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STRATEGIC BUSHFIRE STUDY

for

LOT 481 REEVES STREET, SOMERSBY REZONING

(Lot 481 of DP 1184693)

July 2023

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EXECUTIVE SUMMARY

This Strategic Bushfire Study considers the proposed rezoning of the Darkinjung Local Aboriginal Land Council site located at Reeves Street Somersby.

The *Planning for Bush Fire Protection 2019* (PBP) statutory guideline introduces a range of strategic planning considerations which are intended to be addressed through the strategic principles and assessment requirements of PBP via the preparation of a Strategic Bush Fire Study. In terms of satisfaction of these principles concerning the proposed rezoning, the following is noted:

'ensuring land is suitable for development in the context of bush fire risk'

The proposed rezoning does not present any substantial strategic issues on balance with the risk profile of the landscape. Whilst hazard and risk are not avoided, the risk is capable of being satisfactorily mitigated. This includes the ability to evacuate which is a core facet of minimising risk to life in bush fire prone areas.

'ensuring new development on BFPL will comply with PBP'

This strategic bush fire study identifies the proposed rezoning is capable of satisfying the statutory bush fire protection measures outlined by PBP. Further detail in relation to this would be required to be submitted as part of future subdivision applications to NSW RFS for integrated development.

'minimising reliance on performance-based solutions'

Whilst this study cannot fully determine the potential for performance-based solutions as this is dependant upon a final subdivision settlement pattern, it is noted the proposed rezoning is capable of satisfying the acceptable outcomes as per PBP, as required.

'providing adequate infrastructure associated with emergency evacuation and firefighting operations'

The study considers the strategic aspects of firefighting capability, relevant to the proposed rezoning. This includes how the proposal supports firefighting ability and enables suppression efforts to occur. From a strategic perspective, the proposed development does not involve any identifiable challenges or impediments, but rather seeks to establish a formalised road network that connects with informal fire trails, easement and access tracks to facilitate land management and support suppression, if required.

'***facilitating appropriate ongoing land management practices'***

The proposed rezoning is unlikely to introduce any variation to existing or agreed land management practices for the Darkinjung Local Aboriginal Land Council beyond that which would otherwise be required if the land remained in its current zoning.

Having regard to the strategic principles for the exclusion of inappropriate development contained in Part 4 of PBP, this study does not identify elements of the proposed rezoning that would deem it to be considered inappropriate development pursuant to Part 4 of PBP.

This study demonstrates the proposal to rezone the subject site satisfies EP&A Act s.9.1 Direction 4.3 – 'Planning for Bush Fire Protection' and *Planning for Bush Fire Protection 2019*. The proposal is not considered incompatible with the surrounding environment and bushfire risk. With sound bushfire management, the proposal can coexist within the bushland setting. The Strategic Bushfire Study addresses all bushfire protection related matters required for consideration at the pre-gateway stage, and therefore can proceed through to the next stage of the rezoning process.

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DOCUMENT TRACKING

Project Location	Lot 481 Reeves Street, Somersby
Date	03/07/23
Prepared by	Kristan Dowdle
Reviewed by	Ashley Dowdle
Approved by	Kristan Dowdle
Status	FINAL
Version	3

1.0 INTRODUCTION

Clarke Dowdle & Associates has been engaged by the Darkinjung Local Aboriginal Land Council (DLALC) to conduct a Strategic Bushfire Study (the Study) on the property located at Reeves Street Somersby (subject site).

This Study has been prepared to inform and assist with the consideration of a Planning Proposal for lands situated within the Central Coast Council (CCC) Local Government Area (LGA). The objectives of the Planning Proposal are to amend the Local Environmental Plan (LEP).

The subject land is mapped on the bush fire prone land (BFPL) maps (Figure 3) and therefore under the Ministerial Direction 4.3 (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 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.

1.1 Assumptions and Limitations

The following assumptions and exclusions apply to this study:

- It focuses on the assessment of the proposed rezoning from a strategic land use planning perspective. It is not a detailed bush fire hazard assessment or management plan. It is expected such detail will be prepared and submitted for assessment at the subdivision stage;
- The study has assessed the entire site, whilst it is noted that the rezoning does not change/alter the existing C2-Environmental Conservation areas on the property.
- It is based on available data provided by the Department, as well as additional publicly-available information. It is assumed the evidence source utilised to inform this study are accurate and can be reasonably relied upon for the purposes of its application;
- It is noted this study provides commentary on the interface between bush fire protection measures and the land use planning system; and
- It has been undertaken using a high-level approach, noting additional investigation and scrutiny of available information from a field-based perspective could be undertaken to enhance accuracy.

2.0 OBJECTIVES AND SCOPE OF THE ASSESSMENT

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 are listed in Table 1 below.

Table 1: Strategic Bushfire Study Requirements

ISSUE	DETAIL	ASSESSMENT CONSIDERATIONS
Bush fire landscape assessment	A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	• The bush fire hazard in the surrounding area, including: ➢ Vegetation ➢ Topography ➢ Weather • The potential fire behaviour that might be generated based on the above; • Any history of bush fire in the area; • Potential fire runs into the site and the intensity of such fire runs; and • The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain
Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	• The risk profile of different areas of the development layout based on the above landscape study; • The proposed land use zones and permitted uses; • The most appropriate siting of different land uses based on risk profiles within the site (i.e., not locating development on ridge tops, SFPP development to be located in lower risk areas of the site); and • The impact of the siting of these uses on APZ provision.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	• The capacity for 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 bush fire.
Emergency services	An assessment of the future impact of new development on emergency services.	• Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades; and • Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.
Infrastructure	An assessment of the issues associated with infrastructure and utilities.	• The ability of the reticulated water system to deal with a major bush fire 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.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management	• Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans.

To address the items listed in Table 1 the following methodology was employed for the Study;

PROPOSAL REVIEW

- Review of the proposed rezoning documentation (i.e., maps, specialist reports etc)

DESK-TOP REVIEW

- A desk-top review of available mapping to determine the extent/scale/locale of fieldwork

SITE INSPECTION

- Inspection of the subject site and surrounding bushfire hazard/s
- The inspection was for verification and/or otherwise of the desk-top review and gathered site-specific data on slope and vegetation

DESKTOP ANALYSIS

- Review and analysis of GIS mapping layers relevant to bushfire behaviour
- Mapping layers include recent aerial imagery from Nearmap, Fire history from NPWS, vegetation mapping from OEH, topographical data and the proposed layout provided by the client

REPORTING

- Determine requirements of *Planning for Bush Fire Protection* related to the subject site and development potential;
- Determine protection requirements relating to rezoning consisting of Asset Protection Zones and access
- Determine any areas of concern where bushfire or environmental constraints may prevent the development
- Final report a 'Strategic Bushfire Study' prepared to address EP&A Act s.117 (2) Direction 4.3

3.0 LEGISLATION

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).

When investigating the capability of bushfire prone land to be rezoned for residential purposes, councils must have regard to s.9.1 (2) Direction 4.3 – 'Planning for Bushfire Protection' of the EP&A Act. The objectives of Direction 4.3 are;

a) *to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire-prone areas, and*

b) *to encourage sound management of bush fire prone areas.*

Direction 4.3 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.

4.0 SITE IDENTIFICATION AND DESCRIPTION

4.1 Site Identification and Location

The subject site is currently known as Reeves Street, Somersby (no street number) and is cadastrally known as Lot 481 in DP 1184693. The land is within the Local Government Area (LGA) of Central Coast Council (Fire Danger Index-100) and has an area of 178.5 hectares (ha) and is currently vacant and is provided public road access via Reeves Street which runs along the northern boundary of the site.

The land itself is wholly occupied by unmanaged vegetation with a mixture of communities including Dry Sclerophyll Forest, Hanging Swamps and Wet Sclerophyll Forest. The property contains several fire trails along with several important aboriginal cultural sites (see Figure 5).

The property is bounded by bushland to the south and east. The western boundary of the site is bordered by the M1 Motorway, whilst the northern boundary is bordered by Reeves Street which primarily adjoins rural residential properties.

Reeves Street provides the only access to and from the site, which extends from Wisemans Ferry Road to the west via Bimbil Road; through the Debenham Road North intersection; then across the M1 Pacific Motorway via a high standard two lane concrete bridge (overpass).

It is noted that as a result of the one-way in/one-way out access, Asset Protection Zones (APZ) greater than those required under PBP will be recommended to be incorporated into the design and future land usage.

The proposed area of impact/development occurs on the northern portions of the site fronting the Reeves Road boundary and will be the focus area of this report for future rural residential usage.

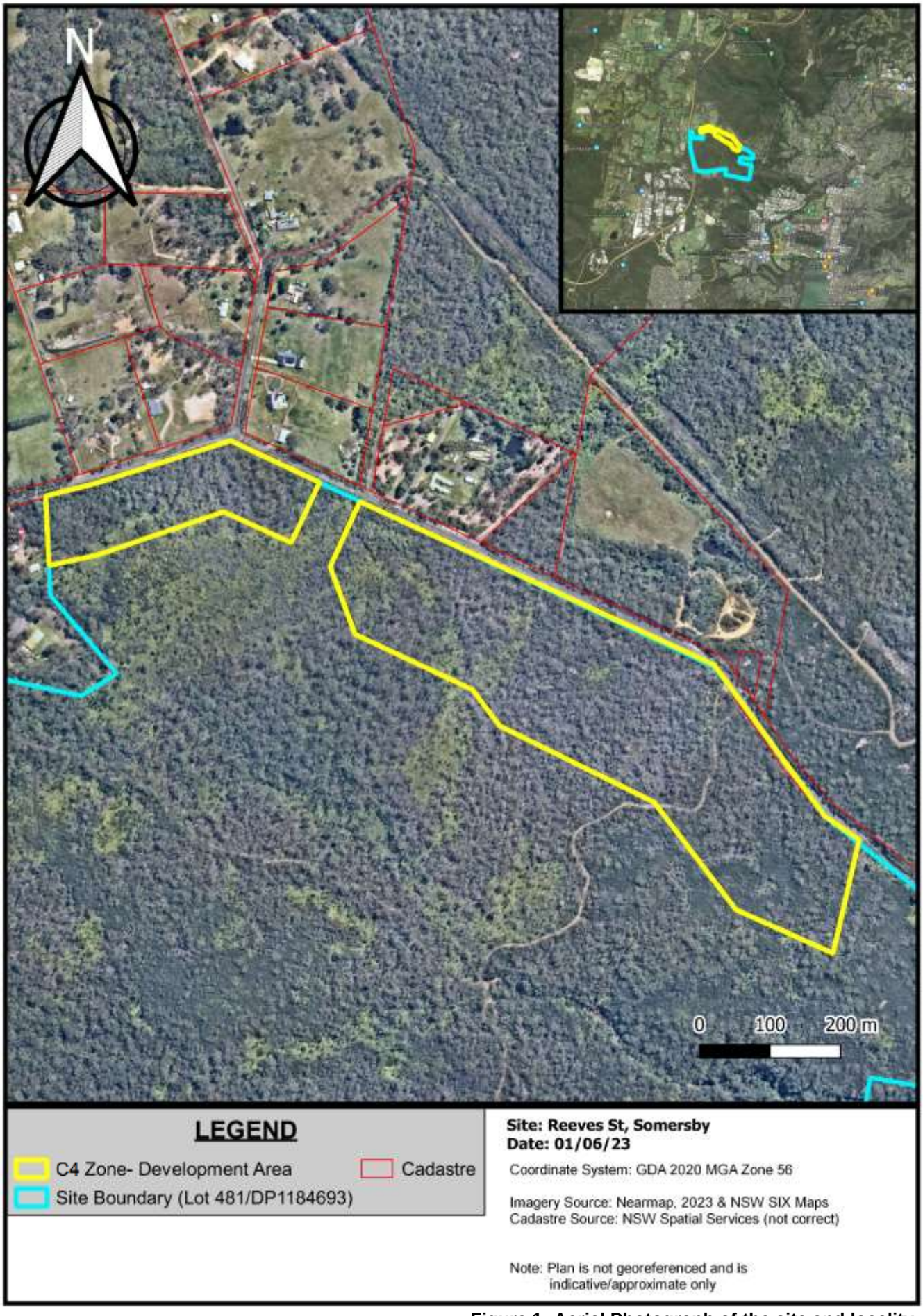


Figure 1: Aerial Photograph of the site and locality

The subject site is currently zoned under the Central Coast Local Environmental Plan (LEP) as RU2-Rural Landscape over the majority of the site with C2-Environmental Conservation zoning occurring on the eastern portions (See Figure 2)

Figure 2: Current Land Zoning (subject site bordered in yellow)
Source: EPlanning Spatial Viewer, 2023

4.2 Bushfire Prone Mapping

The land is mapped by Central Coast Council as being bushfire prone. The subject site has been mapped as containing Category 1 (red) vegetation throughout and therefore the planning requirements of PBP are applicable.

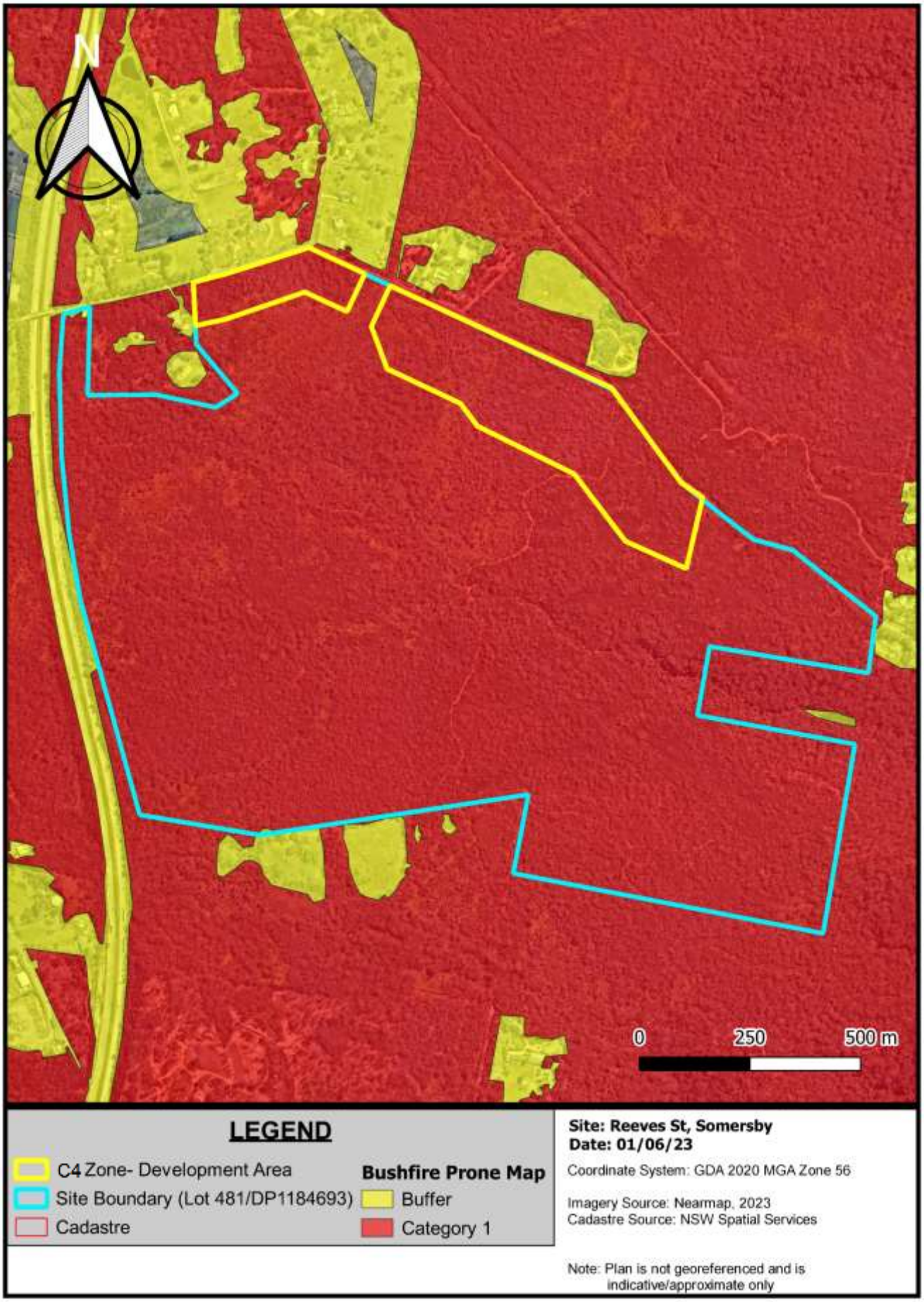


Figure 3: Bushfire Prone Mapping

4.2 Proposal

The proposal relates to the partial rezoning of the current allotment. The aim is to retain the existing C2 areas while allowing for the development of large residential properties focused on environmental living in the northern section of the property. The southern portions, currently designated as RU2 areas, will be proposed for rezoning to C2 (refer to Figure 1). The proposed rezoning will create the following zones:

- C4 - Environmental Living (19.75 Hectares)
- C2 - Environmental Conservation (158.75 hectares in total, including the existing C2 areas)

The existing and proposed C2-zoned areas will be retained, and no buildings/dwellings will be constructed on these lands. However, due to the vegetation that will be retained within the C2 areas, appropriate Bushfire Protection Measures, such as Asset Protection Zones, will be necessary.

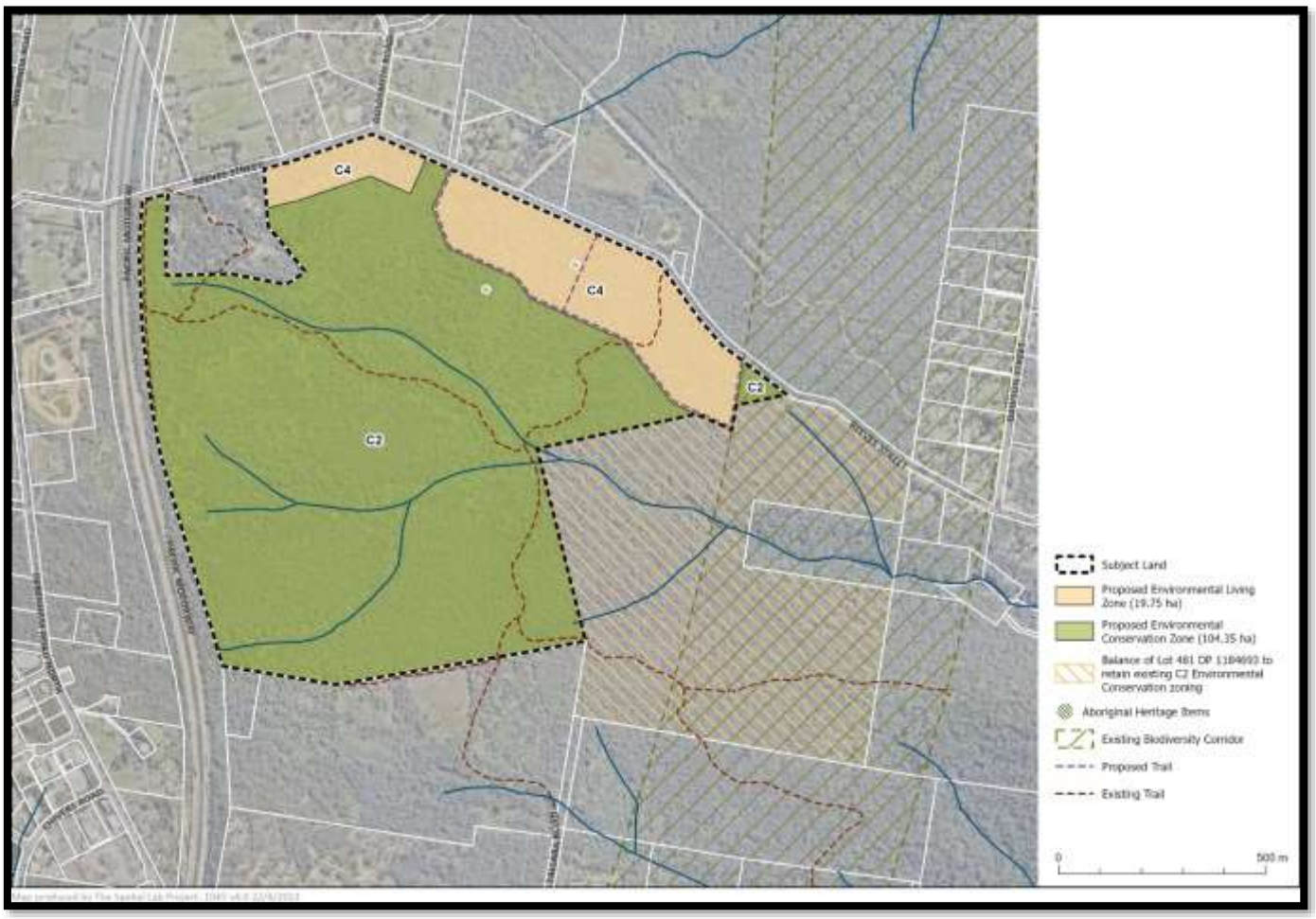


Figure 4: Proposed Rezoning Layout

This study will comprehensively evaluate the entire site, however, it is important to emphasize that the proposed rezoning will not modify the existing C2-Environmental Conservation areas on the property.

Based on the proposed rezoning a preliminary subdivision plan has been provided. The intended design will provide fourteen (14) rural allotments all fronting Reeves Street. As part of the proposal, a fire trail network has been proposed to run along the southern boundary of the twelve (12) lots. Figure 5 highlights the layout.

It is noted that lot yield and final layouts are subject to modification during the preparation of the final planning proposal and post-subdivision design.

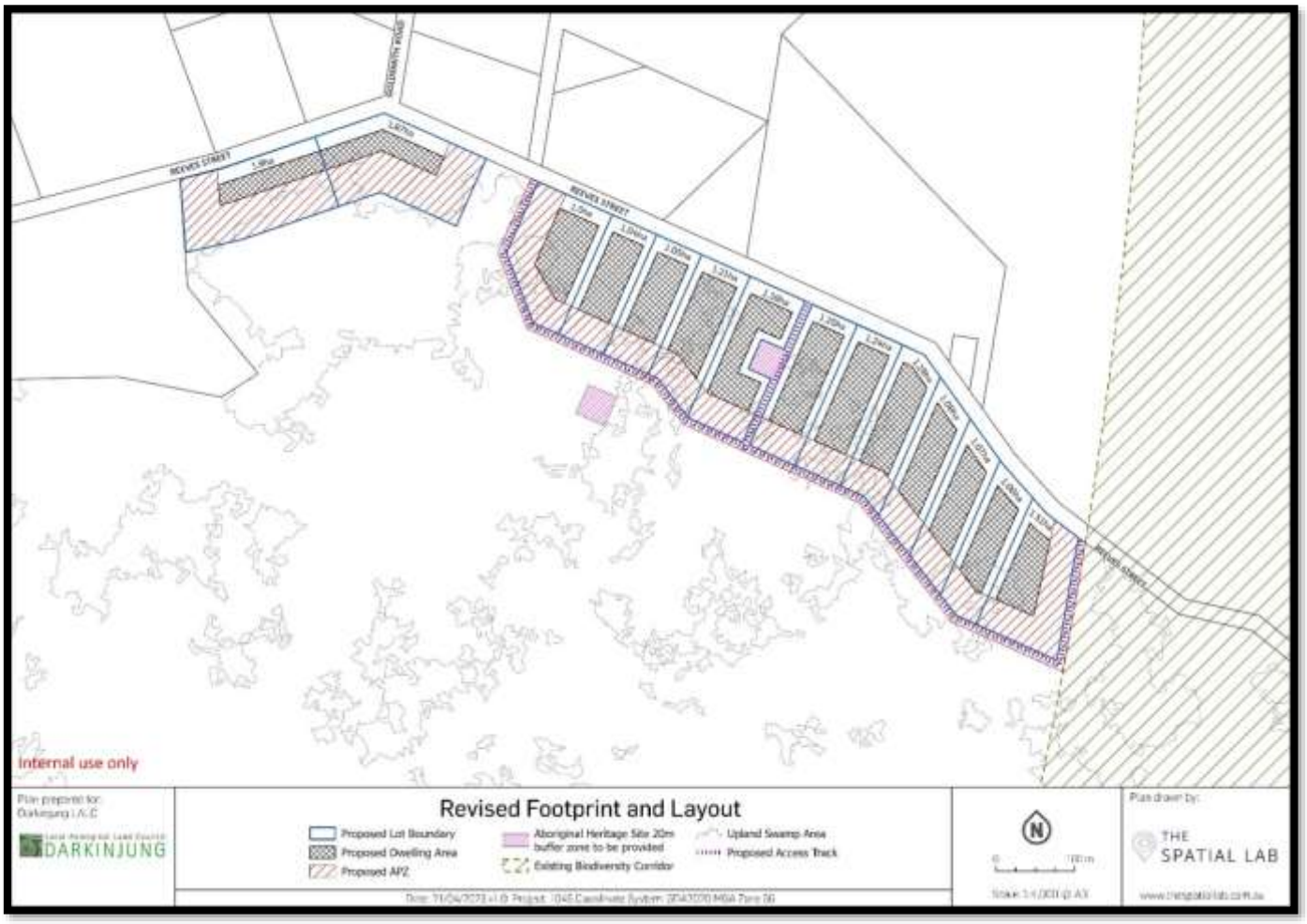


Figure 5: Preliminary Subdivision Layout

5.0 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.

The parameters to be analysed are discussed in the following subsections and consist of bushfire hazard (comprising vegetation and topography), fire weather, fire intensity patterns, fire history and ignition sources.

5.1 Surrounding Vegetation

The predominant vegetation communities known to occur throughout the area are listed in Table 2 below and mapped on Figure 6. The communities have been categorised into vegetation structural formations according to Keith (2004) and then converted under Appendix 1 in PBP.

The vegetation mapping and formations presented in Figure 6 are sourced by the State Vegetation Type Map (SVTM) undertaken by the Department of Planning, Industry and Environment. The vegetation mapping within the site is outlined in Figure 7 and has been sourced by EMM Consulting.

Table 2: Vegetation communities and corresponding structural formations

VEGETATION COMMUNITY	STRUCTURAL FORMATION (KEITH, 2004)	PBP CLASSIFICATION
Northern Sydney Scribbly Gum Woodland	Sydney Coastal Dry Sclerophyll Forests	Forest
Sydney Coastal Sandstone Bloodwood Shrub Forest	Sydney Coastal Dry Sclerophyll Forests	Forest
Sydney Hinterland Turpentine-Apple Gully Forest	Sydney Hinterland Dry Sclerophyll Forests	Forest
Sydney Coastal Upland Swamp Heath	Coastal Heath Swamp	Short Heath
Sydney Sandstone Coachwood-Grey Myrtle Rainforest	Northern Warm Temperate Rainforests	Rainforests
Northern Sydney Heath-Mallee	Sydney Coastal Heaths	Tall Heath

The predominant pattern of vegetation across the site itself and the surrounding landscape is typical with the landscape being a plateau coastal area with the predominant vegetation being dry sclerophyll forest with smaller areas of hanging swamps existing on top of perched water tables typical of the Somersby Plateau area.

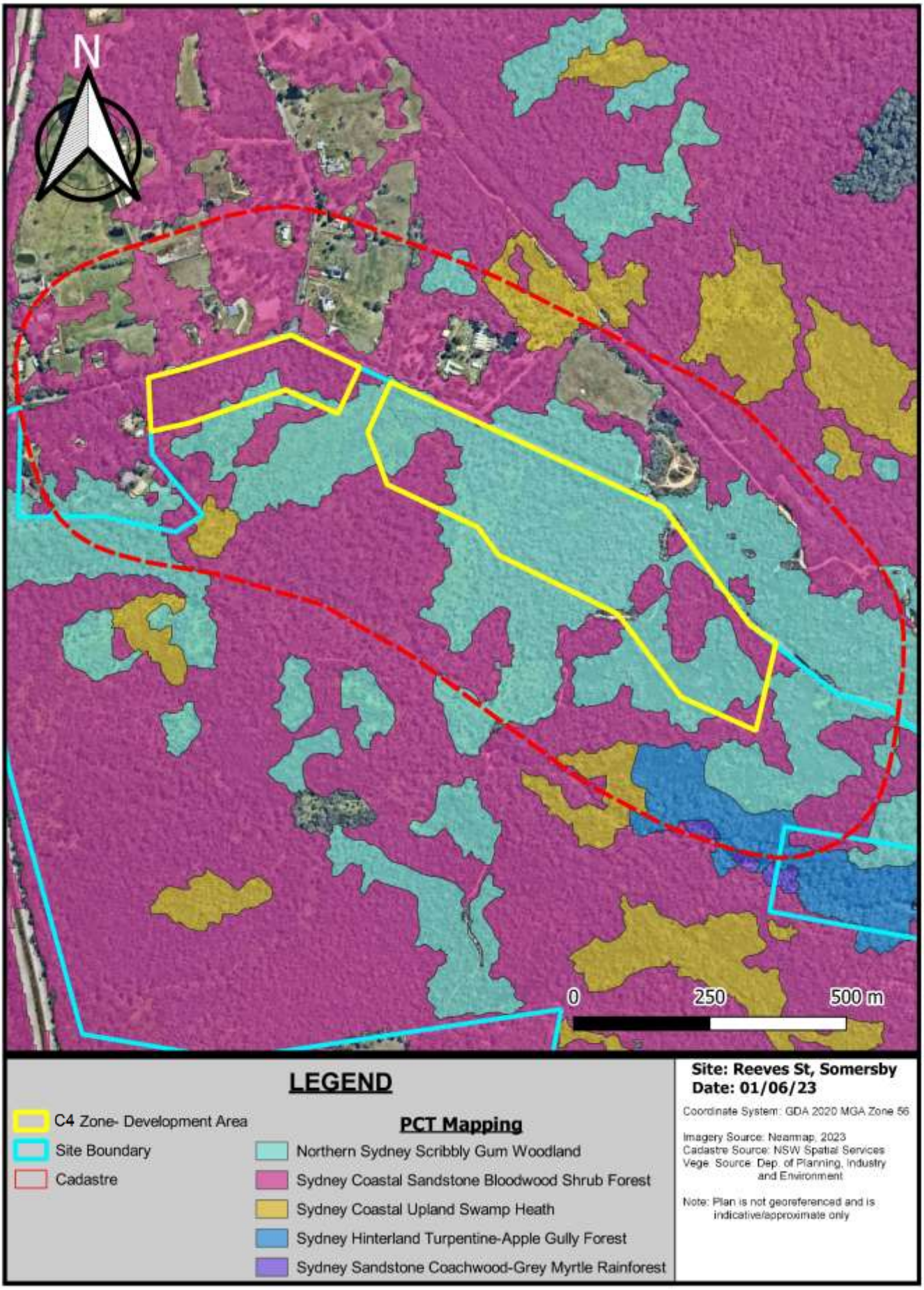


Figure 6: Vegetation Communities

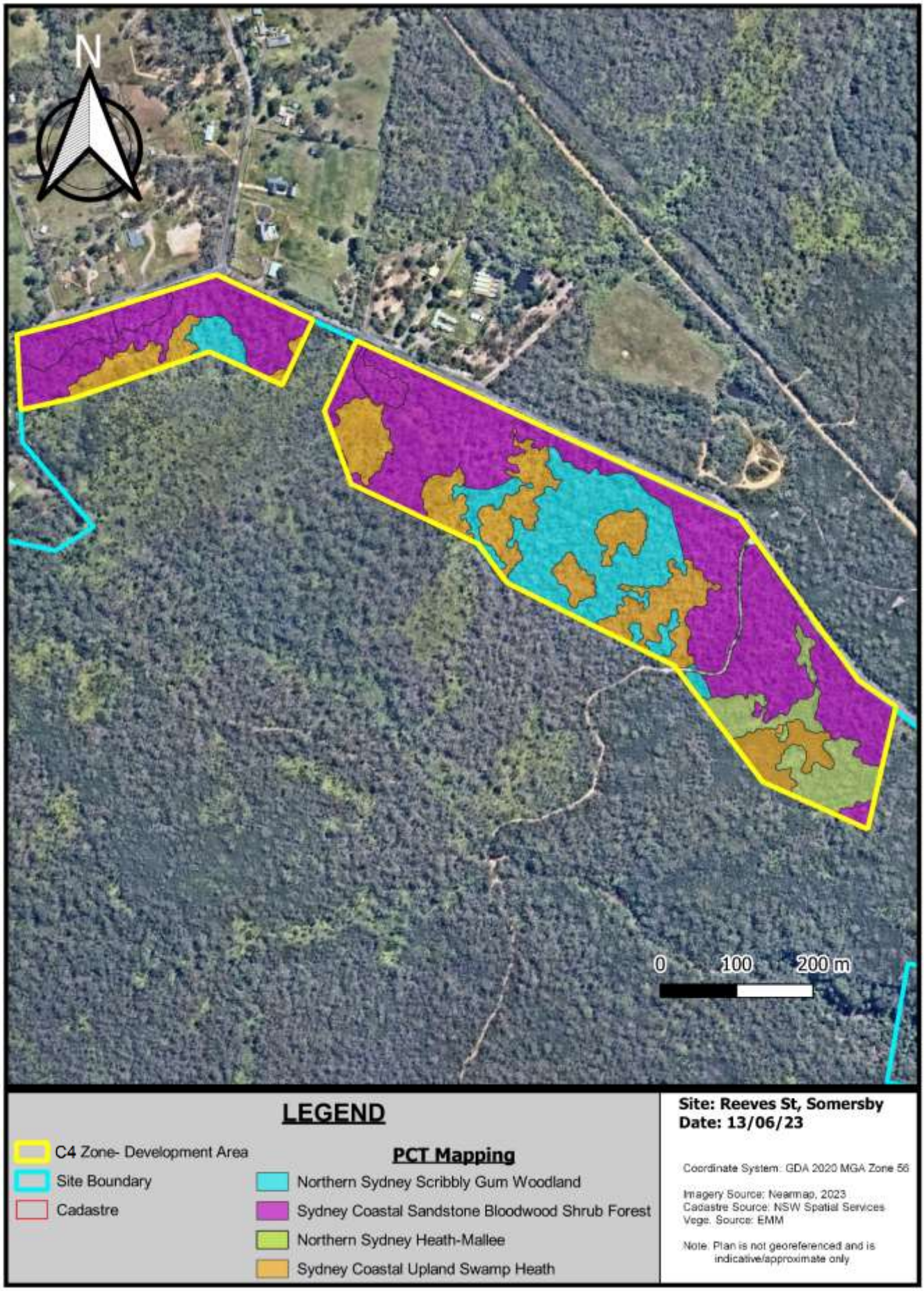


Figure 7: Vegetation Communities within the development area

5.2 Effective Slopes

Section A1.5 of PBP defines the effective slope as;

'The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux. The effective slope is the slope of the ground under the hazard (vegetation). It is not the slope between the vegetation and the building (slope located between the asset and vegetation is the site slope).'

Based on the above definition, in combination with ground truthing and mapping the topography across the landscape within and beyond 140m of the subject site boundaries was determined. The topographic mapping was sourced by NSW Spatial Services (2m contours). This data has a stated accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal.

As shown in Figure 8, the vegetated land surrounding the proposed C4-zoned area falls primarily to the south on a reasonably consistent grade to a gully that exits >300m from the C4 area. The grade to the south within 140m of the C4 area falls within the 5-10° Down Slope category

The bushfire hazards located to the north consist of a plateau area with flat grades before declining on increasing slope further to the north. The grade to the north within 140m of the C4 area falls within the 0-5° Down Slope category

Figure 8 provides the topographic conditions surrounding the C4-zoned areas.

5.3 Fire weather

As described in the *Central Coast Bush Fire Risk Management Plan 2020-2025* (Central Coast Bush Fire Management Committee) the area is cool temperate with predominately summer rainfall. The coastal strip is dominated by local coastal weather patterns (predominant coastal winds) and the western areas can be slightly warmer, drier and less humid, often influenced by wider wind systems.

The bush fire season generally runs from August to March whereby problematic fire weather can occur. Prevailing weather conditions associated with the bush fire season in the Central Coast BFMC area are associated with coastal conditions, and more generally north-westerly winds accompanied by high daytime temperatures and low relative humidity. There are also occasional dry lightning storms occurring during the bush fire season.

The main sources of ignition in the Central Coast BFMC area are:

- Illegal burning activity
- Escapes from legal burning
- Arson & Incendiarism
- Ignition of abandoned/stolen motor vehicles
- Lightning
- Arching electrical power lines
- Occurrence of an extended drought period;
- Lower than average rainfall through winter and spring;
- Persistent north-west winds; and
- Spring/summer thunderstorm activity ('dry' lightning strikes).

5.4 Fire History

The Central Coast BFMC area has on average 843 bush and grass fire incidents per year, of which 6 to 8 on average per year can be considered to be major fires. The main sources of ignition in the Central Coast BFMC area are:

- Illegal burning activity
- Escapes from legal burning
- Arson & Incendiarism
- Ignition of abandoned/stolen motor vehicles
- Lightning
- Arching electrical power lines
- Occurrence of an extended drought period;
- Lower than average rainfall through winter and spring;
- Persistent north-west winds; and
- Spring/summer thunderstorm activity ('dry' lightning strikes).

A review of the fire history mapping from NPWS highlights several fires including wildfires and prescribed burns that have occurred within a 1km radius of the subject site. The major fire to partially impact the site was the 1993-94 Wildfire which occur on the northern portions of the site. This fire was likely a result of spotting from this fire event that burnt larger areas to the south-west.

An additional wildfire occurred on the lower southern portions of the site which is known as the Fountain Creek fire (2002-03).

The site also adjoins a prescribed burn to the north-east known as the Dawson Street 2008-09.

5.5 Likely Fire Behaviour

By integrating the information presented in the preceding sections regarding hazard assessment, weather conditions, historical data, and potential sources of ignition, it becomes feasible to forecast likely fire behavior and identify potential fire paths and scenarios. As emphasized in Section 5.3, the problematic fire scenario arises from the convergence of unfavorable fire weather conditions, such as hot and dry north-westerly to westerly winds during late spring and summer, along with ignition caused by dry lightning strikes.

The primary concern for the proposed C4 area stems from the vegetation within the site itself. Figure 10 illustrates various potential pathways originating from the vegetation, with particular emphasis on fires originating from the west/south-west direction.

A vegetated corridor is present to the south-west beyond the M1 Motorway. While the M1 acts as a significant fire break, limiting the spread of fire into the site, the vegetated area itself could serve as a pathway for embers to enter the property and initiate fires within the site.

Additional pathways for fire are observed from the adjacent vegetated lands to the north, beyond Reeves Road. However, these pathways would require north-easterly winds, which are not typically associated with large-scale fire events, to direct the fire toward the subject site.

Regarding fire control measures, the site offers limited opportunities for bushfire suppression. Although some fire trails are available, the ability to suppress fires on the ground through manual vegetation removal is challenging due to restricted access. Establishing control lines would necessitate aerial bombing to create effective containment measures.

There is a possibility of conducting fire-fighting operations from Reeves Road to the north; however, these aspects pose a lesser risk to the subject site compared to other aspects discussed.

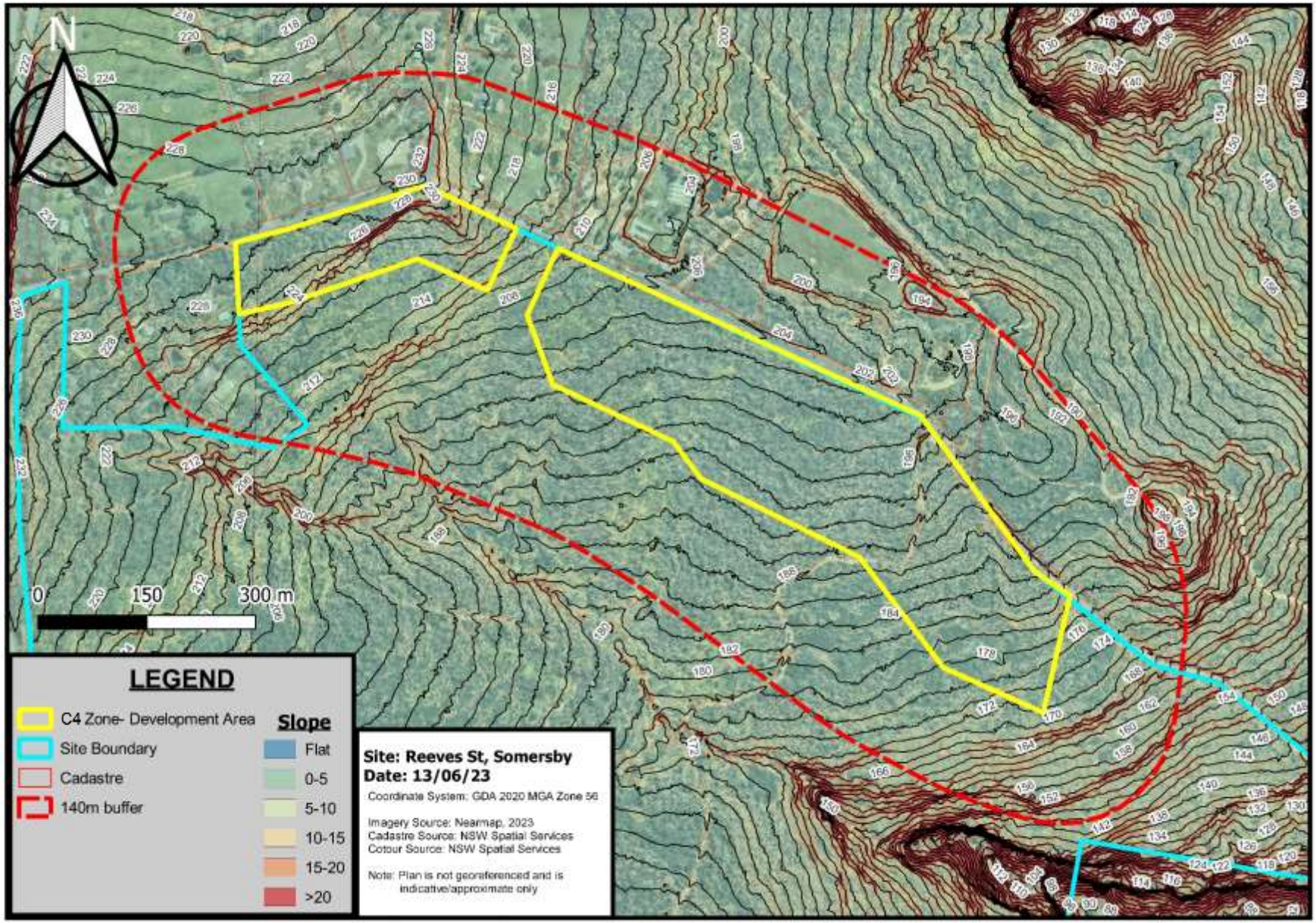


Figure 8: Topographic mapping

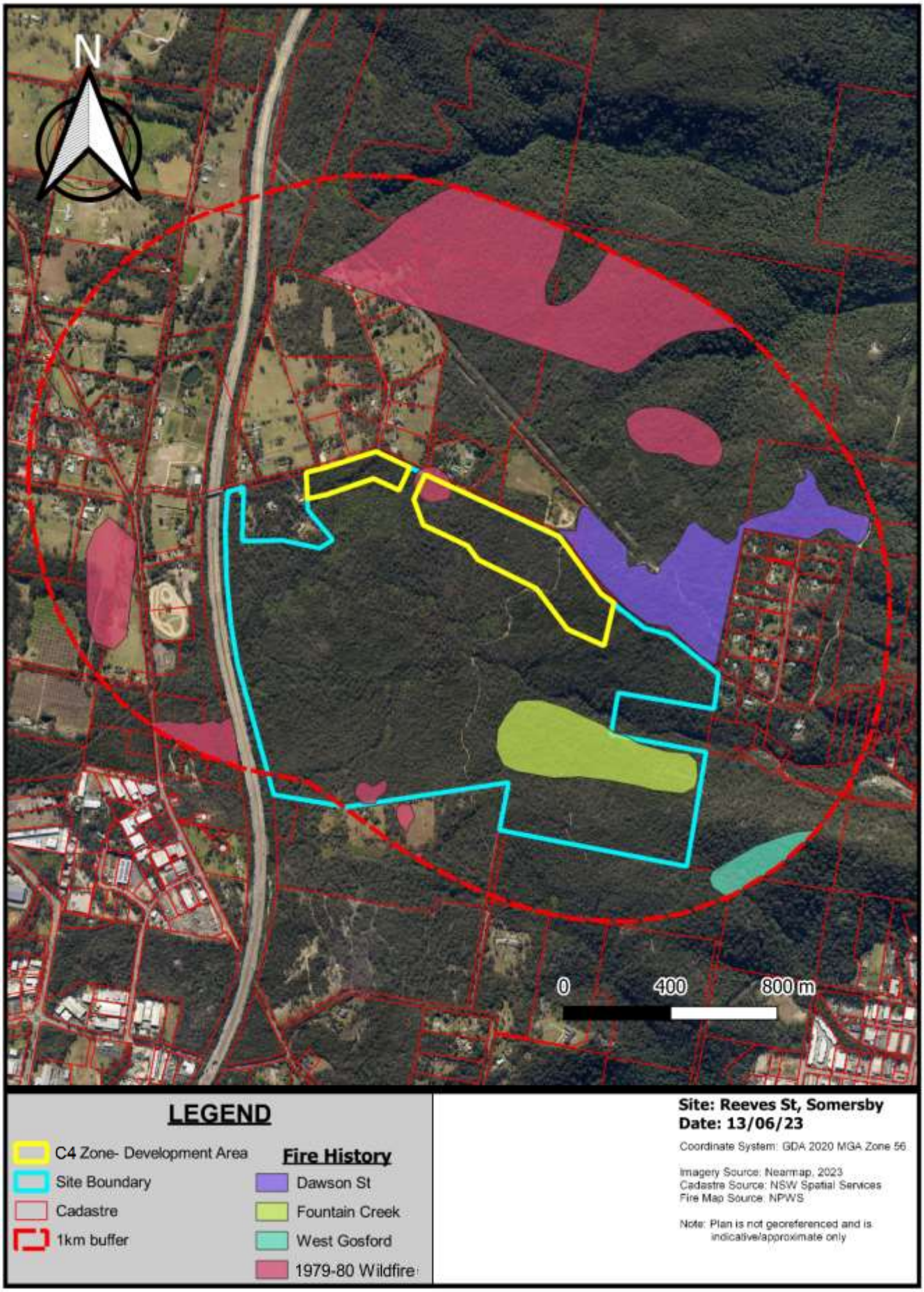


Figure 9: Fire History

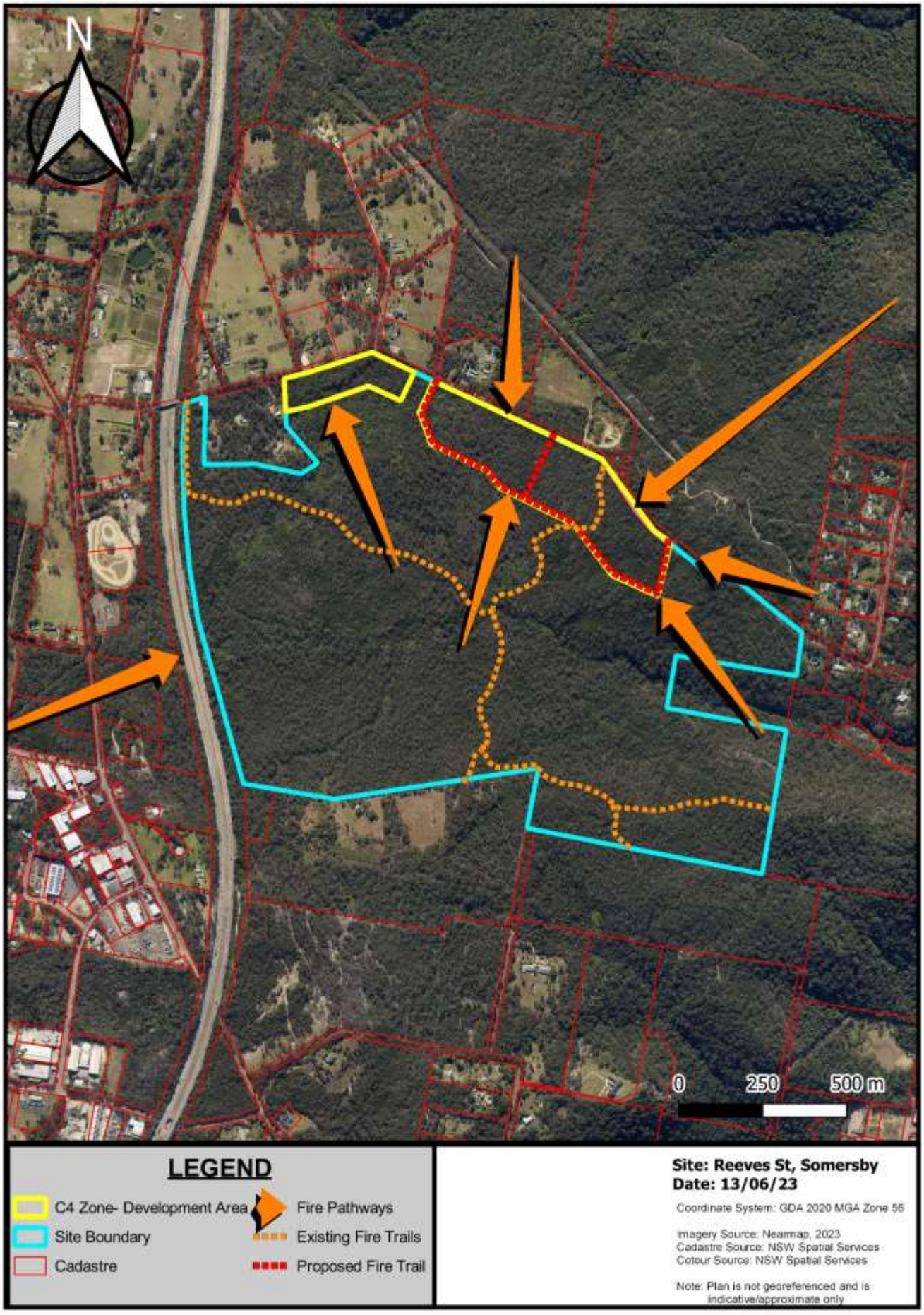

N
0
250
500 m
LEGEND
C4 Zone- Development Area
Site Boundary
Cadastre
Fire Pathways
Existing Fire Trails
Proposed Fire Trail
Site: Reeves St, Somersby
Date: 13/06/23
Coordinate System: GDA 2020 MGA Zone 56
Imagery Source: Nearmap, 2023
Cadastre Source: NSW Spatial Services
Colour Source: NSW Spatial Services
Note: Plan is not georeferenced and is indicative/approximate only

Figure 10: Potential Fire Pathways

6.0 LAND USE ASSESSMENT

6.1 The Risk Profile

Risk is the function of likelihood and consequence, where the consequence is a factor of exposure and vulnerability.

In terms of event likelihood, the risk of a bushfire igniting, spreading and causing damage to future development at the subject site has been assessed following the outcomes of the preceding **Bushfire Landscape Assessment**. The Central BFRMP also identifies that deliberate ignition is observed, largely as a result of the interface of the urban population with a hazard. This translates to an *almost certain probability of higher fire danger* (relevant to historic observed conditions of the Greater Sydney fire weather region), *likely probability of ignition*, and the probability of resulting bush fire occurring is *possible*.

From a risk consequence perspective, the proposed rezoning immediately adjoins vegetation to the south and west. Furthermore, the proposed C2-zoned areas will retain the existing vegetation and provide a bushfire threat to any future works. Thus, exposure to potential flame contact, radiant heat and ember attack is potentially present, unless otherwise mitigated via strategic and/or site-based bush fire protection measures.

Having regard to *vulnerability*, rezoning smaller lot rural residential alters the nature of the land use, the following land use risk profile has been identified in the Study:

- The requirement and ability of the site to accommodate Asset Protection Zones wholly within the subject site;
- The inability for any future works to incorporate perimeter roads into the design;
- The study site does not contain any significant cumulative risks;
- The feasibility of complementary and consistent risk management through the landscape and building design, and community programs for any future works.

6.2 Asset Protection Zones

Appendix 1 of PBP provides a methodology for determining the Asset Protection Zone (APZ) required for any given proposed development. APZ's describe the distance between the proposed development (the asset) and the hazard (the bushland) and vary according to topography and vegetation type. PBP states that the primary purpose of an APZ is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures within the development.

Using the vegetation and slope data presented in Section 5 of this report, APZs have been determined and accommodated within the subject site. The required APZ distances are presented in Table 3 whilst Figure 12 provides the APZ layer on the proposed rezoning plan.

Areas that will require an APZ at an interface with a bushfire hazard that will not already be provided by roads or open space are listed in Table 3 below.

Table 3: Asset Protection Zones

Aspect	Vegetation[1] within 140m of development	Effective Slope of Land	APZ Required[2]	Recommended APZ[3]
North	Forest	0-5° Down Slope	29m	40m
South	Forest	5-10° Down Slope	36m	49m
West	Forest	5-10° Down Slope	36m	49m
		0-5° Down Slope	29m	40m
East	Forest	5-10° Down Slope	36m	49m
		0-5° Down Slope	29m	40m

Notes for Table 3:

- (1) Refer to Keith (2004) and Appendix 1 in *PBP*
- (2) Refer to Table A1.12.1 in PBP for Residential Subdivision Development
- (3) Refer to Table A1.12.5 in *PBP*

Based on the data presented in Table 3, the recommended Asset Protection Zones (APZs) exceed the minimum requirements stipulated in Table A1.12.1 of PBP. The suggested APZs align with the BAL 19 as prescribed in Table A1.12.5 of PBP. This increase of the APZ, coupled with the proposal that any forthcoming residential constructions adhere to the more stringent BAL 29 classification, will provide an additional layer of defence against potential radiant heat impacts. Furthermore, it will enable the implementation of effective fire mitigation strategies within the properties, incorporating the proposed fire trail for enhanced safety measures.

6.3 Construction Requirements for Future Buildings

Buildings proposed within bushfire prone land are required to be assessed to ascertain the Bushfire Attack Level (BAL) in order to design and construct the building in compliance with the corresponding suite of construction specifications listed within Australian Standard *AS 3959- 2018 Construction of buildings in bushfire prone areas*. Such an assessment does not occur until the development application stage.

Based on the minimum APZ dimensions listed in Table 3, those buildings closest to the hazard will have a rating of BAL-29, whilst an APZ equating to BAL 19 has been recommended. The rating reduces to BAL-19, BAL-12.5 and BAL-LOW (no requirements) the further a building is located from a hazard.

The following Figure 11 as sourced from Table A1.7A in PBP provides a background of potential bushfire impacts associated with the corresponding BAL ratings.

Heat flux exposure	Description	AS 3959 construction level
N/A	Minimal attack from radiant heat and flame due to the distance of the building from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements.	BAL-LOW
≤12.5	Attack by burning debris is significant with radiant heat (not greater than 12.5kW/m^2). Radiant heat is unlikely to threaten building elements (such as unscreened glass). Specific construction requirements for ember protection and accumulation of debris are warranted.	BAL-12.5
>12.5 ≤19	Attack by burning debris is significant with radiant heat flux (not greater than 19kW/m^2) threatening some building elements (such as screened glass). Specific construction requirements for embers and radiant heat are warranted.	BAL-19
>19 ≤29	Attack by burning debris is significant and radiant heat flux (not greater than 29kW/m^2) threatens building integrity. Specific construction requirements for ember and higher levels of radiant heat are warranted. Some flame contact is possible.	BAL-29
>29 ≤40	Radiant heat flux and potential flame contact could threaten building integrity.	BAL-40
>40	Significant radiant heat and significantly higher likelihood of flame contact from the fire front will threaten building integrity and result in significant risk to residents.	BAL-FZ

Figure 11: BAL ratings
Source: PBP

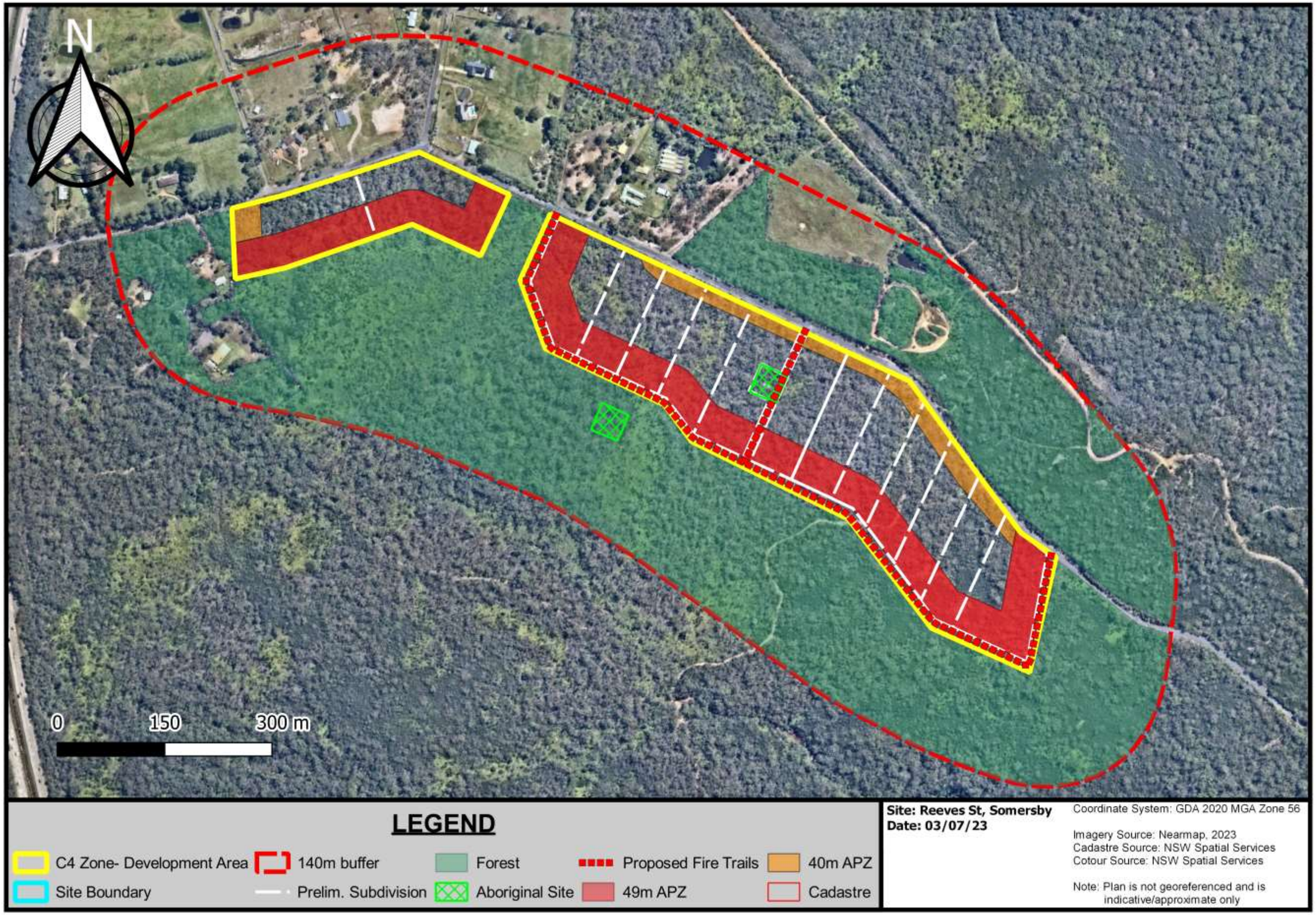


Figure 12: APZ Site Plan

7.0 ACCESS AND EGRESS

As identified in the Traffic Impact Assessment for the rezoning undertaken by Intersect Traffic (May 2023) the site has two main evacuation routes available during a bushfire emergency, those being:

1. West along Reeves Road, then north along Debenham Road North, then further north along Wiseman's Ferry Road to Peats Ridge Road and the M1 Pacific Motorway; and
2. West along Reeves Road then south along Debenham Road North to Chivers Road then further south to Gindurra Road and south along Wiseman's Ferry Road to the Central Coast Highway.

Both routes are sealed and have road widths of at least 6 meters, meeting the requirements of the NSW Rural Fire Service. The roads allow for the passage of bushfire-fighting vehicles while residents evacuate. However, the roads are heavily vegetated, requiring maintenance to provide a 4-meter clearance along their lengths.

The Reeves Street catchment area has approximately 60 dwellings, and considering the average car ownership of 3 vehicles per dwelling, up to 180 vehicles could be evacuating Reeves Street simultaneously. The evacuation route network, consisting of Reeves Street, Debenham Road North, and Wiseman's Ferry Road, has a two-way mid-block capacity exceeding 1,000 vehicles per hour, which is sufficient to accommodate both the vehicles evacuating during a bushfire emergency and the fire fighting vehicles traveling to combat the fire.

For non-perimeter roads on evacuation routes (5.5 metres minimum). They allow bushfire fighting vehicles to pass residents evacuating from the bushfire emergency.

The roads are heavily vegetated in areas and the surrounding vegetation will need to be maintained to provide a 4-metre clearance along the road lengths.

The Traffic Impact Assessment concluded that the site has suitable bushfire evacuation routes that comply with the requirements of the NSW Rural Fire Services Planning for Bushfire Protection. The two available routes meet the necessary road width criteria and allow for the passage of both evacuating residents and firefighting vehicles. However, it was highlighted that there will be a requirement to maintain the vegetation surrounding the roads to ensure a 4-meter clearance for effective evacuation. With the capacity of the road network exceeding the potential number of vehicles evacuating, it is determined that the site is adequately supported in terms of bushfire evacuation routes.

7.1 Proposed Fire Trail

The proposal will involve the creation/construction of a fire trail. The fire trail will serve both as access to Aboriginal Sites and the C2 retained areas but also allow for fire-fighting vehicular access for fire suppression. As a result, the proposed fire trail should be constructed and designed to meet with the NSW Rural Fire *Service Fire Trail Standards 2016-Version 1.1* for a Category 1 vehicle. This will include;

Table 1: Category 1 Fire Trail requirements

REQUIREMENT	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
Width	The width of the trail provides for safe, reliable and unobstructed passage by a Category 1 firefighting vehicle within acceptable operational limits.	› The trafficable surface has a width of 4 metres except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed. › Curves have a minimum inner radius of 6 metres. The minimum distance between inner and outer curves is 6 metres.
Capacity	The construction and formation of the trail is trafficable under all weather conditions (other than due to flood, storm surge or snowfall) for a Category 1 firefighting vehicle.	› Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of 9 tonnes.
Grade and crossfall	The vertical profile of the trail provides for traction and safe working angle within the physical operational capability of a Category 1 firefighting vehicle. *Note: This includes design that does not impede the undercarriage of a vehicle.*	› The maximum grade of a trail is not more than 15 degrees. › The crossfall of the trail surface is not more than 6 degrees. › Drainage structures, feature crossings, or other significant changes in the grade of the trail shall be in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual*.
Clearance	A cleared corridor is provided around the trail which permits the unobstructed passage of a Category 1 firefighting vehicle and for a working corridor either side of the vehicle to enable firefighters to exit from, and access equipment in, the vehicle.	› A minimum vertical clearance of 4 metres is provided above the surface of the trafficable surface clear of obstructions.
Passing	The trail provides for two Category 1 firefighting vehicles to pass at appropriate intervals so as to avoid unacceptable delays in operations.	› Capacity for passing is provided every 250 metres comprising: › A widened trafficable surface of at least 6 metres for a length of at least 20 metres; or › A 6 metre wide and 8 metre long area clear of the trafficable surface with a minimum inner curve radius of 6 metres and minimum outer radius of 12 metres; or › A turnaround as provided for in this table.
Turnarounds	The trail provides for a turning manoeuvre for a Category 1 firefighting vehicle to return in the direction from which it came at appropriate intervals and at the termination of a trail.	› A turning area is provided at the termination of a trail and every 500 metres and is achieved by: › An area clear of the trafficable surface 6 metres wide and 8 metres deep, with a minimum inner curve radius of 6 metres and outer minimum radius of 12 metres; or › A turning circle of minimum 22 metre diameter. › A T-junction with each terminating end of the junction being at least 10 metres in length from the intersection of the roads and the inner radius of that intersection being at least 6 metres › A fire trail or road intersection.
Drainage	The fire trail is drained effectively to manage rainfall runoff to prevent damage to the trafficable surface.	› Drainage of the trail is designed and constructed in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual*.

Figure 13. Category 1 Fire Trail requirements
Source: Planning for Bushfire Protection, 2019

8.0 EMERGENCY SERVICES

Any urban development inherently increases the local resident population, which in turn increases demand or reliance on local emergency services, at least to an extent. The proposed rezoning would allow for up to 14 new dwellings.

Concerning the existing emergency infrastructure, the following RFS stations are located nearby;

- Somersby RFS (~1.5-2km to the west);
- Kariong RFS (~8km to the south);

Additional NSW Fire and Rescue resources stationed at Kariong would also attend any emergency and is located approximately 7km south. The proximity of emergency services to the precinct is considered adequate, provided emergency management and planning fosters a 'leave early' approach.

In addition, any future development within the subject site will require compliance with PBP for access and also water supply requirements listed in Table 5.3d of PBP are applicable for fire fighting (see Figure 14).

The combined land use, access and egress and infrastructure responses of the proposed rezoning to bush fire hazard and risk, analysed by this study, seek to limit the potential exposure of persons and property to unacceptable or intolerable bush fire risk. It does this by adopting measures in a combination approach, utilising a suite of bushfire protection measures that satisfy the strategic principles of PBP, which also minimises the potential demand on emergency services in the event of bush fire.

8.1 Neighbourhood Safer Places (NSPs)

There are two existing NSPs in close proximity to the subject land, which are situated in two different directions from the subject land:

- Mt. Penang Parklands Village Green (Human Settlement), 7.5km south, located at 86-Village Green 1, Corner Carinya St and Parklands Road, Kariong
- The Springs Golf Club (Human Settlement), 15.5 km north-west, located at 1080 Peats Ridge Rd, Peats Ridge

9.0 INFRASTRUCTURE

9.1 Water

Any future subdivision upon the subject site is required to comply with PBP. As the property and future allotments have no access to a reticulated supply of water each future allotment will be required to provide a static supply of water as per the requirements of Table 5.3d of PBP (see Figure 14). The PBP acceptable solution requirements for water is achievable.

Table 5.3d

Water supply requirements for non-reticulated developments or where reticulated water supply cannot be guaranteed.

DEVELOPMENT TYPE	WATER REQUIREMENTS
Residential lots (<1,000m²)	5,000L/lot
Rural-residential lots (1,000-10,000m²)	10,000L/lot
Large rural/lifestyle lots (>10,000m²)	20,000L/lot
Multi-dwelling housing (including dual occupancies)	5,000L/dwelling

Figure 14. Water supply requirements
Source: Planning for Bushfire Protection, 2019

9.2 Electricity and gas

Any future subdivision upon the site is required to comply with PBP. This will include either underground electricity supply to the subject land or 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 are provided in Appendix A.

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

11.0 BUSHFIRE PROTECTION MEASURES SUMMARY

The following provides a summary of the proposed Bushfire Protection Measures incorporated into the proposed rezoning;

1. **Asset Protection Zones (APZs):**
    - The recommended APZs, based on the data presented in Table 3, go beyond the minimum requirements specified in Table A1.12.1 of the Bushfire Planning and Design (PBP) guidelines.
    - These suggested APZs are in alignment with the BAL 19 (Bushfire Attack Level) classification as prescribed in Table A1.12.5 of the PBP.
    - By increasing the size of the APZs, there will be an additional layer of defense against potential radiant heat impacts.
    - Furthermore, it is proposed that any future residential constructions should adhere to the more stringent BAL 29 classification, which will further enhance safety measures.

2. **Landscaping**
    - Any future subdivision/allotment on the subject site must comply with the Landscaping requirements outlined within Appendix 4 of PBP

3. **Access and Bushfire Evacuation:**
    - The Traffic Impact Assessment conducted concludes that the site has suitable bushfire evacuation routes that comply with the requirements of the NSW Rural Fire Services Planning for Bushfire Protection.
    - The two available routes meet the necessary road width criteria and can accommodate both evacuating residents and fire fighting vehicles.
    - It is highlighted that maintaining a 4-meter clearance of vegetation surrounding the roads is necessary for effective evacuation.
    - With the road network's capacity exceeding the potential number of evacuating vehicles, it is determined that the site is adequately supported in terms of bushfire evacuation routes.

4. **Fire Trail Construction**:
    - The proposal includes the creation/construction of a fire trail, which will serve as an access route to Aboriginal Sites and the C2 retained areas.
    - The fire trail will also enable fire-fighting vehicles to access the area for fire suppression purposes.
    - Consequently, the proposed fire trail must be constructed and designed in accordance with the NSW Rural Fire Service Fire Trail Standards 2016-Version 1.1 for a Category 1 vehicle.

5. **Future Subdivision Requirements for Water, Electricity and Gas Installations:**
    - Any future subdivision/allotment on the subject site must comply with Table 5.3 of PBP
    - Since the property and future allotments do not have access to a reticulated supply of water, each future allotment will be required to provide a static supply of water as per the requirements of Table 5.3d of the PBP (refer to Figure 14).
    - Additionally, compliance with PBP requirements is expected at the Development Application (DA) stage. This includes either underground electricity supply to the subject land or ensuring that no part of a tree is closer than 0.5 m to the powerline conductors if the electrical transmission line is above ground.
    - Reticulated or bottled gas installations on the lot must follow Australian Standard AS/NZS 1596 'The storage and handling of LP Gas' (Standards Australia 2014) and meet the requirements of relevant authorities. The use of metal piping is necessary for these installations.

Based upon the detailed assessment of the surrounding vegetation conditions and risk profile, with the implementation of the recommended Bushfire Protection Measures within this document, the proposed rezoning and future land usage meet the aims and objectives of PBP.

12.0 CONCLUSION

Clarke Dowdle & Associates has been engaged by the Darkinjung Local Aboriginal Land Council (DLALC) to conduct a Strategic Bushfire Study (the Study) on the property located at Reeves Street Somersby. The assessment was performed in June 2023 and was conducted in accordance with the procedures and methods recommended in the NSW Rural Fire Service published document '*Planning for Bushfire Protection, 2019'* (PBP).

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.

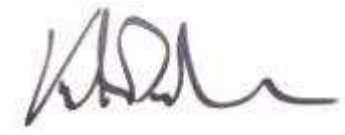
In conclusion, the proposal to rezone the subject site satisfies EP&A Act s.9.2 Direction 4.3 – 'Planning for Bush Fire Protection' and Planning for Bush Fire Protection 2019. The proposal is not considered incompatible with the surrounding environment and bushfire risk. With sound bushfire management, the proposal can coexist within the bushland setting.

The determining authorities and Rural Fire Service may suggest further or additional measures to be implemented in the planning and construction on the subject site.

We would be pleased to provide further information on any aspects of this report.

For and on behalf of

Clarke Dowdle and Associates



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- *It is important to note that the measures outlined in the relevant requirements of AS3959-2018 Construction of Buildings in Bushfire-Prone Areas, NASH Standard - Steel Framed Construction in Bushfire Areas 2021, and the construction requirements in Planning for Bushfire Protection 2019 cannot provide a guarantee that a building will survive a bushfire event on every occasion. This is primarily due to factors such as the level of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions. As a result, Clarke Dowdle & Associates disclaims any claims and assumes no liability in the event of any damage, loss of property, or loss of life resulting from a bushfire event.*

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- Intersect Traffic (2023) *Traffic Impact Assessment –Planning Proposal-Environmental Living Residential Development – 250 Reeves Street, Somersby.*
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APPENDIX A PBP PERFORMANCE CRITERIA COMPLIANCE

The following tables outline the performance requirements and acceptable solutions provided in Section 4.2 of PBP for any future subdivision's compliance.

Asset Protection Zones

Intent of measures: *to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
ASSET PROTECTION ZONES	potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.
	APZs are managed and maintained to prevent the spread of a fire towards the building.	APZs are managed in accordance with the requirements of Appendix 4.
	the APZs is provided in perpetuity.	APZs are wholly within the boundaries of the development site
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees.
LANDSCAPING	landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	landscaping is in accordance with Appendix 4; and fencing is constructed in accordance with section 7.6.

Access

Intent of measures: *to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
ACCESS	firefighting vehicles are provided with safe, all-weather access to structures.	• property access roads are two-wheel drive, all-weather roads; • perimeter roads are provided for residential subdivisions of three or more allotments; • subdivisions of three or more allotments have more than one access in and out of the development; • traffic management devices are constructed to not prohibit access by emergency services vehicles; • 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; • all roads are through roads; • dead end roads are not recommended, but if unavoidable, 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; • where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; • where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and • one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.
	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.	• hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; • hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning*; and • there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.
PERIMETER ROAD	access roads are designed to allow safe access and egress for 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.	• are two-way sealed roads; • minimum 8m carriageway width kerb to kerb; • parking is provided outside of the carriageway width; • hydrants are located clear of parking areas; • are through roads, and these are linked to the internal road system at an interval of no greater than 500m; • curves of roads have a minimum inner radius of 6m; • the maximum grade road is 15 degrees and average grade of not more than 10 degrees; • the road crossfall does not exceed 3 degrees; and • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

NON-PERIMETER ROAD	access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	• minimum 5.5m carriageway width kerb to kerb; • parking is provided outside of the carriageway width; • hydrants are located clear of parking areas; • roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; • curves of roads have a minimum inner radius of 6m; • the road crossfall does not exceed 3 degrees; and • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
PROPERTY ACCESS	firefighting vehicles can access the dwelling and exit the property safely	• There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided 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. In circumstances where this cannot occur, the following requirements apply: • minimum 4m carriageway width; • 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; • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; • provide a suitable turning area in accordance with Appendix 3; • curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; • the minimum distance between inner and outer curves is 6m; • the crossfall is not more than 10 degrees; • maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and • a development comprising more than three dwellings has access by dedication of a road and not by right of way.

Services-Water, electricity and gas

***Intent of measures**: to 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.*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
WATER SUPPLY	adequate water supplies is provided for firefighting purposes.	• reticulated water is to be provided to the development where available; • a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and • static water supplies shall comply with Table 5.3d.
	• water supplies are located at regular intervals; and • the water supply is accessible and reliable for firefighting operations.	• fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005; • hydrants are not located within any road carriageway; and • 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 the relevant clauses of AS 2419.1:2021.
	the integrity of the water supply is maintained.	• all above-ground water service pipes are metal, including and up to any taps; and • above-ground water storage tanks shall be of concrete or metal

ELECTRICAL SERVICES	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 of 30m, unless crossing gullies, gorges or riparian areas; and
		  ○ no part of a tree is closer to a power line than the distance set out in ISSC3 *Guideline for Managing Vegetation Near Power Lines*.

GAS SERVICES	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 **-** *The storage and handling of LP Gas*, 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 are not used; and • above-ground gas service pipes are metal, including and up to any outlets.