management in order to refine mapping and establish a bushfire vegetation hazard dataset for the bushfire hazard assessment in **Section 3.2** of this report. Site inspections were undertaken in May 2020 by ELA Principal Bushfire Consultant Nathan Kearnes, with a follow up inspection August 2022 by ELA Consultant Scott Chrystal.

The updated vegetation hazard is mapped in Figure 5 (see **Appendix C** for assessment photos) and contains the following considerations:

- Assessment 1 and 2 – landscaped overstorey vegetation with occasional remnant native vegetation, limited to no mid-storey – classified as woodland
- Assessment 3 and 4 - remnant native vegetation, small patches amongst houses, with cleared understorey and minimal mid-storey; classified as woodland
- Assessment 5 – Managed land; mown understorey and well separated canopy
- Assessment 6 – Conservatively assessed as forest vegetation with closed canopy

2.1.2 Topography and Slope

Figure 6 shows that elevation within the broader Study Area is generally lower within the vegetated corridors, corresponding to the presence of drainage features, most predominant in the north-western and eastern portions of the study area. Elevation within the Subject Land is higher and generally falling to the west.

Slope has been identified from a Digital Elevation Model (DEM) generated from 2 m contours.

The Study area is generally gently sloped, with steeper areas occurring in the eastern portion of the study area and to a lesser extent, the west. Within the subject land and immediate surrounds, the slope is gentler and less variable.

2.1.3 Bushfire Weather

The climate in The Hills Bush Fire Management Committee Area is typically described as having warm summers and cooler winters (BFMC 2019). Rainfall is greatest during summer and autumn, with winter and spring generally drier. Adverse bushfire weather conditions in The Hills District are generally related to hot north-westerly winds that occur during the fire season. The fire season is declared annually by the RFS and for the Study Area is generally declared from late Spring (1st October) to Autumn (31st March), however is varied in some years.

PBP (RFS 2019) identifies that the Forest Fire Danger Index (FDI) that applies to the subject land is FDI 100.

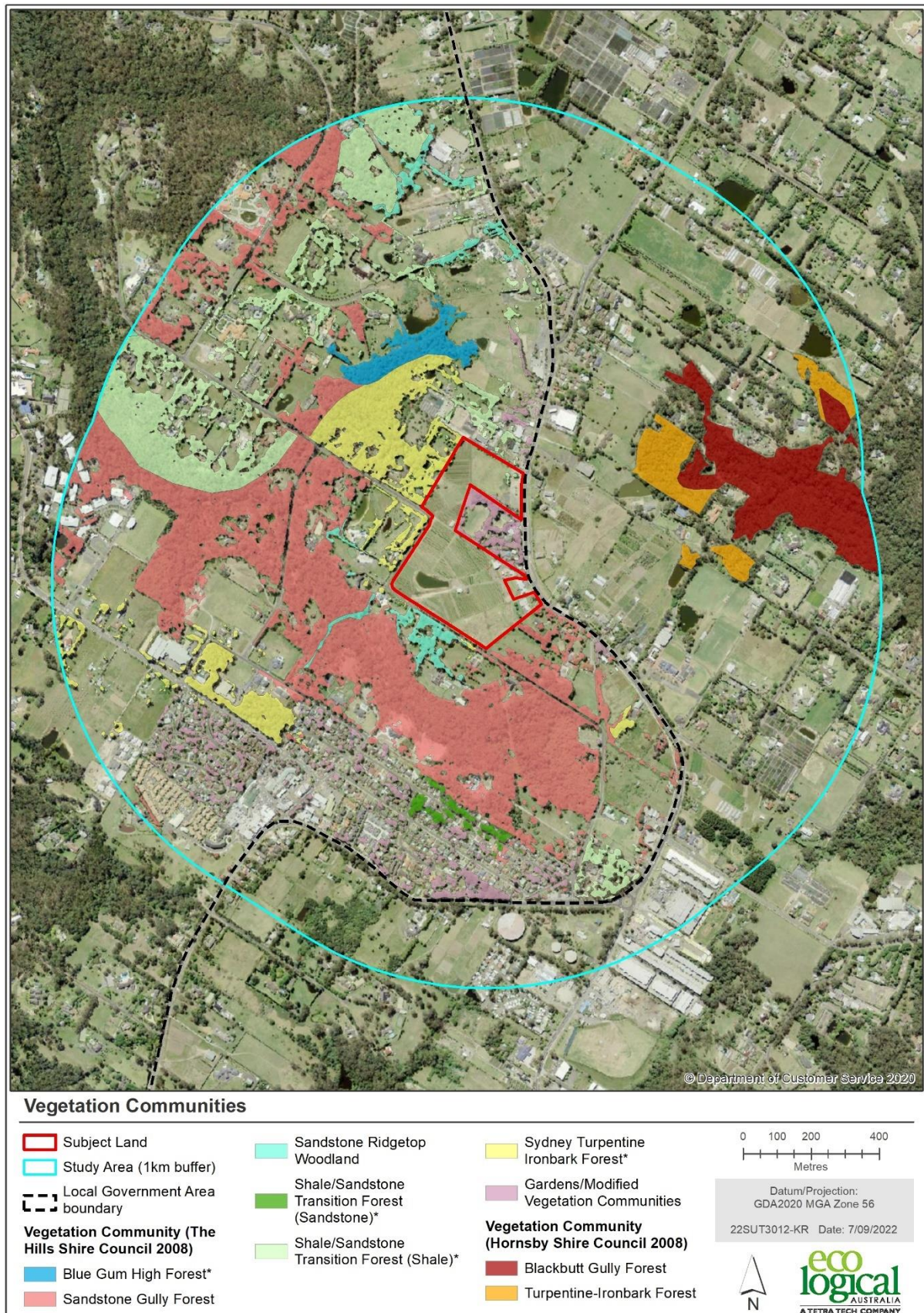


Figure 4: Mapped Vegetation Communities (Hornsby / The Hills Shire)

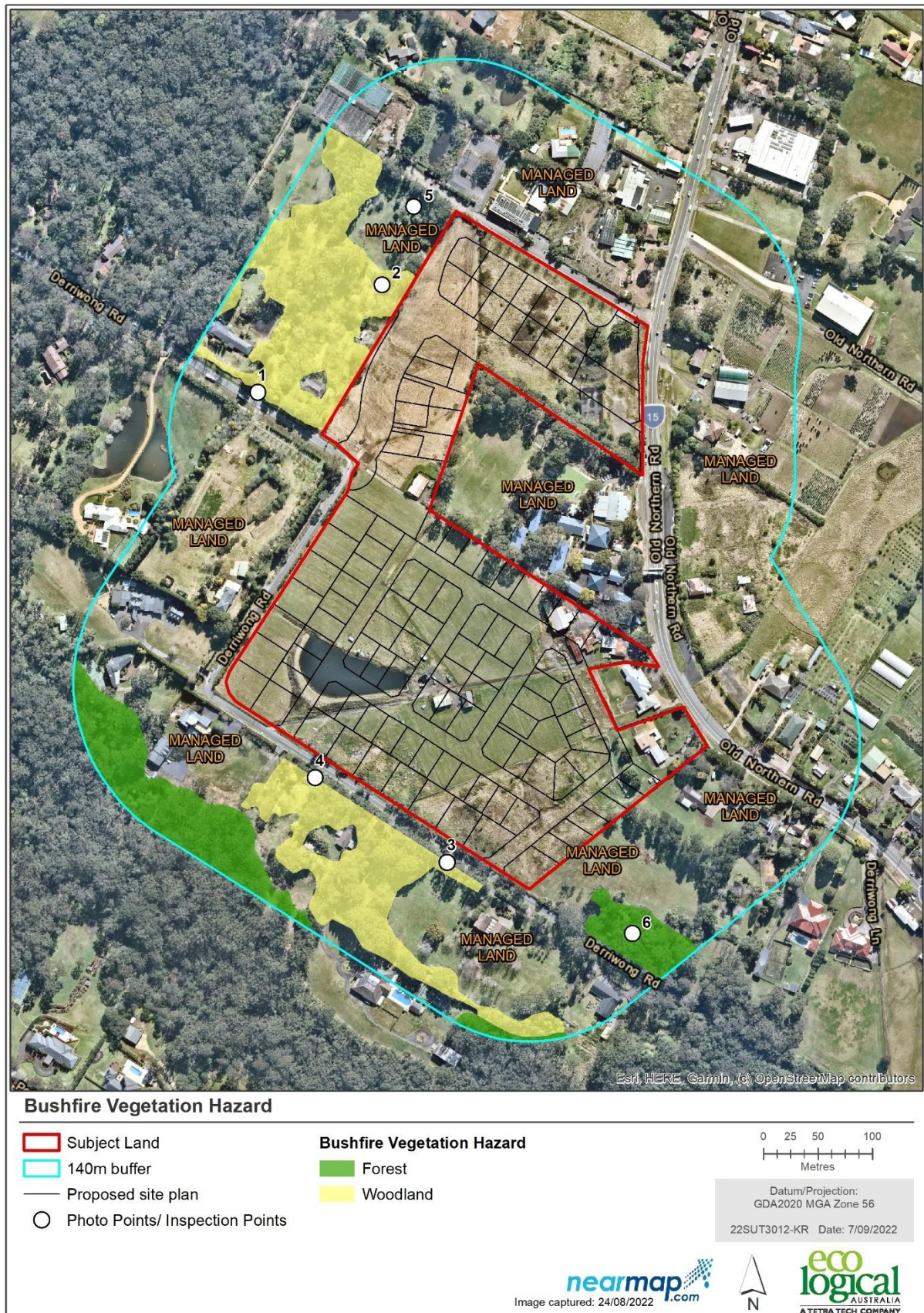


Figure 5: Bushfire Vegetation Hazard, with assessment points

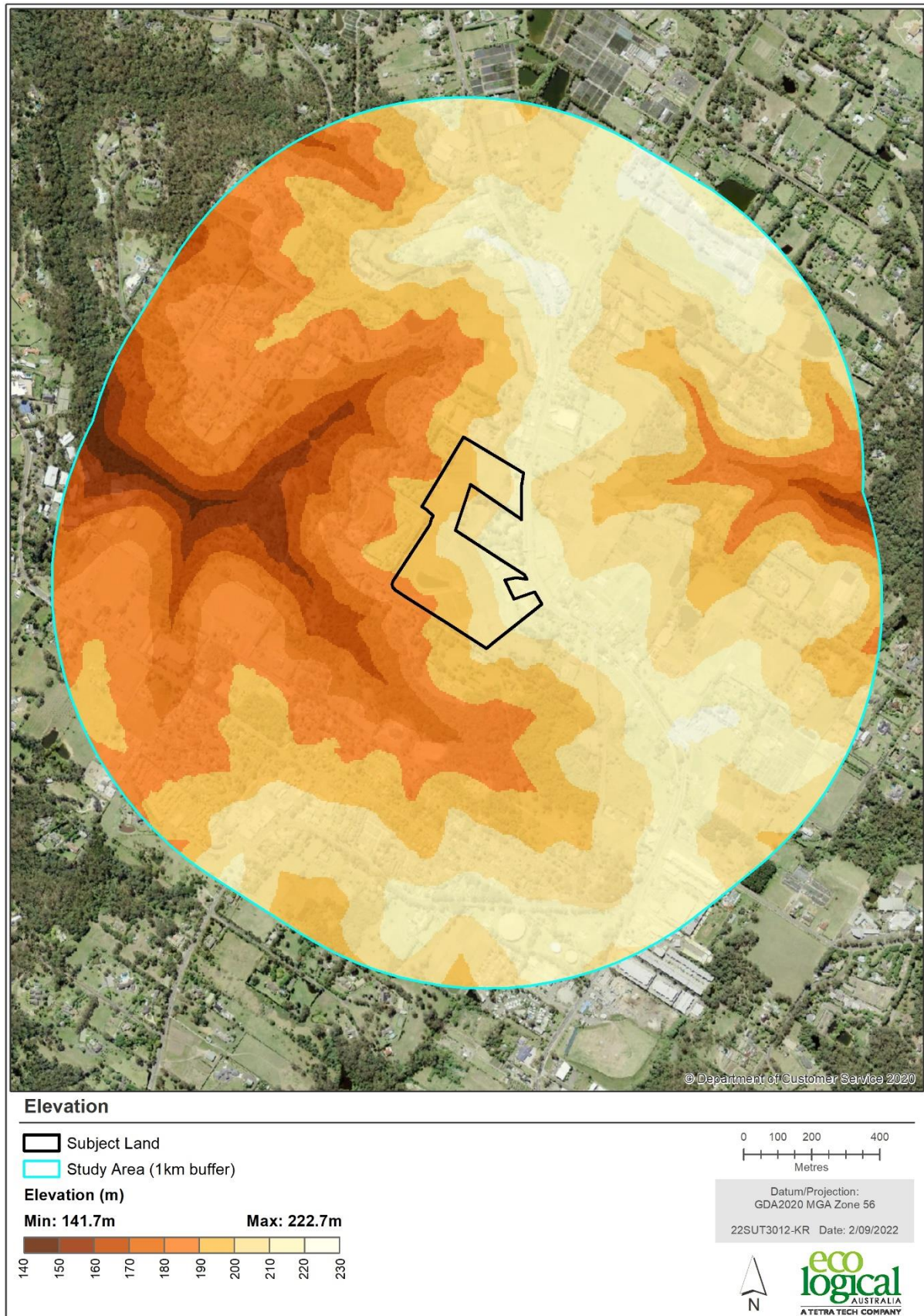


Figure 6: Elevation within the study area

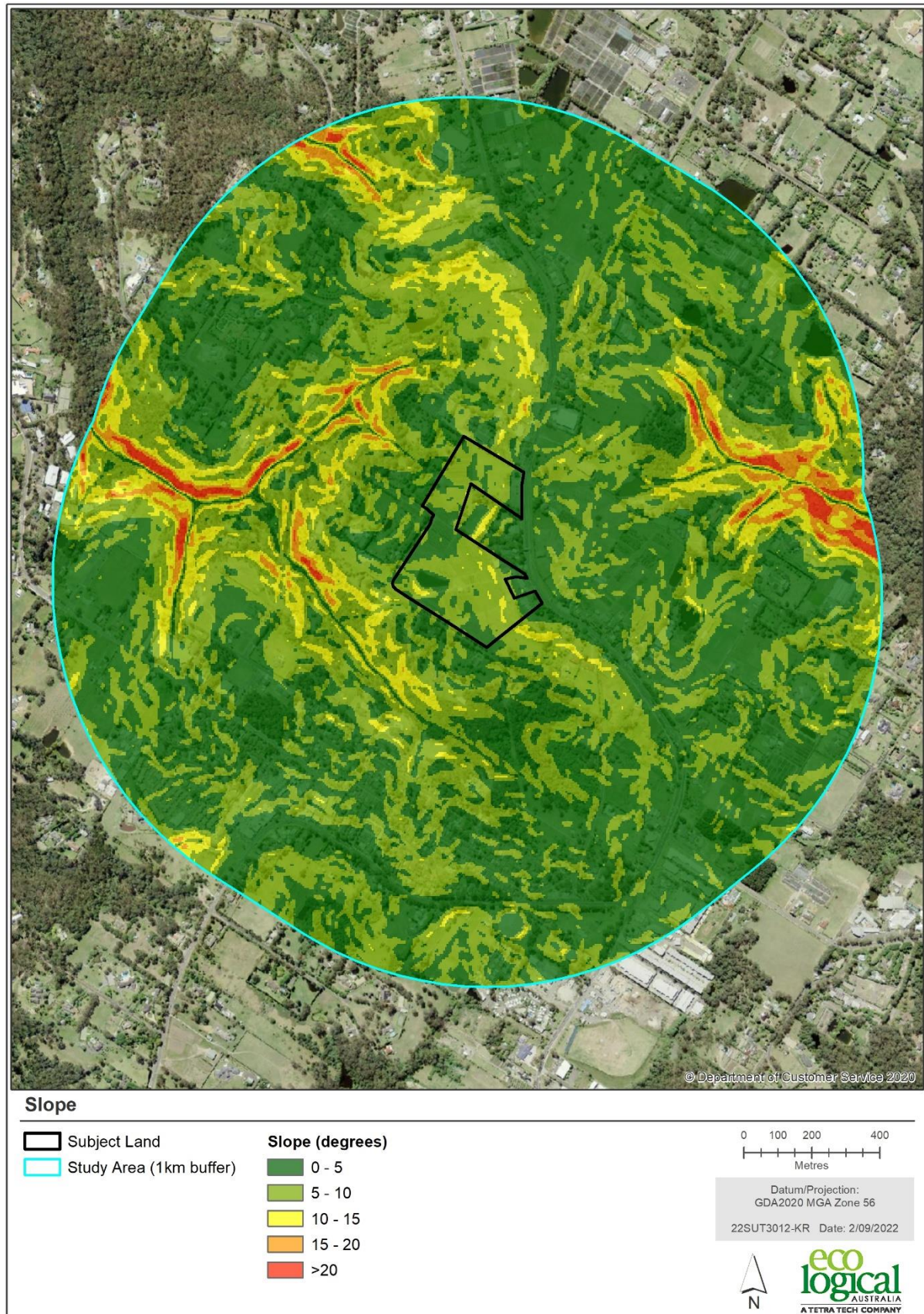


Figure 7: Slope within the 1 km study area

2.2 Potential Fire Behaviour

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

- Burning under the influence of north-westerly winds, particularly during warmer summer months;
- Moving upslope in the steeper, vegetated areas to the north west, west and east.

If fires were to occur under a Fire Danger Rating (FDR) of Extreme or above, within the steeper forested areas to the east and north-west, such fires may have the potential to spread quickly through vegetated patches. However, if a fire was to approach the subject land, it is likely to become slower moving and much less intense, due to flatter land and a mosaic of land uses and management practices that has significantly reduced the available fuel in the areas immediately adjoining the subject land.

In a regional perspective, there is limited connectivity of the vegetation within the Study Area to BFPV further afield within the region (e.g. within 5 km). This is due to the dominance of existing residential and rural residential land uses, with remaining BFPV mostly being located within riparian corridors. Further, there is disconnection of many of these areas of BFPV to the Study Area and there are no nearby areas of extensive BFPV. Therefore, the potential fire attack relevant to the site is most likely from local bushfire ignitions rather than large landscape fires that would pose elevated risk.

2.3 Bushfire History

The Hills Bush Fire Risk Management Plan (BFRMP) (BFMC 2019) identifies that the main sources of ignition in The Hills BFMC area are:

- Escaped private hazard reduction burns;
- Arson; and
- Lightning

According to the BFRMP, there are on average 153 bush fires per year within The Hills District, however only a low number of these (average of 4) become major fires.

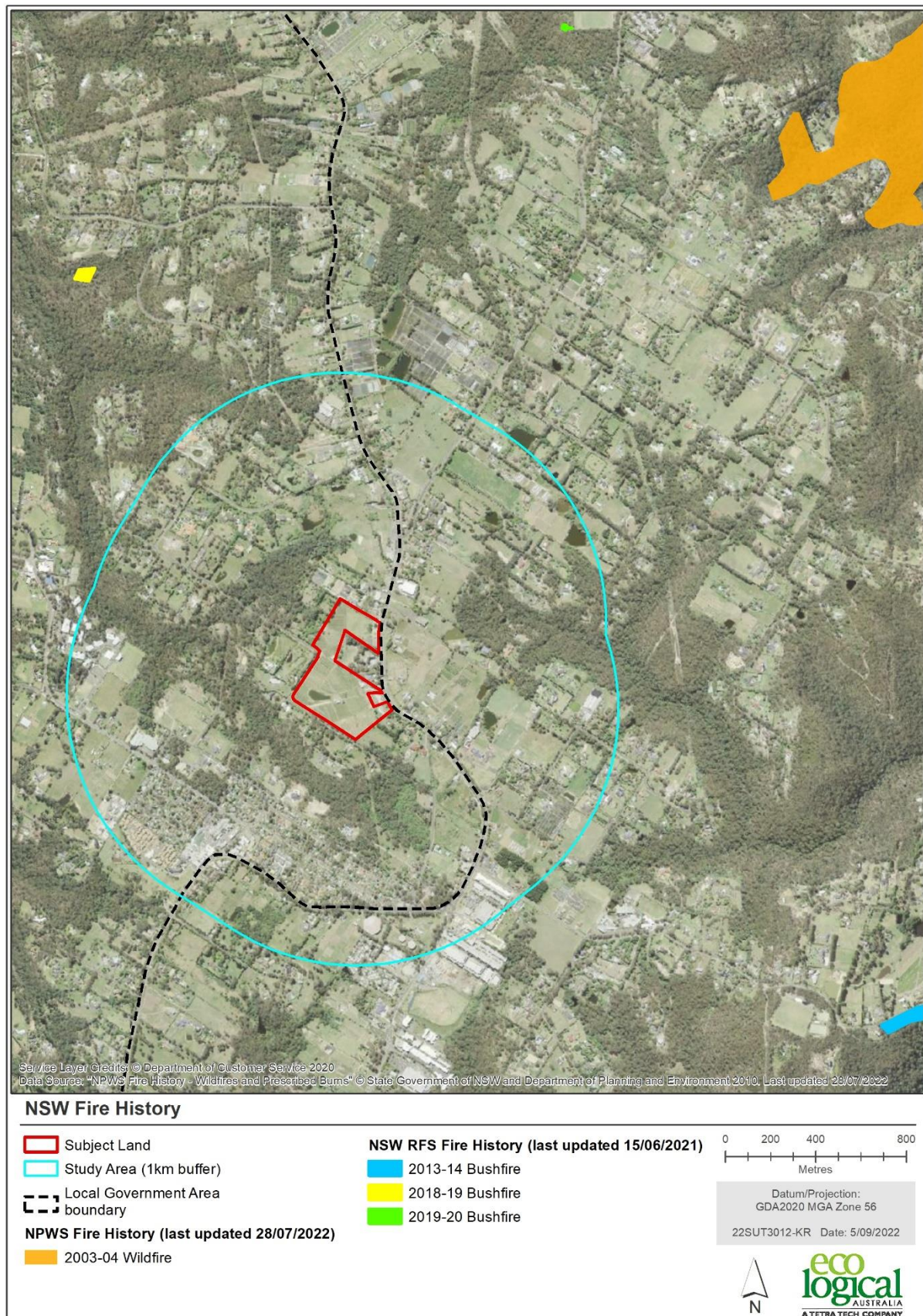


Figure 8 shows the fire history for the study area over the last 40 years for both prescribed burns and unplanned fire (wildfire) from the NPWS fire history mapping data set. As shown, only one wildfire (2003-2004) has occurred within proximity to the broader study area and subject land during this period. The Study Area is not known to have an extensive history of bushfire.

2.4 Summary of Landscape Bushfire Risk Assessment

The landscape bushfire risk analysis indicates the potential for bushfire attack of the subject land given the presence of BFPV in adjoining areas. The likelihood of this potential bushfire attack is however decreased by the limited connectivity to BFPV in the region and the limited fuel connectivity from adjoining areas to many areas of the subject land.

Analysis indicates a limited mapped fire history within the surrounding area, with restricted potential to develop into major fires. Additionally, there are advantages to fire mitigation in the landscape that can be achieved by the provision of appropriate bushfire protection measures within the subject land. In particular, the subject land can facilitate APZ's without extensive vegetation clearing and design mechanisms including perimeter roads and a connected road network.

The landscape risk analysis indicates a risk level where it is feasible to design and build resilience into the community that matches or exceeds the bushfire protection requirements established by PBP.

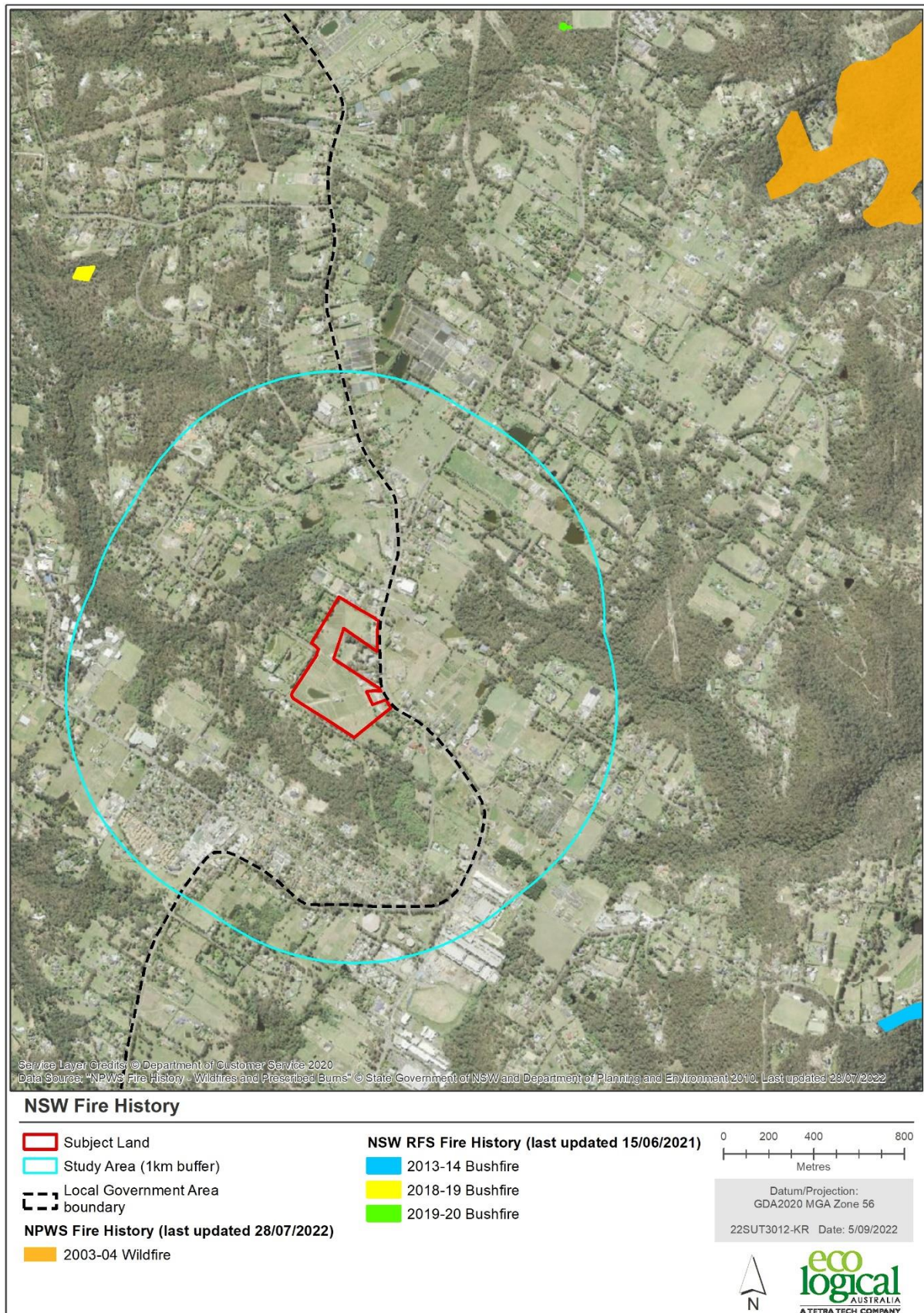


Figure 8: NPWS Fire History within the Study Area

3. Land Use Assessment

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

3.1 Risk Profile

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

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

The feasibility of the study area 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.

3.2 Land Use Evaluation

Future development on BFPL will need to satisfy the performance criteria identified in PBP for various land uses. For strategic planning, it is expected that future land uses enabled by the proposal can accommodate the acceptable solutions identified in PBP to minimise reliance on performance solutions at the DA stage. A summary of these requirements is outlined below and evaluated for the master plan in Table 4.

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. This will include the requirements for residential subdivision as set out in Chapter 5 of PBP.

3.2.1 Chapter 5 of PBP - Residential Subdivision

Future residential land uses will be subject to the requirements outlined in Chapter 5 of PBP. Following planning approval, future development will need to demonstrate the suitability of the proposed subdivision. The following provisions will need to be considered:

- Provision of compliant APZs;
- Access and egress within the developable land and along the adjoining public road system shall include safety provisions for attending emergency service vehicles and evacuating residents;

- Future subdivision design shall include perimeter roads separating developable lots from hazardous bushland areas;
- Access is to be ensured for maintenance of APZ and other fire mitigation activities;
- Firefighting water supply; and
- Provision of access and infrastructure requirements according to Table 5.3b of PBP.

3.3 Feasibility of Asset Protection Zones

The feasibility of the Planning Proposal to comply with the BPM identified within PBP is a fundamental consideration of the study. Whilst BPM and their performance criteria are a benchmark for approval of a development, a strategic level study needs also to evaluate these measures within the landscape risk context. This Study has therefore considered the following:

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

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

Based on the landscape assessment of vegetation and slope, an assessment of the feasibility of APZs compliant with the Acceptable Solutions in PBP has occurred. The APZ dimensions listed in Table 3 are the minimum requirements under the PBP Acceptable Solutions for residential development (i.e. to meet a maximum Radiant Heat Flux (RHF) or 29 kW/m^2). Figure 9 shows that the PBP required APZ can be achieved within the subject land.

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

- Vegetation formation in the assessment is derived from The Hills Shire Council and Hornsby Shire Council vegetation maps and amended via desktop assessment from NearMap imagery captured 27/5/2020 and site assessment by ELA in May 2020 / August 2022 (see **Appendix C**), as discussed above.
- All APZ can be contained within the development site, or provided by the road network;
- 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/m^2 . Best practice is that all residential subdivisions meet this standard. No assessment for Special Fire Protection Purposes (SFPP) has been undertaken.
- The addition or rehabilitation of any vegetation within the site (such as for unmanaged public open space) will influence APZ requirements, if proposed. 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 3: Indicative APZs

Transect	Slope ¹	Vegetation Formation ²	PBP required residential APZ (m) ³
1	Downslope >0 to 5 degrees	Woodland	16 m
2	Downslope >0 to 5 degrees	Woodland	16 m
3	Downslope >0 to 5 degrees	Forest	29 m

¹ Slope most significantly influencing the fire behaviour of the site having regard to vegetation found as per PBP.

² Predominant vegetation is identified, according to PBP.

³ Assessment according to Table A1.12.2/A1.12.5 of PBP 2019.

3.4 Summary of Land Use Evaluation

The location and type of land uses included in the proposal are 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 strategic planning principles, and the ability for bushfire protection measures to be provided. Table 45 below provides a summary of the land use evaluation for differing development types.

Table 4: 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 	Analysis indicates differing residential typologies can comply with PBP.
Staging	Bushfire Protection Measures should be adequately provided at all stages of development, if development is to be staged.	If subdivision is to be staged, suitable temporary BPM's to be accommodated within the subject land.

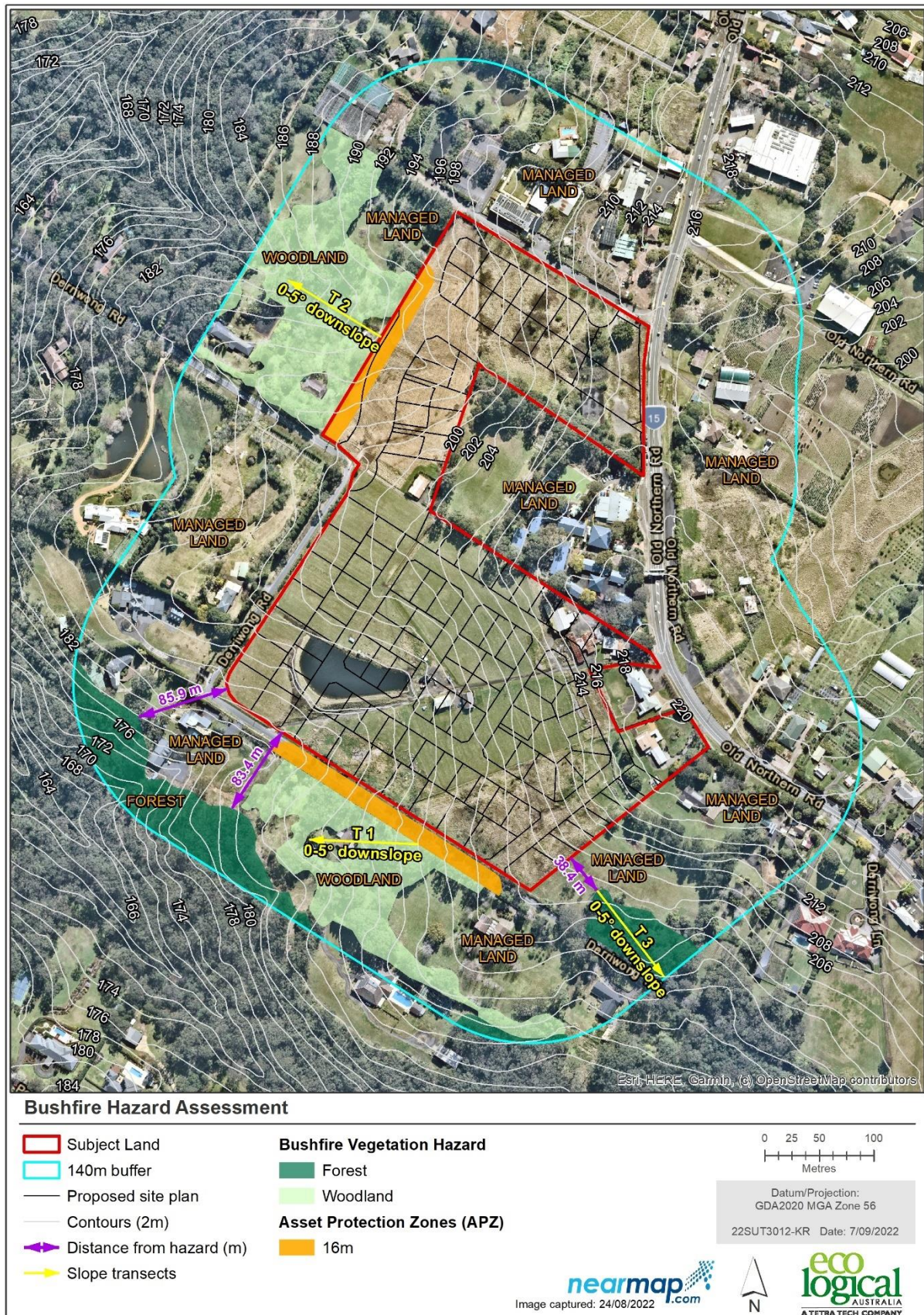


Figure 9: Bushfire Hazard Assessment

4. Access, Egress and Evacuation

Future development applications will need to address access requirements in more detail as per PBP 2019 (see Table 5, Appendix A) and achieve:

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

Strategic planning, Chapter 4 of PBP requires the following assessment considerations:

- capacity of the proposed road network to deal with 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;
- the potential for development to be isolated in the event of a bushfire.

As per the traffic analysis undertaken by AECOM, the masterplan area will feature three access points onto the Old Northern Road and four access points onto Derriwong Road (AECOM, 2020).

Various road upgrades and improvements have also been proposed including:

- New drop-off zone for Dural Public School to ease congestion,
- Dedicated land to HSC for a future Regional Road (Annangrove Rd Bypass), facilitating a future link from Annangrove Road to Old Northern Road, assisting with the road capacity in the area.
- Construction of an intersection at the eastern boundary of the site on the Old Northern Road, near Dural Public School, enabling safer traffic movement.

As indicated in the traffic analysis, proposed upgrades to the road network and increased vehicle capacity will result in only a small net increase in traffic movements and therefore it is anticipated that access and egress for residents and emergency services will be satisfactory.

Perimeter roads are provided adjacent to all hazards, as per the proposed layout plan (Figure 2) and evident in Figure 9, with Derriwong Road providing existing perimeter access.

4.1 Evacuation

While the risk of a significant bushfire necessitating the need for evacuation of the Subject Land in its entirety is low, it is nevertheless important that strategic planning affords the provision of multiple options for evacuation. The planned development of residential communities provides an opportunity to increase community resilience to bushfire, planned urban development should ensure provision for:

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

Initial assessment of emergency evacuation has occurred and includes the following:

- An analysis of the most relevant bushfire attack scenarios (i.e. fire from the north west);
- Identification of evacuation and refuge locations (see figure 10 below)
- An evaluation of evacuation adequacy and option for the shortcomings identified.

4.1.1 Early Offsite Evacuation

Evacuation is a necessary component of bushfire planning for the protection of life. Strategic planning should include adequate provision to support offsite evacuation. Key considerations for offsite evacuation are:

- Early offsite evacuation is critical, with late evacuation considered unsafe
- Evacuation should occur away from (or across) the path of a fire, but not towards it
- Roads that could be cut by fire during the evacuation period are not suitable
- The road must be suitable to use in an emergency situation
- Intervention by emergency services should not be relied on for road control or other activities.

There are three existing Neighbourhood Safer Places (NSP) in close proximity to the subject land, which are situated in three different directions from the subject land:

- Dural Country Club (Building), 2.5 km north, located at 662A Old Northern Road Dural.
- Dural Salvation Army (Open Space), 2 km south, located at 227 New Line Road (access via Old Northern Road) Dural
- Dural Mall (Open Space), 2 km west, located at Kenthurst Road Dural

4.1.2 Onsite refuge capacity

While much of the Subject Land area is situated outside of the 10 kW/m² setback (Figure 10), as modelled following the requirements set out in the RFS NSP guidelines (NSW RFS, 2017), Dural Public School which borders the site on three boundaries, effectively provides an on-site refuge opportunity. As shown in Figure 10, the school site is suitable to provide an open space NSP option, with suitable areas situated outside of the 2 kW/m² setback, as modelled according to the NSP guidelines.

4.1.3 Low risk development outcomes

In combination with the proposed capacity for early off-site evacuation the risk level of the proposed development outcomes, is considered acceptable with much of the proposed area outside of the 100 m statutory distance that bushfire protection measures are applied to development within PBP and AS 3959 (i.e. bushfire prone property). This 100 m zone can also be considered as the area of future development that will be the most exposed to any bushfire attack and therefore where there is the greatest need for response by occupants, i.e. consideration of evacuation or refuge.

4.2 Emergency Services

The following is recommended for strategic land use planning to achieve the objectives and strategic planning principles of PBP 2019 relating to emergency management. Strategic emergency management planning is undertaken in collaboration with emergency service organisations within the strategic land use planning process, to establish preferred future outcomes (i.e. emergency evacuation) that have implications for land use planning, including:

- a. Emergency evacuation planning; and
- b. Evacuation adequacy assessment.

There are several RFS brigades within close proximity, which include:

- Dural Brigade (3 km east);
- Glenhaven Brigade (4 km south-west);
- Kenthurst Brigade (6 km north-west via Kenthurst Road)
- Galston Brigade (7 km north via Galton Rd)
- Middle Dural Brigade (7 km north via Old Northern Rd)
- The Hills District Control Centre - Operational Support (3k km west)

Additional NSW Fire and Rescue resources stationed at Castle Hill would also attend any emergency and is located approximately 6.5 km south. The proximity of emergency services to the Subject Land are considered adequate, provided emergency management and planning fosters a 'leave early' approach.

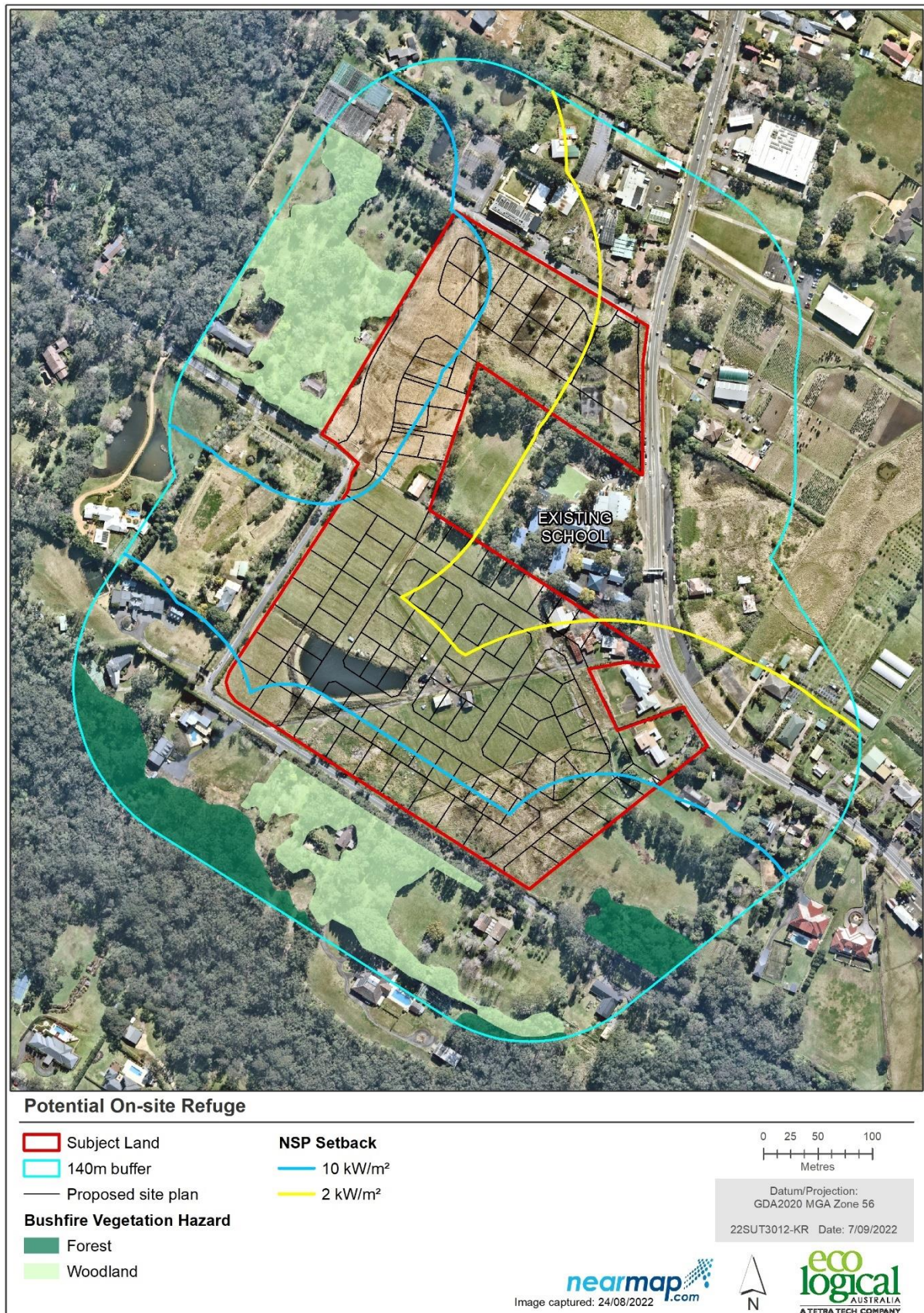


Figure 10: Potential On-site refuge opportunities

5. Infrastructure and Adjoining Land

Strategic planning requirements seek to identify any potential issues associated with infrastructure and 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 are explored below and summarised in Appendix C. Table 5.3 and Table 6.8 of PBP detail the acceptable solution requirements.

5.1 Water

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

Further detail regarding water supply requirements is detailed in PBP and acceptable solution requirements for water supply are expected to be achievable for future development within the subject land.

5.2 Electricity and gas

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

- Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and
- No part of a tree is closer to a line than the distance set out in accordance with the specifications in ISSC3 ‘Guide for the Management of Vegetation in the Vicinity of Electricity Assets’ (ISSC3 2016).

Reticulated or bottled gas is to be installed and maintained in accordance with Australian Standard AS/NZS 1596:2014 ‘The storage and handling of LP Gas’ (SA 2014) and the requirements of relevant authorities (metal piping must be used).

Further detail regarding electricity and gas requirements detailed in PBP. The acceptable solution requirements for these services are expected to be achievable for the future development within the study area contemplated by the Master Plan Application.

5.3 Adjoining Land

Future development contemplated by the Master Plan Application should not compromise any offsite bushfire management works. Given the adherence to PBP that is required, any future development

should also not require a change to the bushfire management practices for retained and/or adjoining bushfire prone vegetation. Additionally, there is capacity for all APZ's to be wholly within the Subject Land or provided by public roads. Therefore, there are no concerns regarding the impact of the proposal on adjoining land.

6. Conclusion

This strategic bushfire study has assessed the bushfire risk to the Planning Proposal, the appropriateness of the proposed land uses and the ability for appropriate bushfire protection measures to be provided.

The planning proposal was assessed against the bushfire strategic planning requirements of *Planning for Bushfire Protection* (PBP). In undertaking this assessment, a Strategic Bushfire Study was prepared to comply with the requirements set out in Chapter 4 (*Strategic Planning*) of PBP. The Strategic Bushfire Study examined whether the precinct is appropriate given its bushfire risk exposure context or whether it represents ‘inappropriate development’ as described by PBP.

The technical assessment compiled for this study considered the broader bushfire landscape and risk profile for the precinct, along with the feasibility for the provision of bushfire protection measures within the indicative staging plan. 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.

A key outcome of this study is the identification that the Subject Land is not exposed to a significantly high bushfire risk. This has been determined on the basis that the risk posed by the bushfire hazard on lands adjoining the precinct is moderated by existing land management, along with the fragmented nature of the hazard, impeding the potential for large landscape fires to the subject land. In addition, the mapped fire history, along with bushfire weather analysis demonstrates a reduced risk from the south and east. Therefore, the hazard influencing the site does not demonstrate an increased risk at a level that cannot be responded to by the provision of bushfire protection measures.

A key finding of this study which supports the capacity for urban development, is the ability for future development to afford bushfire protection measures that meet the requirements of PBP. This includes the provision of perimeter roads and asset protection zones. Additionally, low risk development outcomes are achievable on site, with a large proportion of the subject land situated outside of ‘bush fire prone land’ and being located greater than 100 m from the hazard, thus outside the areas where bushfire protection measures are formally prescribed by PBP. This further indicates the lower risk context of the site.

As the site is not considered to have a significantly high bushfire risk context, it is not expected that large scale evacuation would be required. However, there is opportunity for added bushfire resilience with suitability for open space refuge within the adjacent public school. This capacity allows for differing evacuation and refuge options to be provided to the community, which research into past bushfire incidents indicates is important, and specifically supports community resilience under rapid onset bushfire attack, where evacuation may be unable to be undertaken or unsafe.

The findings of this study in relation to the strategic planning principles of PBP indicate that rezoning within the precinct:

- Does not trigger the “inappropriate development” exclusion requirements of PBP;

- That the Acceptable Solution bushfire protection measures within PBP can be met by the future development contemplated and that there is opportunity for protection measures beyond the minimum compliance under PBP;
- Compliance with PBP is not reliant on the intervention/response by emergency services or hazard management on adjoining land;
- The rezoning proposal will not adversely impact the bushfire safety of occupants of nearby existing development and wherever possible, will actually lower the risk.

It is concluded that the Planning 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 – 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 5: 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 – 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 6: Performance criteria for services provision for residential and rural residential subdivisions

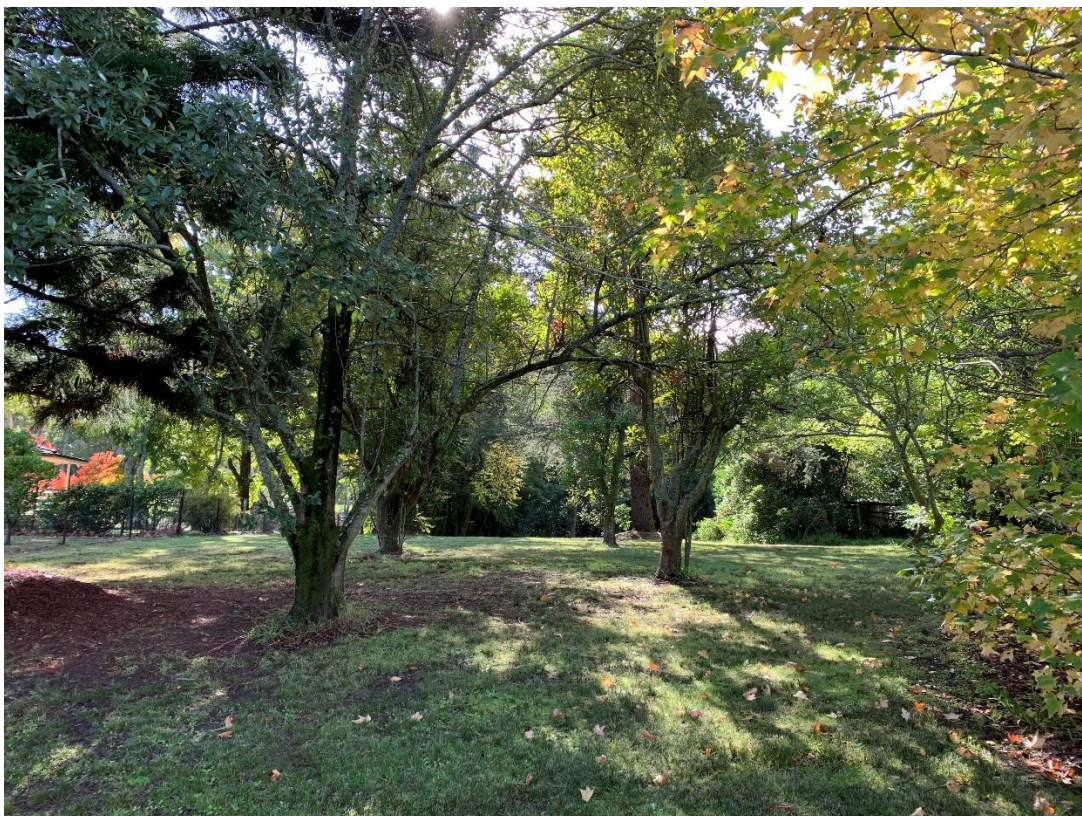
Performance Criteria	Acceptable Solutions
The intent may be achieved where:	
a water supply is provided for firefighting purposes	reticulated water is to be provided to the development, where available; a static water supply is provided where no reticulated water is available.
water supplies are located 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 7: 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

Appendix C – Hazard Assessment Photo Points

ASSESSMENT POINT 1



ASSESSMENT POINT 2



ASSESSMENT POINT 3



ASSESSMENT POINT 4



