



Derriwong & Old Northern Road Dural
Bushfire Strategic Study

Dural Development Management Services Pty Ltd

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Project Manager	Deanne Hickey
Prepared by	Nathan Kearnes / Deanne Hickey
Reviewed by	Nathan Kearnes
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Template 2.8.1

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1. Introduction

1.1 Background

This Strategic Bushfire Study (the Study) has been prepared to inform and assist with the consideration of a Planning Proposal for lands situated within The Hills Shire Council (HSC) Local Government Area (LGA). The objectives of the Planning Proposal are to amend The Hills Local Environmental Plan (LEP) 2019 as it applies to land located adjoining Old Northern Road and Derriwong Road, Dural. Primarily, the intention is to rezone the sites from RU6 Transition to R2 Low Density Residential. Accompanied with the rezoning would be a reduction in the maximum height of building from 10 metres to 9 metres; a reduction in the minimum lot size from 2 hectares to 700m²; and the introduction of a local provision enabling a minimum lot size of 600m² on the northern site.

The site is comprised of two masterplan areas, northern and southern (Figure 1 to 3). The northern masterplan area (Figure 2) includes:

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

The southern masterplan area (Figure 3) includes:

- 606 Old Northern Road - Lot 1 DP 73652;
- 602 Old Northern Road - Lot 1 DP 656036;
- 600A Old Northern Road (also known as 11 Derriwong Road) - Lot 101 DP 713628;
- 600 Old Northern Road - Lot 100 DP 713628;
- 7 Derriwong Road - Lot 12 DP 866560;
- 590 Old Northern Road - Lot D DP 38097, Lot D DP 39261;
- 5 Derriwong Road (also known as 586 Old Northern Road) - Lot 11 DP 866560; and
- 584 Old Northern Road - Lot 1 DP 660184.

The subject land is mapped as vegetation buffer on the bush fire prone land (BFPL) maps (Figure 4) and therefore under the Ministerial Direction 4.4 (Planning for Bushfire Protection) issued under Section 9.1 of the *Environmental Planning and Assessment Act 1979*, where a Planning Proposal includes or is in close proximity to BFPL, the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service (RFS) following receipt of a gateway determination. 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 an earlier report (ELA 2016) prepared for the original Gateway application and addresses the current requirements established by PBP (RFS 2019) for Strategic Planning studies.

1.2 Planning Framework

The NSW *Environmental Planning and Assessment Act 1979* (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 *Rural Fires Act 1997* (RF Act).

1.2.1 Direction 4.4 – ‘Planning for Bush Fire Protection’

When investigating the capability of bushfire prone land to be rezoned for residential purposes, councils must have regard to s.9.1 (2) Direction 4.4 – ‘Planning for Bushfire Protection’ of the EP&A Act. The objectives of Direction 4.4 are:

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

Direction 4.4 instructs councils on the bushfire matters which need to be addressed when drafting LEPs. This includes:

- Consultation with the Commissioner of the NSW RFS, and take into account any comments so made;
- Draft LEPs shall have regard to PBP; and
- Compliance with numerous bushfire protection provisions where development is proposed.

After the rezoning stage, future subdivision and the construction of buildings will also require assessment against PBP. These assessments are based on the final development applications for these proposals.

1.2.2 Planning for Bushfire Protection

PBP (RFS, 2019) 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 provide an opportunity to assess the suitability of future land uses within the broader bushfire hazard setting, to ensure that future land uses can meet the objectives of PBP. As such, this Study seeks to address the requirements for a strategic bushfire study, as listed in Table 4.2.1 of PBP, and summarised in Table 1 below.

Table 1 – Summary of requirements for a strategic bush fire study (RFS 2019).

Issue	Detail
Bush fire landscape assessment	A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.
Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan 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 masterplan area and site layout.
Emergency services	An assessment of the future impact of the new development on emergency services provision.
Infrastructure	An assessment of the issues associated with infrastructure provision.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.

1.2.3 Rural Fires Act 1997 (RF Act)

The objects of RF Act are to provide:

“(a) for the prevention, mitigation and suppression of bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts, and
 (b) for the co-ordination of bush fire fighting and bush fire prevention throughout the State, and
 (c) for the protection of persons from injury or death, and property from damage, arising from fires, and
 (c1) for the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires, and
 (d) for the protection of the environment by requiring certain activities referred to in paragraphs (a)-(c1) to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the *Protection of the Environment Administration Act 1991*.”

Key requirements of the RF Act in relation to this project include:

- All landowners to exercise a duty of care to prevent bush fire from spreading on or from their land under section 63 of the RF Act. This involves taking steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of a bush fire on or from any land vested in or under its control or management. This relates to the appropriate provision and maintenance of Asset Protection Zones (APZs), landscaping and any retained vegetation when developing land (RFS 2006; RFS 2019); and
- Under Section 64 obligations, if a fire is burning at any time during a bush fire danger period, the occupier immediately on becoming aware of the fire must take all possible steps to extinguish the fire, and if unable without assistance to extinguish the fire, inform the appropriate officer (RFS, Fire and Rescue NSW) of the existence and locality of the fire if it is practicable to do so without leaving the fire unattended.

1.3 Aims and Objectives

The Study provides an assessment of the landscape bushfire risk and the residual risk for the development proposed by the Planning Proposal following the provision of bushfire protection measures. It includes the following strategic assessment considerations in PBP (RFS 2019):

- Ensuring land is suitable for development in the context of bush fire risk;
- Ensuring future development on BFPL can comply with PBP 2019;
- Minimising reliance on performance-based solutions;
- Providing infrastructure associated with emergency evacuation and firefighting operations; and
- Facilitating appropriate ongoing land management practices.

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 north west 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

BFPL is certified by the RFS in accordance with legislative requirements and published by the Department of Planning. Categories of mapped BFPL affecting the study area and adjoining areas, are shown in Figure 4. The presence of mapped BFPL on the subject site, including the vegetation buffer, requires that any new development must satisfy the aim and objectives of PBP (RFS 2019). On formally mapped BFPL, an assessment is required to consider the vegetation hazard and effective slope within the site and adjoining areas, in order to determine the required site specific bush fire protection measures in relation to any proposed development.

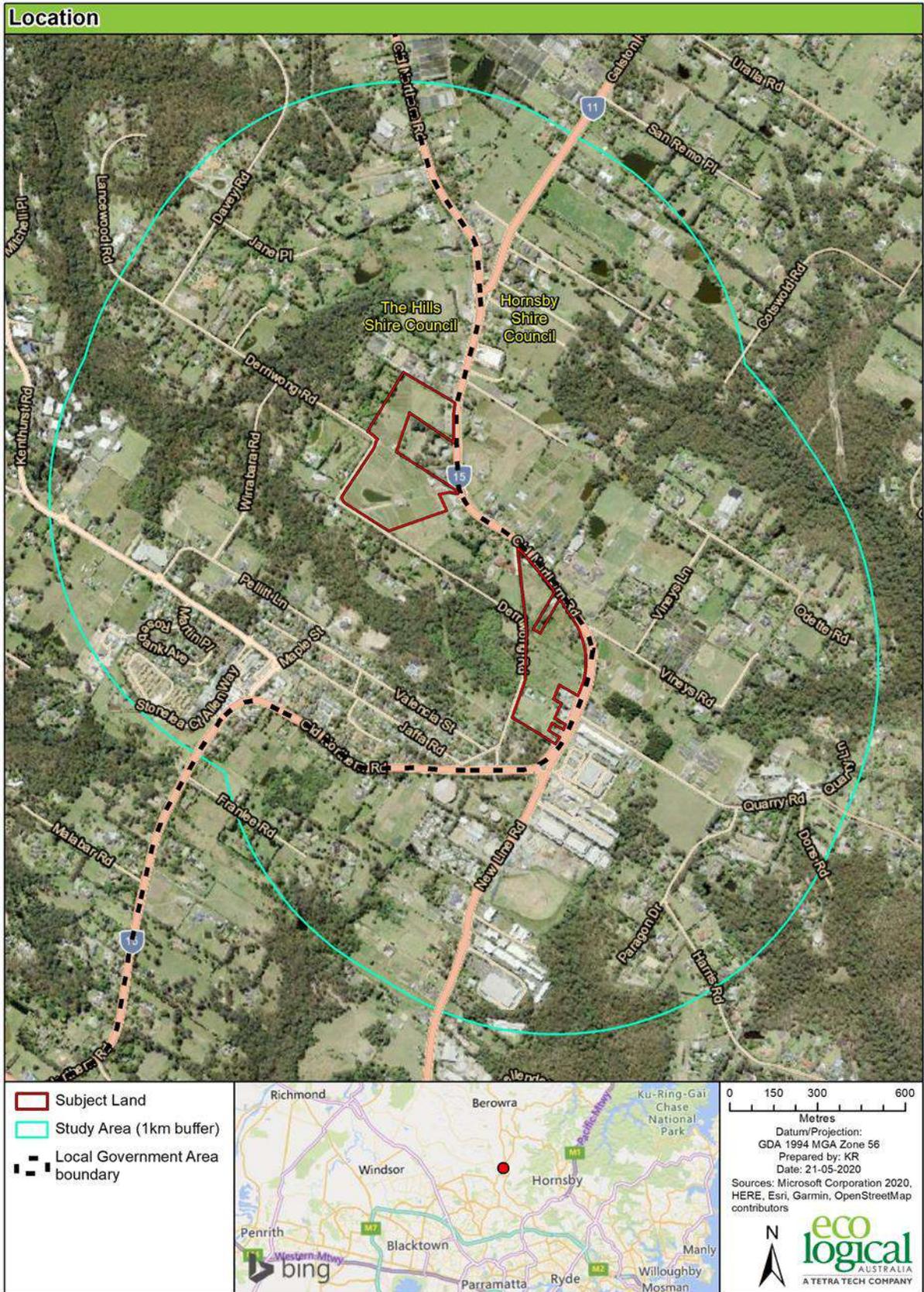


Figure 1: Study area

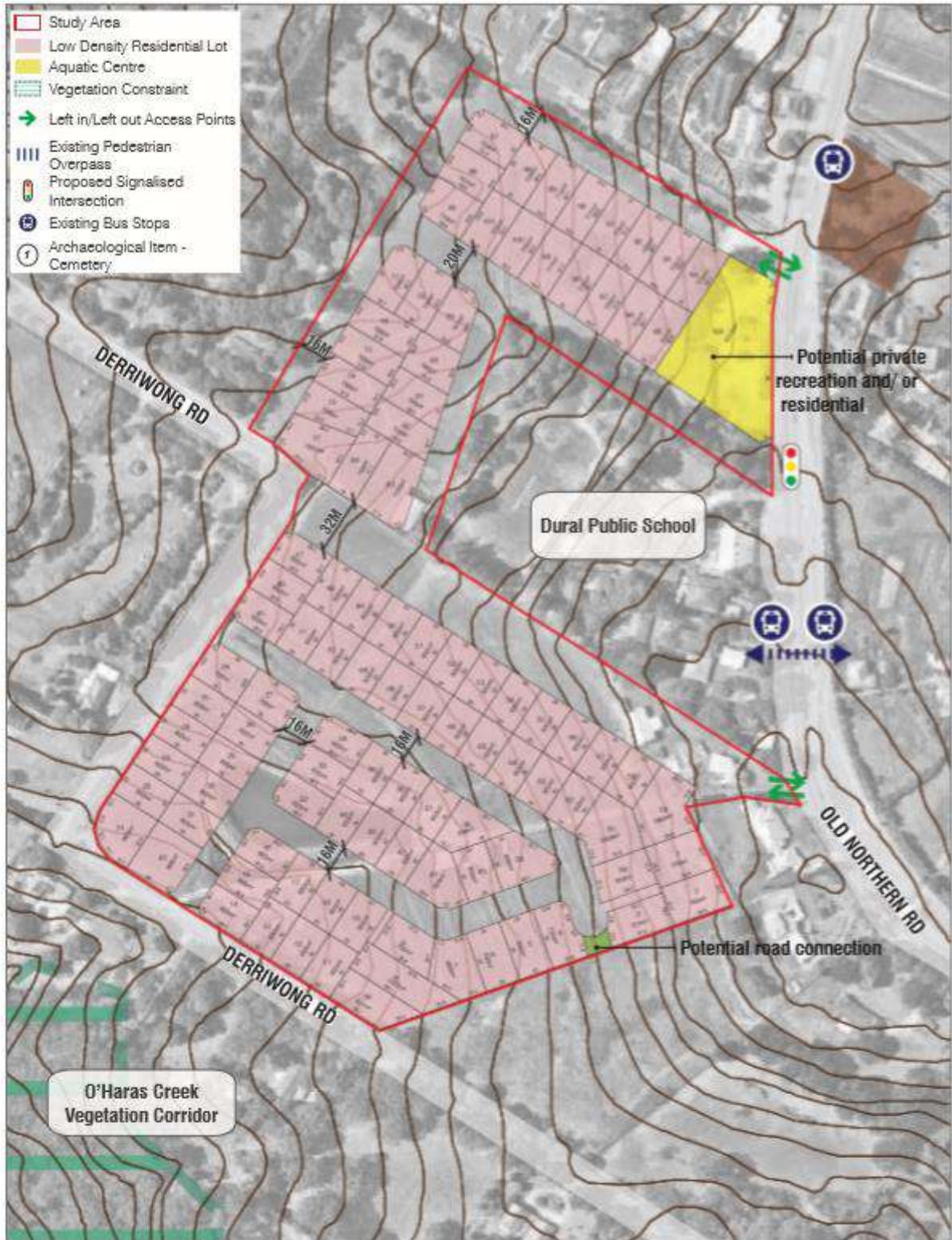


Figure 2: Indicative future layout – Northern masterplan

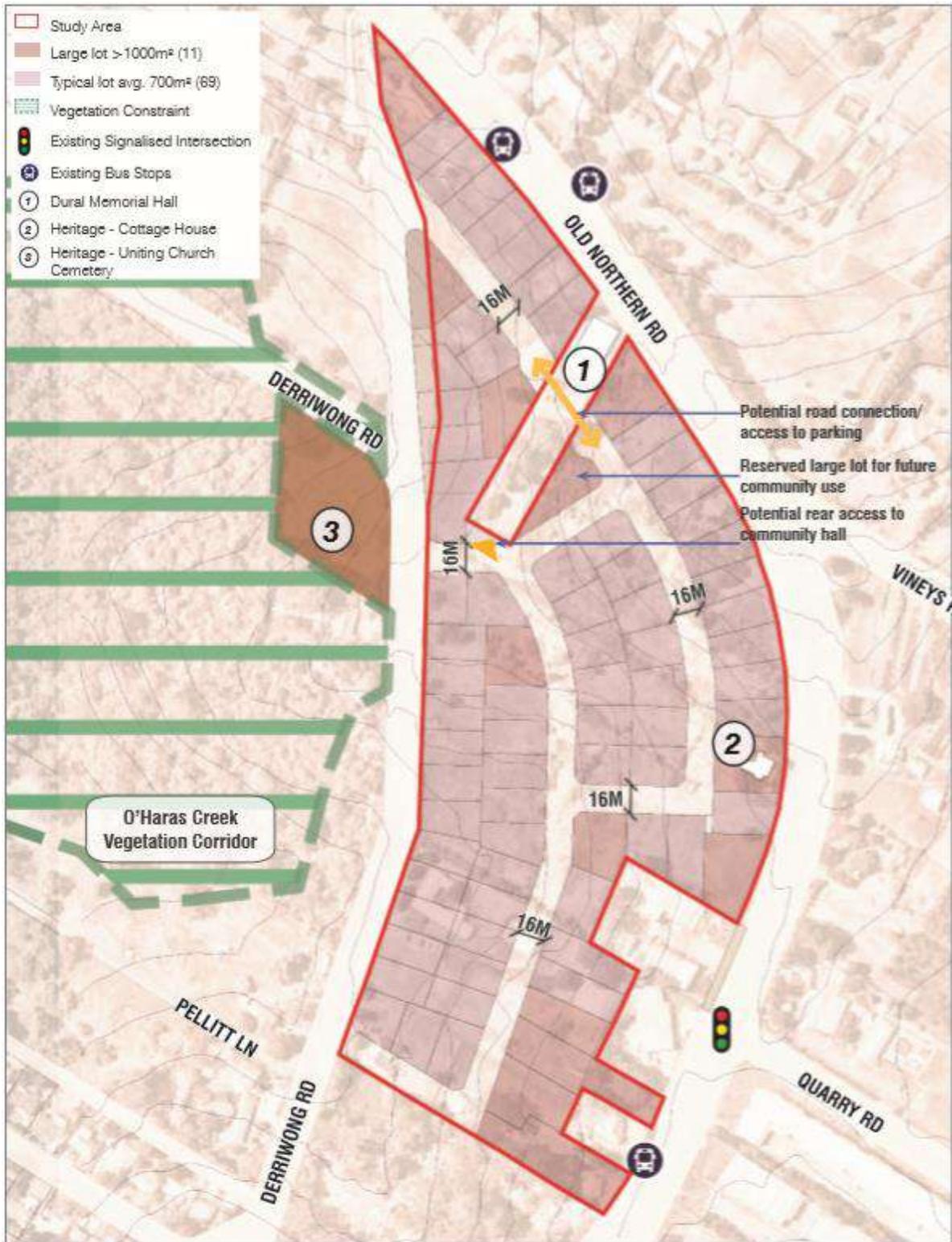


Figure 3: Indicative future layout – Southern masterplan

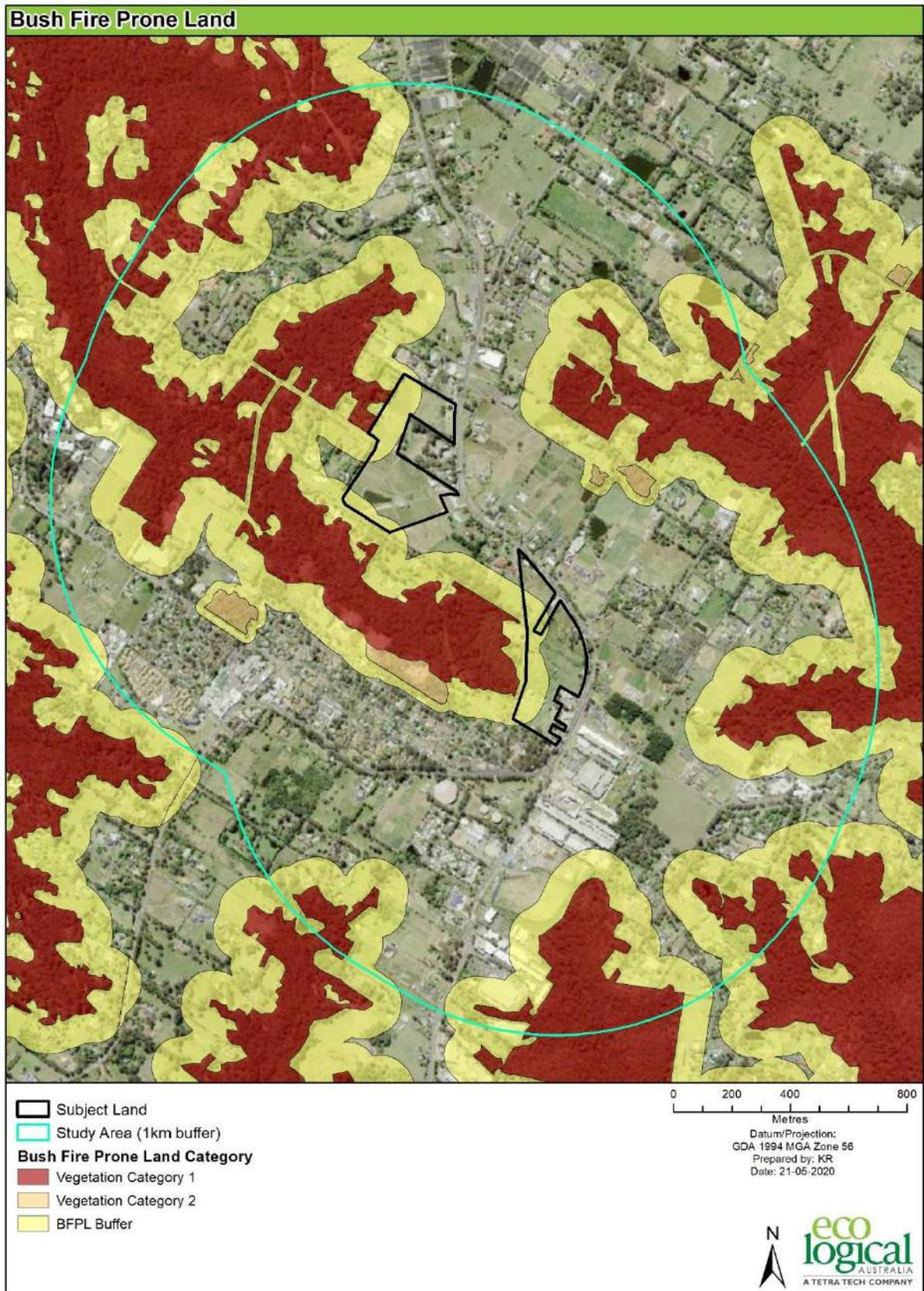


Figure 4: Bush fire prone land

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 bushfire prone vegetation (BFPV) in amongst residential, rural residential and rural land uses. In particular, the O’Hara Creek corridor to the west and north-west of the subject land is mapped as Vegetation Category 1 and presents a continuous enough matrix of BFPV to potentially allow the spread a bushfire to the subject land 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 and/or lands containing managed vegetation.

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 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 5). 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
	Sydney Coastal Dry Sclerophyll Forests	Peppermint-Angophora Forest
	Cumberland Dry Sclerophyll Forests	Shale Sandstone Transition Forest
	Sydney Coastal Dry Sclerophyll Forests	Sandstone Gully Forest; Sandstone Ridgetop Woodland

Desktop assessment and rapid site inspection was then 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 4 of this report. The updated vegetation hazard is mapped in Figure 6 (see Appendix C for assessment photos) and contains the following considerations:

- Assessment Point 1 – patchy remnant vegetation with disturbed understory, small in size and disconnected from other patches; classified as low hazard.
- Assessment 2 – regenerating forest vegetation with shrubby mid-storey; classified as forest
- Assessment 3 – cemetery;- hazard edge refined
- Assessment 4 – remnant forest vegetation; retain forest classification
- Assessment 5 and 6 - remnant native vegetation, small patches amongst houses, with cleared understory and minimal mid-storey; classified as woodland
- Assessment 7 and 8 – landscaped overstorey vegetation with occasional remnant native vegetation, limited to no mid-storey – classified as woodland

2.1.2 Topography and Slope

Figure 7 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 and classified into the following PBP 2019 slope classes (see Figure 8):

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

Steeper areas where fire control is typically more difficult occur in the eastern portion of the study area and to a lesser extent, the north 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 fire weather conditions in The Hills District is 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.

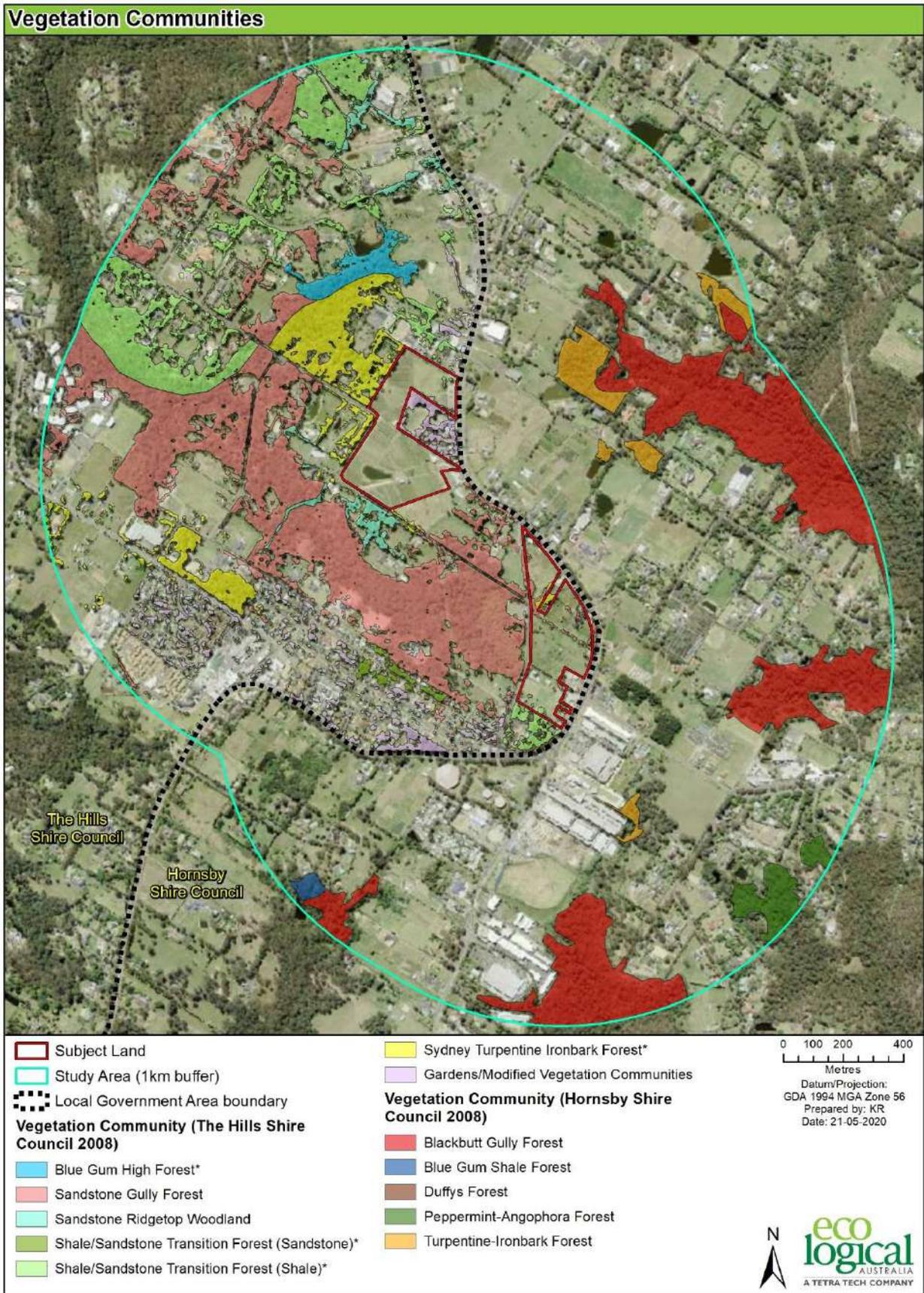


Figure 5: Mapped Vegetation Communities



Figure 6: Bushfire Vegetation Hazard, with assessment photo points

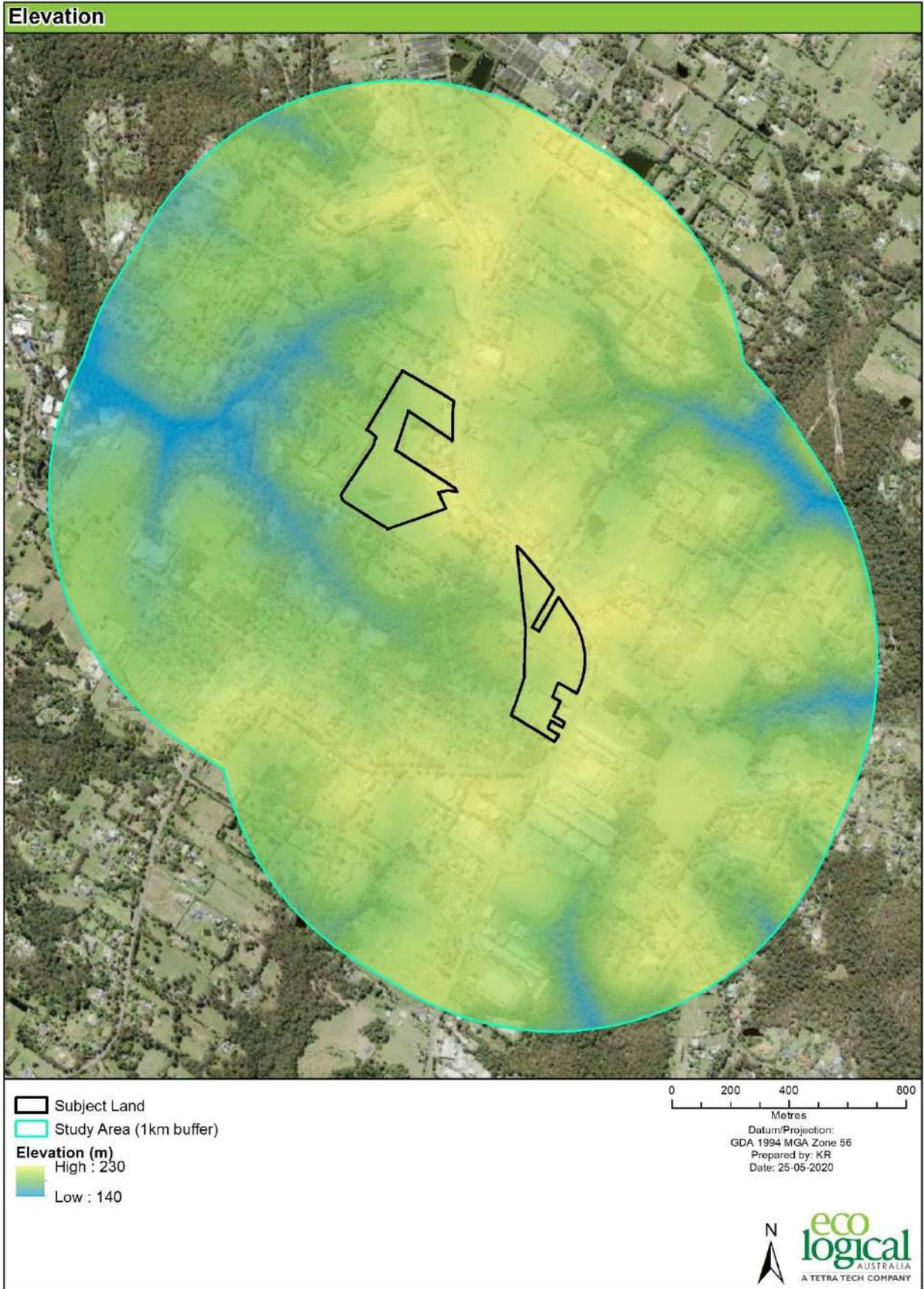


Figure 7: Elevation within the study area.

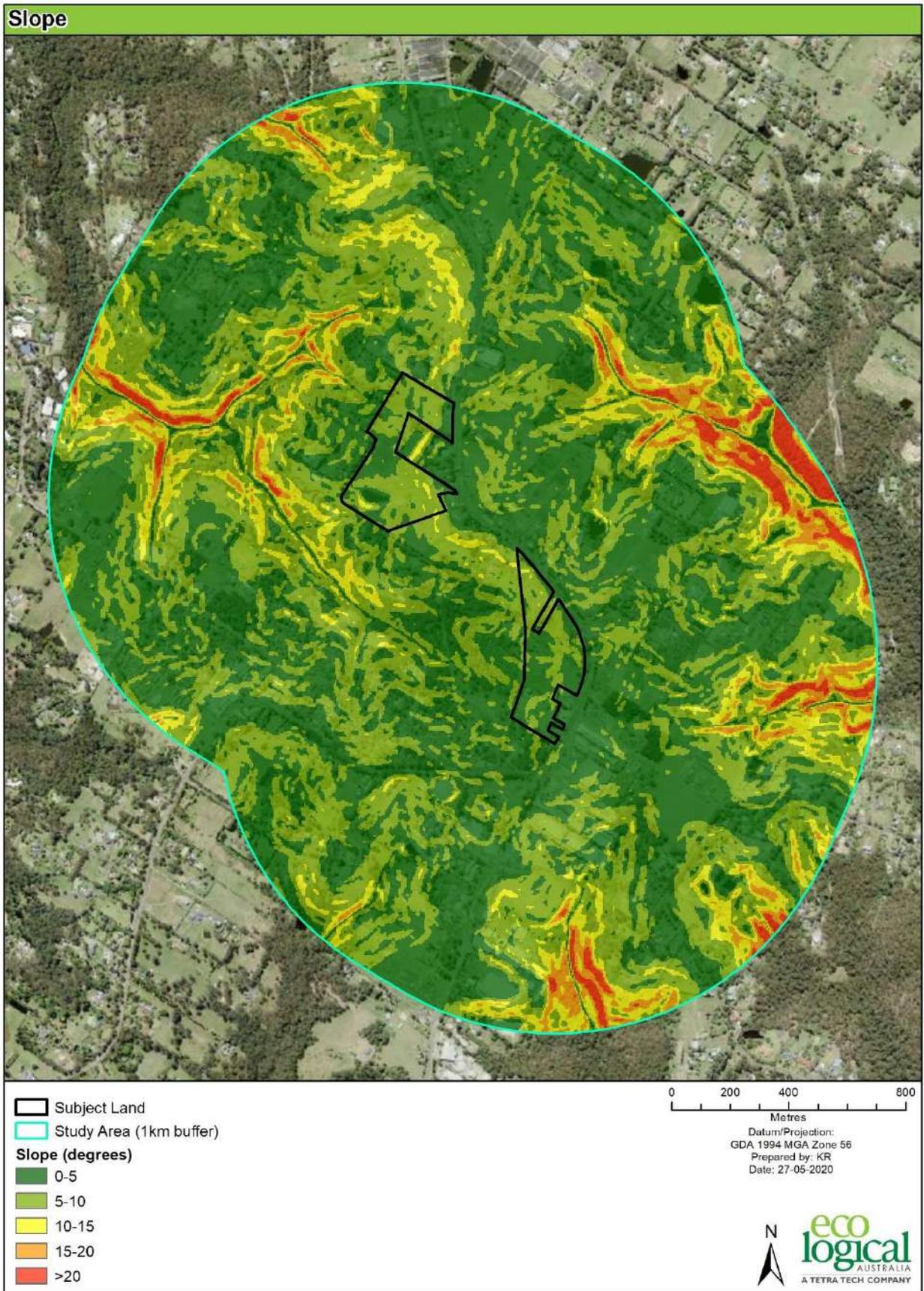


Figure 8: Slope within the 1 km study area

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 Very High 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 is 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 9 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 fire history within the surrounding area, with limited 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.

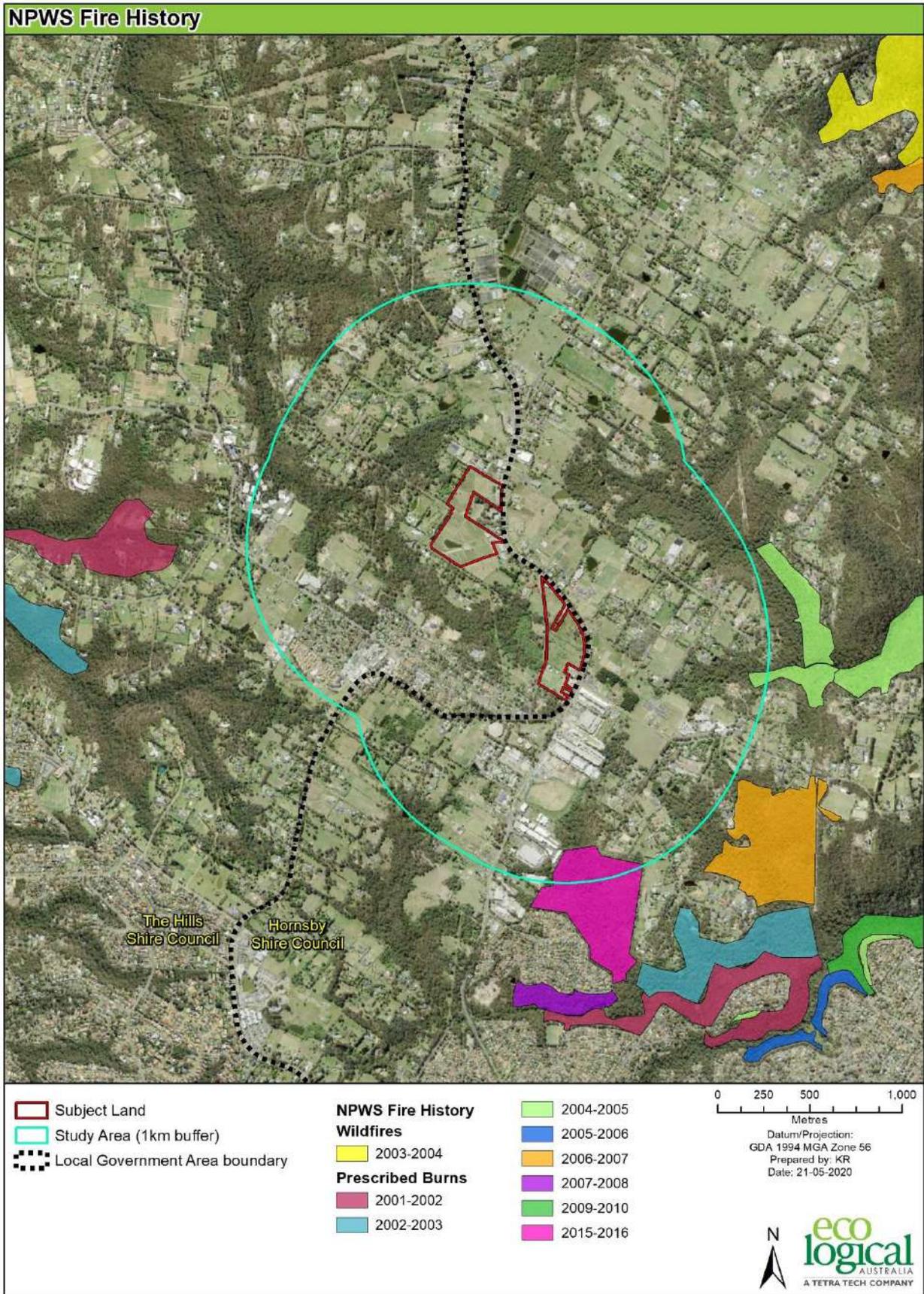


Figure 9: Fire History in the Study Area.

3. Land Use Assessment

The EP&A Act and the RF Act are the primary legislative instruments relevant to bushfire planning for the site. PBP is called up by these Acts as the subject land is mapped as bush fire prone land, and it is a critical guide in assessing the bushfire risk suitability of the proposal.

PBP (RFS 2019) outlines broad principles and assessment considerations for strategic planning. It also specifies that bushfire protection measures need to be considered at the strategic planning stage to ensure that the future development can comply with PBP (as specified in Chapters 5-8 of PBP 2019).

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.*

3.1 Risk profile

The feasibility of the Planning Proposal to comply with the bushfire protection measures 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 Study has therefore considered the:

- The bushfire landscape and any need for adjustment of the protection measures given the landscape risks;
- Pattern and potential bushfire resilience of the bushland interface;
- Potential cumulative risk associated with the bushfire protection measures;
- Risk profile of different areas and their appropriate land use; and
- Potential for application of innovative or emerging bushfire protection measures.

The following land use risk profile has been identified in the Study:

- There is opportunity within the subject land to locate Asset Protection Zones and other bushfire protection measures to meet the acceptable solutions within PBP 2019;

- Perimeter roads are feasible in the design
- No unusual cumulative risks have been identified.
- Complementary and consistent risk management through landscape and building design, and community programs are also feasible.

3.2 Summary of land use assessment

The location and type of land uses included in the Planning 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; and the ability for bushfire protection measures to be provided. It is assumed that more detailed design work will be undertaken should the Planning Proposal be supported, to ensure appropriate micro siting and design, in order to meet or exceed the requirements of PBP.

4. Feasibility of Asset Protection Zones

Based on the landscape assessment of vegetation and slope, preliminary Asset Protection Zones (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 3 and represent the required minimum setback detailed in PBP (2019). Indicative APZs identified in Figure 10 are for a scenario of residential development only. Final APZ dimensions should be determined based on the final design, vegetation configuration and topography.

The subject land is surrounded by rural residential properties managed using various practices, resulting in a discontinuous canopy and generally managed understory. In undertaking this assessment, the following assumptions are made in relation to the proposed 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 (see Appendix C), as discussed in section 2.11.
- 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/m². 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
4	Downslope >0 to 5 degrees	Low Hazard (Rainforest)	14 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.

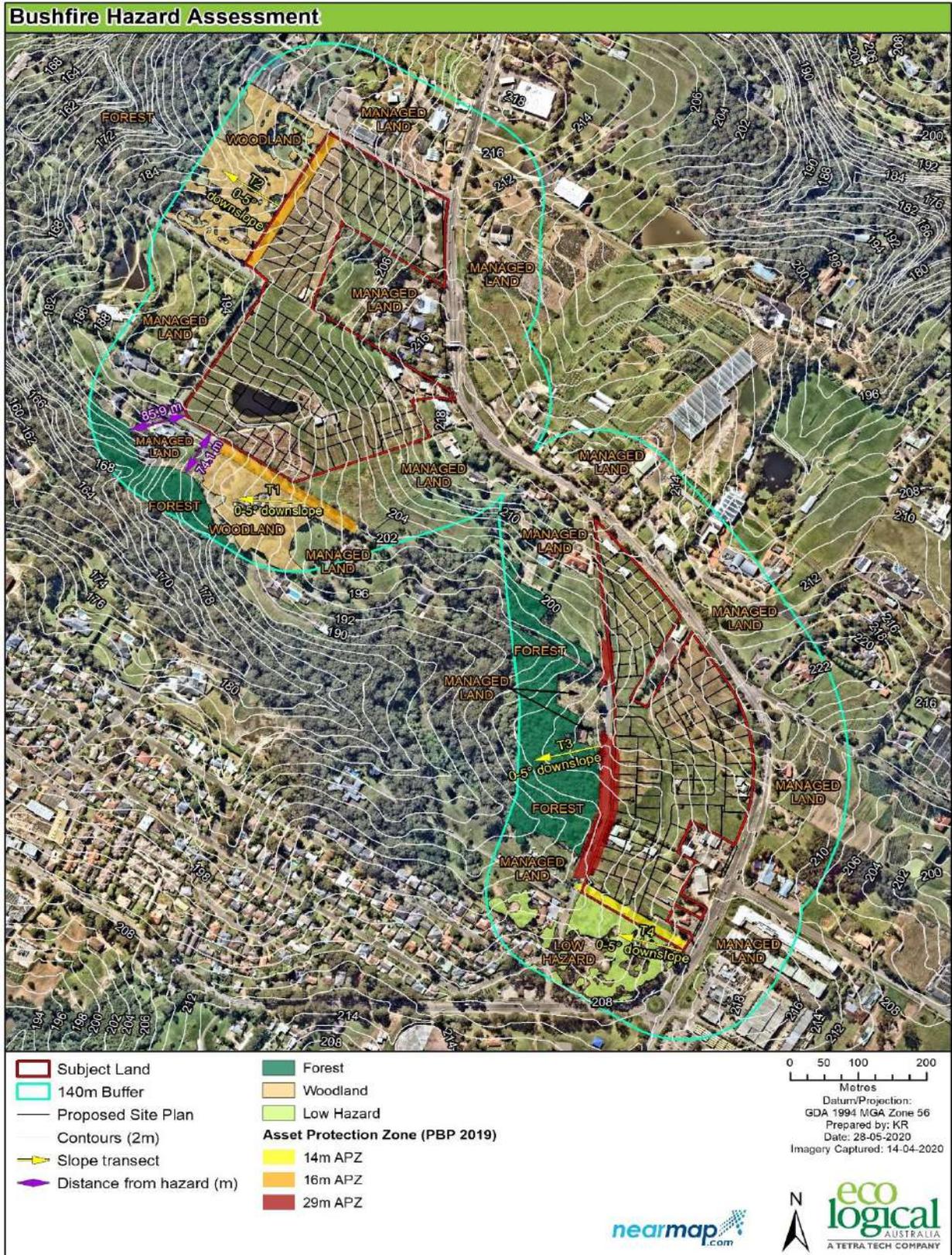


Figure 10: Bushfire Hazard Assessment

5. Access and egress

As per the traffic analysis undertaken by AECOM, the northern masterplan area will feature three access points onto the Old Northern Road and four access points onto Derriwong Road (AECOM, 2020) (Figure 2). The southern masterplan area will be primarily accessed via Derriwong Road with three access points provided, as shown in Figure 3.

Various road upgrades and improvements have also been proposed including:

- New drop-off zone for Dural Public School and signalised intersection on the Old Northern Road 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 a signalised intersection at the eastern boundary of the site and Old Northern Road, enabling safer traffic movement.

Future development applications will need to address access requirements in more detail as per PBP 2019 (see **Table 4** 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

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.

6. 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 precinct are considered adequate, provided emergency management and planning fosters a 'leave early' approach.

6.1.1 Evacuation

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 (Section 6.1.2); and
- An evaluation of evacuation adequacy and option for the shortcomings identified.

6.1.2 Assessment of Neighbourhood Safer Places (NSPs)

There are three existing NSPs 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

7. Infrastructure

7.1 Water

To comply with PBP, the subject site should be serviced by reticulated water. Fire hydrant spacing, sizing and pressures should comply with AS 2419.1 – 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 the building are to be metal, including and up to any taps.

Table 54 identifies the acceptable solution requirements of Section 5.3.4 of PBP, while **Table 65** identifies the requirements for lots that may require a static water supply (i.e. if >70 m from hydrant points).

The PBP acceptable solution requirements for water is achievable.

7.2 Electricity and gas

Underground electricity supply to the subject land is compliant with PBP. If the electrical transmission line to the subject land is above ground, no part of a tree is to be closer than 0.5 m to the powerline conductors.

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

Details for compliance with PBP 2019 are provided in Table 5.

8. Adjoining land

Future development should not be reliant on any off-site bushfire mitigation measures. All buildings and land uses should be designed to be resilient to bushfire attack in circumstances where no additional fuel management occurs outside of the subject land.

The proposed land uses should not have a deleterious impact on the ability for bushfire management activities to be undertaken on adjoining land. Given the adherence to PBP 2019 and other land use planning requirements, the proposed land uses should not increase bushfire management needs for retained and/or adjoining bushfire prone vegetation.

9. Conclusions

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.

It has been found that the Planning Proposal meets the aim and objectives of PBP and can achieve required APZs and other bushfire mitigation measures and does not impose additional mitigation actions on adjoining land. At the detailed design phase, lot design / APZ provision, infrastructure, access and construction plans are required to meet the specifications outlined in PBP 2019. However, the assessment of the Planning Proposal in this Strategic Bushfire Study identifies that the orderly provision of bushfire protection measures to achieve the deemed to satisfy standards prescribed within PBP is achievable.

It is concluded that the Planning Proposal is 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.

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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 4: 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
	<p>a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</p>
<p>access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating</p>	<p>minimum 5.5m width kerb to kerb; and parking is provided outside of the carriageway width; and hydrants are located clear of parking areas; and roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and curves of roads have a minimum inner radius of 6m; and the road crossfall does not exceed 3°; and a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</p>
<p>firefighting vehicles can access the dwelling and exit safely</p>	<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 5: 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 6: 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 5



ASSESSMENT POINT 6



ASSESSMENT POINT 7



ASSESSMENT POINT 8



