Frenchs Forest Precinct Strategic Bushfire Study

NSW Department of Planning, Industry and Environment

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Contents

Executive Summary **5**
1. Introduction **6**
1.1 Background 6
1.2 Aims and Objectives 6
1.3 Study Area 6
1.4 Legislative Framework 11
1.4.1 NSW Environmental Planning and Assessment Act (1979) 11
1.4.2 Rural Fires Act 1997 (RF Act) 12
1.5 Assessment Approach 12
1.5.1 Assessment Framework 14
2. Summary of Planning Proposal **16**
3. Bushfire Landscape Risk Assessment **17**
3.1 Bushfire Hazard 17
3.1.1 Vegetation 17
3.1.2 Slope 17
3.1.3 Bushfire Weather 21
3.2 Bushfire Risk Considerations 23
3.2.1 Bushfire History 23
3.2.2 Fire Catchment 23
3.2.3 Potential Fire Behaviour 27
3.2.4 Ignition and Fire Spread Scenarios 28
3.3 Summary of Landscape Bushfire Risk Assessment 28
4. Land Use Assessment **29**
4.1 Risk profile 29
4.1.1 Feasibility of Asset Protection Zones 29
4.1.2 Land use evaluation 36
5. Access and Egress **39**
5.1 Evaluation of Access and Egress 39
5.2 Evacuation 41
6. Emergency Services **44**
7. Infrastructure **46**
7.1 Water 46
7.2 Electricity and gas 46

8. Adjoining Land **47**
9. Assessment of Strategic Planning Requirements **47**
10. Conclusion & Recommendations **50**
11. References **51**
Appendix A – Brick Pit Reserve Concept **53**
Appendix B – Access Specifications: Subdivision and SFPP Development **54**
Appendix C – NSP Criteria **56**
Appendix D - Services Specifications **57**

List of Figures

Figure 1: Frenchs Forest Precinct 7
Figure 2: Current Land Zoning 8
Figure 3: Proposed Land Zoning 9
Figure 4: Bush Fire Prone Land 10
Figure 5: Vegetation formations within the greater Study Area (source: OEH,2016) 19
Figure 6: Slope within the Study Area 20
Figure 7: Directional FDI Analysis 22
Figure 8: Wildfire history within the study area. 24
Figure 9: Wildfire frequency since 1951. 25
Figure 10: Fire catchments influencing the subject land. 26
Figure 11: Bushfire Hazard Assessment and APZ requirement, overall 32
Figure 12: Bushfire Hazard Assessment and APZ requirement, North. 33
Figure 13: Bushfire Hazard Assessment and APZ requirement for current conditions, South 34
Figure 14: Bushfire Hazard Assessment and APZ requirement, future hazards South. 35
Figure 15: Current Access Hierarchy (source: Jacobs, 2020) 40
Figure 16: Existing Declared Neighbourhood Safer Places 42
Figure 17: Preliminary NSP setback requirements 43
Figure 18: Fire Stations in close proximity to the site 45

List of Tables

Table 1: Summary of PBP assessment considerations for a Strategic Bushfire Study (RFS 2019) 14
Table 2: Proposed Zoning, Permissible Land-uses (Warringah LEP 2011) and Potential SFPP Land-uses 16
Table 3: PBP hazard class and fuel loads for vegetation types in the study area 18
Table 4: PBP Indicative APZ requirements 30
Table 5: Future land use evaluation 37
Table 6: Existing NSPs in vicinity of study area 41
Table 7: Fire Stations within proximity to the site 44
Table 8: Evaluation of the rezoning proposal against the Strategic Planning Principles of PBP (RFS 2019) 48

Table 9: Performance criteria for access for residential and rural residential subdivisions.....54
Table 10: Assessment criteria for an NSP (RFS 2017) 56
Table 11: Principles for NSP site identification (RFS 2017) 56
Table 12: Performance criteria for services provision for residential and rural residential subdivisions57

Executive Summary

When investigating the capability of Bush Fire Prone Land in relation to rezoning, the *NSW Environmental Planning and Assessment Act 1979* prescribes that consent authorities must have regard to s.9.1 (2) Direction 4.4 – 'Planning for Bushfire Protection'. Direction 4.4 prescribes consultation with the NSW Rural Fire Service (RFS); having regard to '*Planning for Bush Fire Protection 2019*' (PBP); and compliance with the provision of bushfire protection measures.

This Strategic Bush Fire Study evaluates the proposed rezoning of the subject land and the future development contemplated against the strategic planning principles and 'inappropriate development' requirements stated in Chapter 4 Strategic Planning of PBP. The applicable bushfire assessment framework for strategic planning outlined in PBP, was applied to the rezoning proposal for the Frenchs Forest Precinct.

The key findings of this study are that the subject land is not exposed to a 'high' bushfire risk, and the proposed rezoning does not present an unacceptable risk for future development. Whilst areas of elevated bushfire risk exist in the broader landscape, the feasibility of bushfire protection measures for future development within the subject land, the small extent of internal bushfire hazard, and the separation of the subject land to bushfire hazards surrounding the site, means the residual risk can be lowered to an appropriate level, and thus the rezoning proposal is considered consistent with the strategic planning principles of PBP.

As the primary purpose of the rezoning is to facilitate future development of a new town centre and it is located in a lower risk setting, it is recommended that opportunities for onsite refuge are investigated to increase the overall resilience of the broader community to bushfire. This could be provided by built or open space within future community facilities.

1. Introduction

This Strategic Bushfire Study has been prepared for the Planning Proposal developed by the NSW Department of Planning, Industry and Environment (DPIE) which contemplates rezoning for the Frenchs Forest Precinct and Town Centre. This study provides an assessment of the proposed rezoning in regard to the strategic planning principles outlined in '*Planning for Bushfire Protection*' (PBP) (RFS 2019). This is the first step in the planning pathway. Once rezoning is approved, it is anticipated that future development will be activated via the Development Application process.

1.1 Background

The Frenchs Forest Precinct (the subject land) (Figure 1) is situated within the Northern Beaches Local Government Area (LGA) and is currently primarily zoned R2 Low Density Residential under the Warringah Local Environment Plan (LEP) 2011 (Figure 2). ELA understands that the Planning Proposal seeks to rezone the subject land to facilitate the future development of a new town centre, the provision of medium density residential and shop top housing opportunities, recreation land uses, infrastructure, and alignment of the existing hospital with special infrastructure zoning (Figure 3).

1.2 Aims and Objectives

The aim of this study is to review the rezoning proposal in relation to the strategic planning requirements of PBP. The key objective is to undertake a Strategic Bushfire Study (SBS) as per the strategic planning principles, 'inappropriate development' exclusions and assessment considerations outlined in PBP.

1.3 Study Area

The subject land (Figure 1) is located approximately 20 km north of the Sydney CBD, with the central portion of the site bounded by Frenchs Forest Road west to the north, Warringah Road to the south, and the Wakehurst Parkway to the east.

The central portion of the subject land is currently occupied by the Northern Beaches Hospital and The Forest High School, with existing residential land use zones located north of Frenchs Forest Road West and south of Warringah Road. There are also existing commercial land uses in Bantry Bay in the south east aspect of the site.

As the rezoning proposal does not trigger any change in the current land use of the Northern Beaches Hospital site nor will it facilitate any further development of this site, which has recently been through a redevelopment, this particularly site was not assessed by this study (i.e. no change to the status quo).

The subject land is mapped as vegetation buffer on the Northern Beaches Council bushfire prone land (BFPL) map as published by the DPIE (Figure 4).

Figure 1: Frenchs Forest Precinct

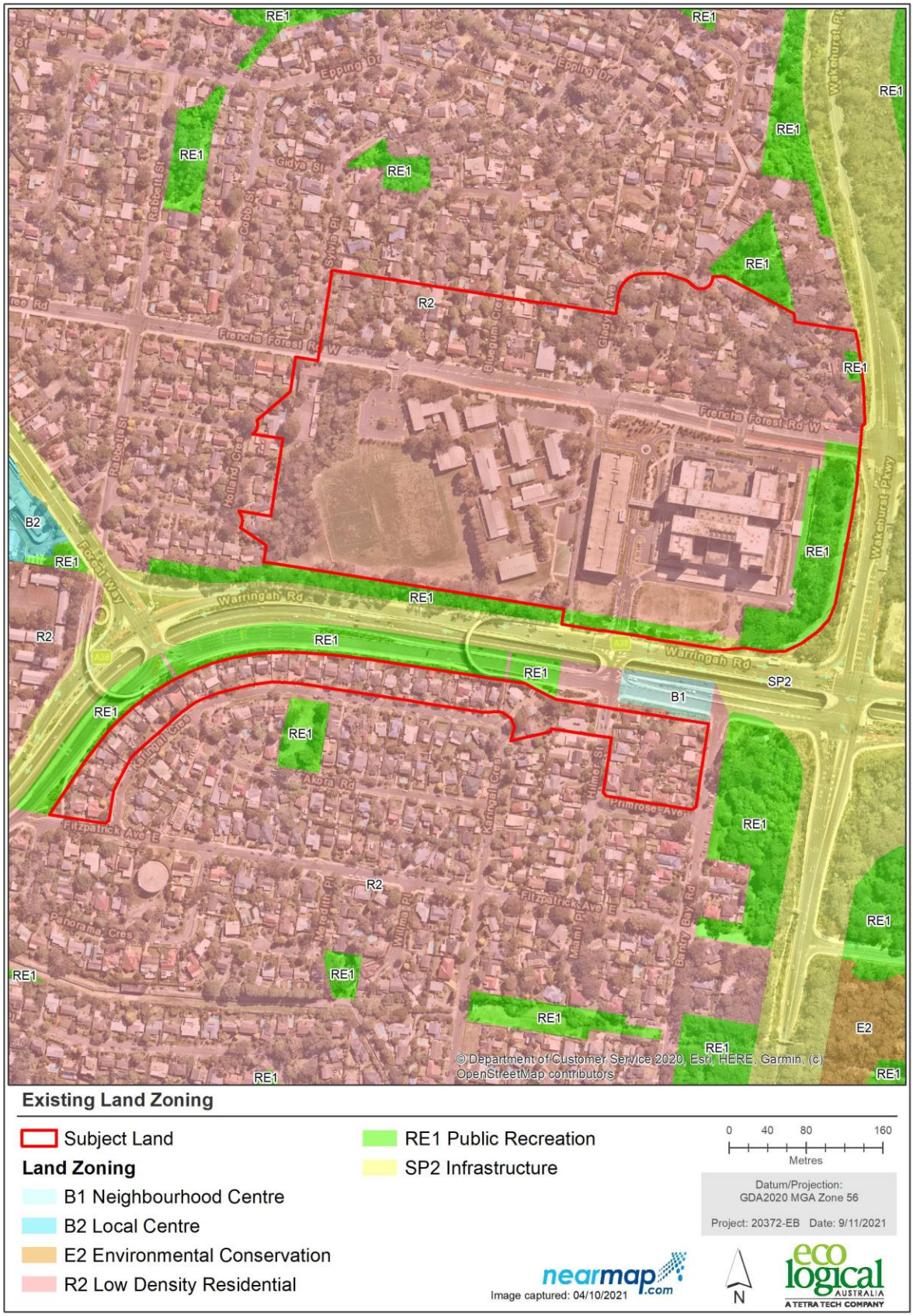

Figure 2: Current Land Zoning

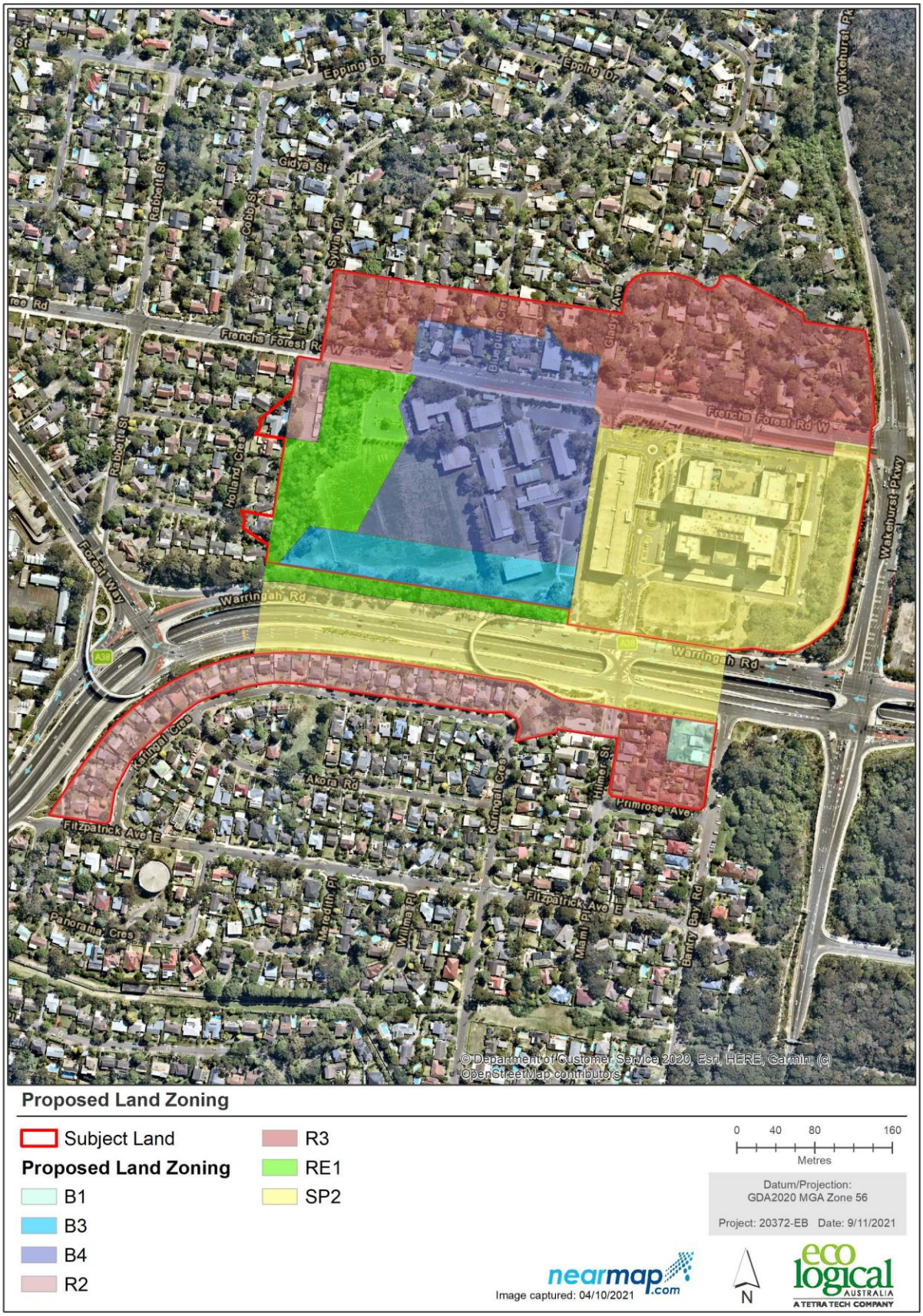

Figure 3: Proposed Land Zoning

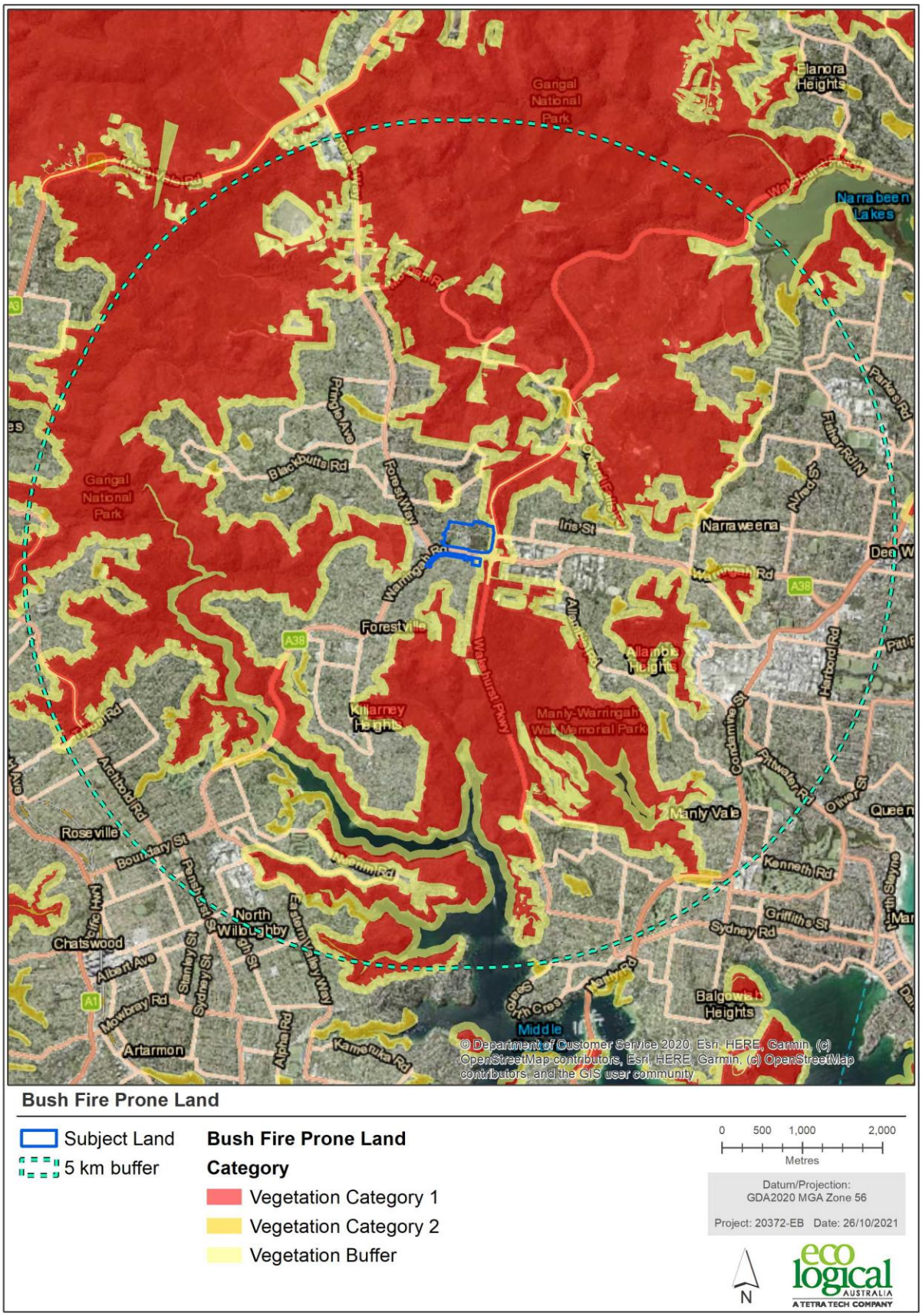

Figure 4: Bush Fire Prone Land

1.4 Legislative Framework

Under the Ministerial Direction 4.4 (Planning for Bushfire Protection) issued under Section 9.1 (2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), 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). Therefore, the assessment detailed in this study seeks to outline how the proposal can adhere to the requirements of PBP. The legislative framework guiding the assessment of bushfire risk and the application of bushfire protection measures at the strategic level, includes the NSW *EP&A Act* and the *Rural Fires Act 1997* (RF Act). Key aspects of these instruments are outlined below.

1.4.1 NSW Environmental Planning and Assessment Act (1979)

The NSW *EP&A* Act is the principal planning legislation for the state, providing a framework for the overall environmental planning and assessment of development proposals. Various legislation and instruments are integrated with the *EP&A Act*, including the *RF Act*. Section 10.3 of the *EP&A Act* requires the identification of BFPL and development of BFPL maps, which act as a trigger for bushfire assessment provisions for strategic planning and development. When investigating the capability of BFPL in relation to a planning proposal, consent authorities 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 bushfire prone areas; and
- To encourage sound management of bushfire prone areas.

Direction 4.4 instructs the consent authority on the bushfire matters which need to be addressed with respect to master planning. This includes:

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

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

- Section 3.29 of the *EP&A Act* relates to the development of State Environmental Planning Policies (SEPPs) and within these policies, bushfire considerations may apply for example:
  - Codes SEPP (Exempt and Complying Development Codes)
    - Clause 34 specifies complying development standards that prescribe compliance with PBP and AS3959, with development on BFPL not permitted within BAL-40 and BAL-FZ.
  - Seniors Housing SEPP (Housing for Seniors or People with a Disability)
    - Clause 27 of the SEPP requires PBP compliance and RFS consultation for development on BFPL.
  - Infrastructure SEPP
    - Clause 16 of the SEPP requires RFS consultation for residential or Special Fire Protection Purpose (SFPP) development on BFPL; and

- Section 4.14 relates to infill and other development.
  - Requires that all development on BFPL conforms to the specifications and requirements outlined in PBP, i.e., the specific requirements for residential infill in Chapter 7; and
  - The consent authority should be satisfied that the development conforms to PBP, or otherwise consult with the RFS Commissioner.
- Section 4.46 relates to integrated development and triggers Section 100B of the *RF Act* and Clause 44 of the *Rural Fires Regulation 2013* (RF Reg):
  - Applicable to subdivision, with specific requirements in Chapter 5 of PBP.
  - Applicable to SFPP developments, with specific requirements in Chapter 6 of PBP; and
  - Requires a bushfire safety authority under Section 100b of the *RF Act*.
- Section 9.1 relates to strategic or local planning.
  - Applicable to land use planning that covers large areas and may include a variety of land uses and longer-term development objectives. Specific requirements are outlined in chapter 4 of PBP.

1.4.2 Rural Fires Act 1997 (RF Act)

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

- Prevention, mitigation and suppression of bushfires;
- Co-ordination of bush fire fighting and bush fire prevention;
- Protection of persons from injury or death, and property from damage, arising from fires;
- Protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires; and
- Protection of the environment by requiring certain activities have regard to the principles of ecologically sustainable development.

1.5 Assessment Approach

Section 9.1 (2) of the *EP&A Act* triggers consideration of PBP for strategic planning. Chapter 4 of PBP contains strategic planning principles, 'inappropriate development' exclusions and assessment considerations required for strategic planning proposals. Chapter 4 of PBP prescribes the completion of a Strategic Bushfire Study, which provides the opportunity to assess whether proposed land uses associated with master planning are appropriate in the bushfire risk context. It also provides the ability to assess the strategic implications of future development for bushfire mitigation and management.

The strategic planning principles of PBP are:

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

These principles trigger the consideration of bushfire protection measures at the strategic planning stage, to provide an opportunity to consider the suitability of future land uses within the broader bushfire risk setting and that future land uses can meet the aim and objectives of PBP outlined below:

> *The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of 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 defendable 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.*

In addition, Chapter 4 of PBP prescribes that strategic planning should exclude 'inappropriate development' in bushfire prone areas, where:

- *the development area is exposed to a high bush fire risk and should be avoided;*
- *the development is likely to be difficult to evacuate during a bush fire due to its siting in the landscape, access limitations, fire history and/or size and scale;*
- *the development will adversely affect other bush fire protection strategies or place existing development at increased risk;*
- *the development is within an area of high bush fire risk where density of existing development may cause evacuation issues for both existing and new occupants; and*
- *the development has environmental constraints to the area which cannot be overcome.*

This study therefore assesses the proposal in the context of the PBP strategic planning principles, 'inappropriate development' exclusions as well as the assessment considerations identified in Table 4.2.1 of PBP, summarised in Table 1 below.

Table 1: Summary of PBP assessment considerations for a Strategic Bushfire Study (RFS 2019)

Issue	Summary of Assessment Considerations
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 master plan area or site layout for the proposed uses.
Access and egress	A study of the existing and proposed road networks both within and external to the planning proposal/master plan area and site layout.
Emergency services	An assessment of the future impact of the new development on emergency services provision.
Infrastructure	An assessment of the issues associated with infrastructure provision.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.

1.5.1 Assessment Framework

Investigation of the suitability for development within an area of interest, involves a complex and large array of bushfire-related issues and concepts. Prioritisation of first principle bushfire risk considerations is critical. Therefore, the following bushfire assessment framework will guide this study.

1.5.1.1 Residual risk

All BFPL poses a bushfire risk. Complete removal of bushfire risk is not appropriate or possible in many instances, nor is it a policy setting under PBP. Determining whether the level of residual risk (i.e., the level of risk after application of bushfire protection measures) is a key factor in the strategic assessment of whether a development proposal is appropriate.

Provided the risk exposure is appropriately reduced, development can occur with an appropriate level of safety on BFPL. PBP outlines the measures to achieve bushfire risk reduction generally and establishes the NSW policy setting for appropriate bushfire protection. Experience and research have successfully demonstrated appropriate bushfire protection is feasible within a very wide range of bushfire risk situations. Nevertheless, development on BFPL always has a residual bushfire risk e.g., from burning debris or for offsite evacuation, regardless of the initial risk level and risk treatments. This SBS acknowledges that the outcome of any potential development on BFPL resulting from the planning proposal includes a level of residual risk and explores the acceptability of that risk.

1.5.1.2 Risk to life versus risk to property

A lower residual risk is required for the protection of life than that required for the protection of built assets, due to the vulnerability of people exposed to bushfire attack and the pre-eminent value assigned to human life. Assessment of the residual risk has therefore considered life and property risks separately, in the first instance.

1.5.1.3 Life protection and evacuation

An appropriately low residual risk to human life is fundamentally important in bushfire protection. Whilst offsite evacuation potentially offers a safer destination, the risks associated with undertaking offsite evacuation (e.g., travel during an emergency) can pose additional risks. Also, the logistical

challenges of offsite evacuation can be high and should not become an unacceptable burden on emergency services, and in a strategic planning context, should not adversely impact the demands of the existing emergency service evacuation management.

Early offsite evacuation is the nationally accepted safest means for protection of life and for offsite evacuation to be effective, it should not require the assistance of emergency services. Notwithstanding that early unassisted offsite evacuation is a key risk assessment benchmark in this SBS; experience and research has demonstrated that it is not fail-safe or always feasible. Research and post incident inquiries have also found that providing evacuees options (along with warnings and information) is important to their survival.

Alternative options such as onsite refuge and 'shelter-in-place' are also not fail-safe, but design solutions exist in many situations to lower the residual risk to an appropriate level for both onsite and offsite options. A well-designed combination of the two may achieve the lowest residual risk, even if the onsite options are considered a 'redundancy' in terms of bushfire risk planning.

1.5.1.4 Emergency service response

The acceptability of proposed development should not be reliant on emergency service response / intervention. However, an emergency service response is a legitimate risk lowering consideration, that can be viewed as a bushfire protection 'redundancy' in a strategic planning context.

1.5.1.5 Adjoining lands

Whilst fuel management (e.g., hazard reduction burning) lowers bushfire risk under most circumstances, during extreme bushfire attack and with increasing time after a burn, the life and property protection benefit is likely to be minimal. As fuel management programs achieving a satisfactory level of risk reduction cannot be guaranteed, they cannot be relied upon for life and property protection design in a strategic planning context.

2. Summary of Planning Proposal

The proposed rezoning will facilitate differing land use activities and future development across the site, as shown in Figure 3. It presents a plan that enables a variety of residential topologies as well as non-residential uses. Future land uses enabled by the planning proposal and structure plan would be subject to various aspects of PBP, when occurring on BFPL. These aspects are summarised in Table 2 below.

Table 2: Proposed Zoning, Permissible Land-uses (Warringah LEP 2011) and Potential SFPP Land-uses

Proposed Zoning	Key Land Uses	Potential SFPP Uses
B1 - Neighbourhood Centre	Community facilities, shop top housing, shops, food and drink premises, business premises, supermarket, medical centres, recreation facilities	Home based child care and centre based child care, some community facilities, boarding houses, some recreation facilities
B4 - Mixed Use	Community facilities, commercial premises, entertainment facilities, medical centres, residential flat buildings, shop top housing	Home based child care and centre based child care, some community facilities, senior housing, registered clubs, function centres, hotel or motel accommodation, some recreation and entertainments facilities, boarding houses
B3 - Commercial Centre	Community facilities, commercial premises, entertainment facilities, medical centres	Centre based child care, some community facilities, senior housing, registered clubs, function centres, hotel or motel accommodation, some recreation and entertainment facilities, boarding houses
R2 - Low density Residential	Detached dwellings, dual occupancy, secondary dwellings	Home based child care and centre based child care, hospitals, group homes, education establishments, some community facilities
R3 - Medium Density Residential	Detached dwellings, attached dwellings, secondary dwellings, multi dwelling housing, dual occupancy, residential flat buildings, neighbourhood shops, community facilities	Home based child care and centre based child care, some community facilities, hospitals, group homes, education establishments, places of worship
SP2 - Infrastructure	Roads	n/a
RE1 - Public Recreation	Recreation facilities, community facilities, kiosk, restaurant and cafes	Some recreation facilities and community facilities

3. Bushfire Landscape Risk Assessment

A landscape risk assessment was undertaken for the rezoning proposal and includes assessment of bushfire hazard, potential fire behaviour and bushfire history within a 5 km radius of the LGA.

3.1 Bushfire Hazard

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

3.1.1 Vegetation

Vegetation mapping for the Sydney Metropolitan Catchment (OEH, 2016) was utilised for the broader study area whilst mapping for the subject land was prepared by ELA based on vegetation mapping for the planning proposal and surrounds (SMEC 2015; ELA 2018) previous site inspections undertaken by ELA in October 2018, and NearMap imagery (Figure 5)**.** A summary of the relationship between PBP hazard class and vegetation formation within the study area is shown in Table 3.

The study area is situated within a broader landscape exhibiting forest and heath vegetation, primarily present within Garigal National Park (Figure 5). The Manly Warringah Memorial State Park (Manly Dam) is also located to the southeast, on the eastern side of the Wakehurst Parkway. The Wakehurst Parkway north of Frenchs Forest Road West bisects remnant vegetation north west of the site. Closer to the subject land, the surrounding land is predominately comprised of a mixture of residential and commercial land uses, with remnant vegetation occurring in smaller, less contiguous patches and separated from the site by arterial and sub-arterial roads.

3.1.2 Slope

Slope across the broader study area has been generated from a Digital Elevation Model (DEM) which was established using 2 m contours. The slope raster has been classified into the following slope classes as per PBP: 0° (flat); >0° – 5°; >5° – 10°; >10° – 15°; >15° – 20°; >20°. Figure 6 shows the slope across the broader study area.

As is evident in Figure 6, the subject land is generally gently sloped, however steeper slopes are evident on adjacent land to the north and northwest. The topography is highly variable within the broader study area, with steeper topography associated with the geomorphology of Middle Cove in the south and south east, and Middle Creek and Deep Creek in the north.

Table 3: PBP hazard class and fuel loads for vegetation types in the study area

PBP Hazard Class	Fuel Load (t/ha)[1]	Keith Formation/Classes
Forested Wetlands	15.1	Coastal Floodplain Wetlands
Forests	36.1	Sydney Coastal Dry Sclerophyll Forests Northern Hinterland Wet Sclerophyll Forest Coastal Swamp Forest North Coast Wet Sclerophyll Forests
Heathlands	36.6	Sydney Coastal Heaths
Rainforest	13.2	Northern Warm Temperate Rainforests
Freshwater Wetlands	4.4	Coastal Freshwater Lagoons

[1]FROM A1.12.8 OF PBP

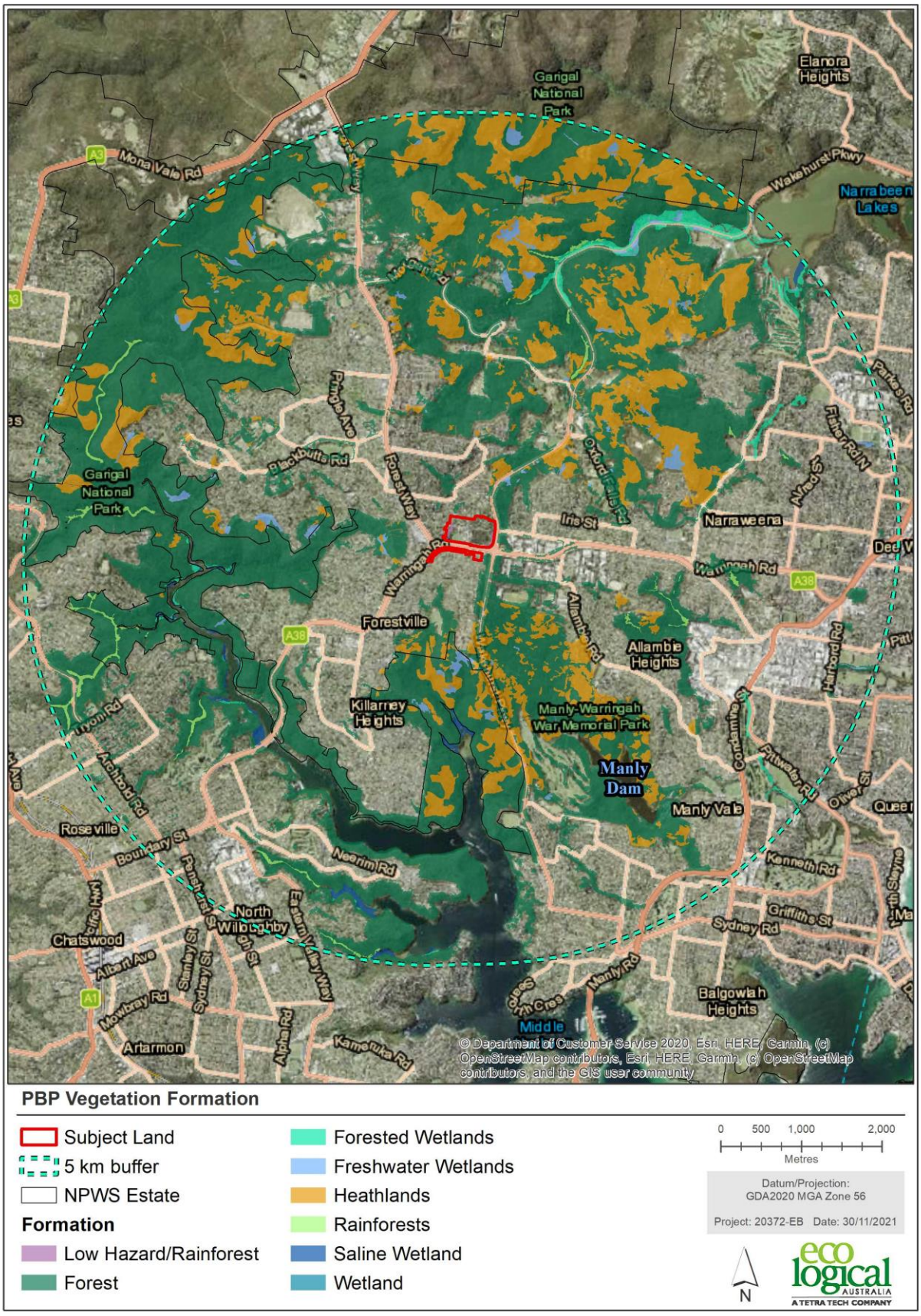

Figure 5: Vegetation formations within the greater Study Area (source: OEH,2016)

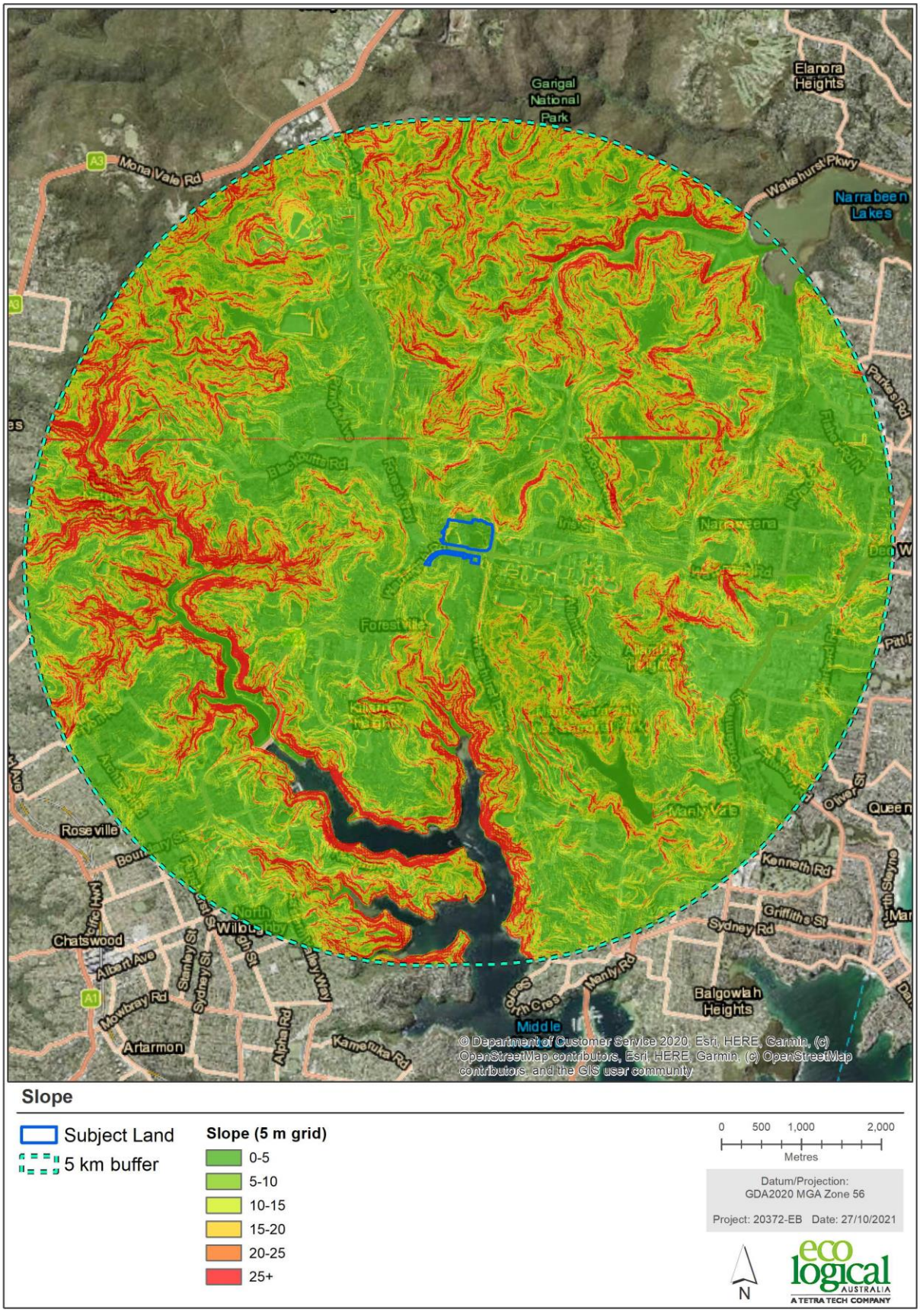

Figure 6: Slope within the Study Area

3.1.3 Bushfire Weather

The subject land is situated within the Warringah Pittwater Bush Fire Risk Management Committee (BFRMC) area. The climate is temperate, with uniform rainfall throughout the year, although increased rainfall may be evident between February and March (BFMRC, 2010). The gazetted bushfire season generally spans from October to March and conditions during these months include north-westerly winds, high daytime temperatures and low relative humidity.

Bushfire weather is often described in terms of the Forest Fire Danger Index (FFDI) and this metric has a direct influence on the intensity of bushfire behaviour, with a higher FFDI corresponding to weather conditions with potential for higher intensity fires. Weather data analysed by Lucas (2010) under the National Historical Fire Weather Dataset (1972-2020) incorporates the daily FFDI, where suitable inputs are available, from over 70 weather stations across Australia. Days of Very High Fire Danger Rating (FDR) or above, occur on average about 9 days per year based on data analysed from the National Bushfire Weather Data set for Sydney Airport weather station (station number 066037) which is the closest suitable weather station to the site in the dataset compiled by Lucas (2010).

For the purposes of PBP, the FDI required to be used for development assessment for the site, is 100, as identified for the Greater Sydney Region which includes the Northern Beaches LGA. The FDI used by PBP influences certain bushfire protection measures including Asset Protection Zones (APZ) and construction standards via the assessment of the Bushfire Attack Level (BAL).

However, utilising historical data from the Sydney Airport weather station from the National Historical Fire Weather Dataset, and applying the maximum FFDI for a 1 in 50-year event (being the accepted recurrence period for land use planning) provides a better understanding of bushfire weather relevant to the Study Area. To analyse the FFDI for a 1 in 50-year event from the Sydney Airport weather station data, a Generalised Extreme Value (GEV) analysis was undertaken using the process documented by Douglas (2017) and Douglas et al (2014; 2016). The dataset was split into subsets based on identified directions of potential bushfire attack relevant to the site, being North to south-east (clockwise); South-east to South-west (clockwise); South-west to North (clockwise). The following directional FFDIs were identified through the GEV analysis of the historic weather records for Sydney Airport:

- Maximum FFDI for wind directions from the north to south-east was 63;
- Maximum FFDI for wind directions from the south-east to south-west was 47; and
- Maximum FFDI for wind directions from the south-west to north was 116.

This analysis indicates that there is variation in the potential likelihood and consequence of bushfire attack from different directions, toward the study area as shown in Figure 8. Areas exposed to bushfire attack at higher FFDI are more likely to be impacted by fire as adverse fire weather will occur more often from those directions and a higher fire intensity is more likely as the weather conditions reach higher FFDI values. For the subject land, aspects exposed to hazards in the west to north are more likely to be subject to these conditions. Areas exposed to bushfire attack at lower FFDI have a lower (but potentially still significant) risk profile.

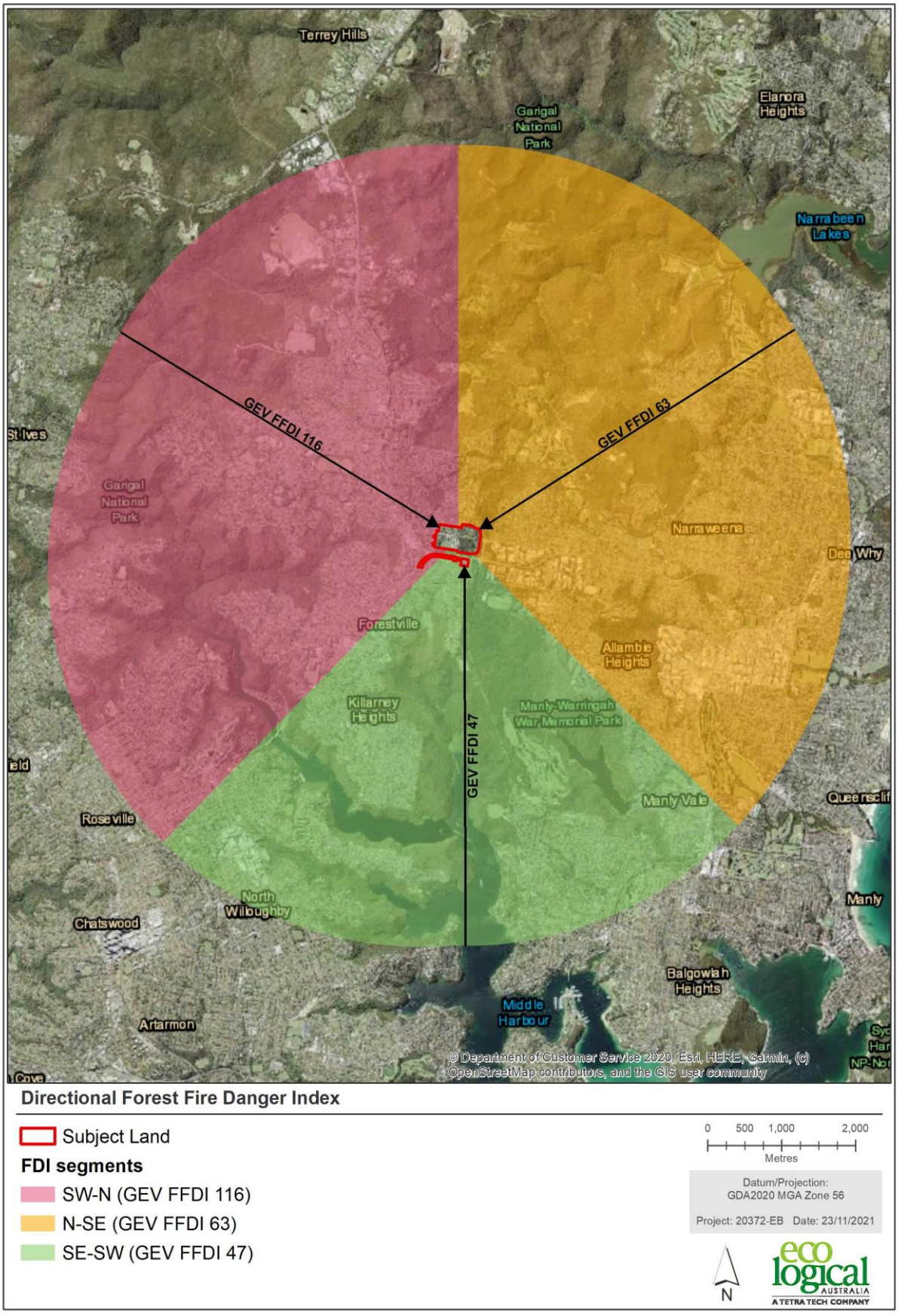

Figure 7: Directional FDI Analysis

3.2 Bushfire Risk Considerations

The following sections outline considerations informing the bushfire risk exposure of the subject land.

3.2.1 Bushfire History

According to the Warringah Pittwater BFRMP, there are on average of 48 fire incidents per annum, however it is only approximately every 5 to 7 years that any of these fires progress to major fires.

As mapped in the NPWS fire history and Rural Fire Service fire history mapping datasets (DPIE 2021), since 1951 fires have occurred within the broader study area, however none have been mapped as having impacted the subject land during this time. Of note, the fire history shows a historic large fire occurring in the north of the study area within Garigal NP. To the south of the site fire activity within Garigal NP and Manly Dam has also occurred, however these fires have also not impacted the subject land.

Whilst this data may not contain all wildfires, the spatial mapping of fire events indicates that the frequency of wildfire within the study area is low, with very few areas subject to repeated wildfire, as indicated in Figure 9**.** Further, management of the surrounding land as per the BFRMC plan, along with fire mitigation advantages from road infrastructure and urban development, is likely to have contributed to no fires impacting the subject land.

3.2.2 Fire Catchment

High level analysis of the potential fire catchments influencing the study area was undertaken and the results of this analysis are displayed in Figure 10. Delineation of fire catchments helps to identify the location and size of potential fire run and therefore bushfire attack scenarios for different locations within the subject land. This informs assessment of the risk profile across the site, with exposure to larger fire catchments generally resulting in an elevated bushfire risk.

As evident in Figure 10, the fire catchment most influential to the subject land is to the north, with a potential fire pathway extending over 5 kilometres. However, this pathway is disrupted from reaching the subject land by the Wakehurst Parkway and residential development north of the site. The presence of Deep and Middle Creek perpendicular to this fire path would also assist in mitigating this potential fire activity from the north. To the west, a much narrower fire pathway extending beyond 5km is evident, however there is no direct approach to the subject land with existing urban development present west of the subject land. All other fire pathways identified in the surrounding study area are separated from the subject land and are either narrow in width or fragmented by roads and urban development.

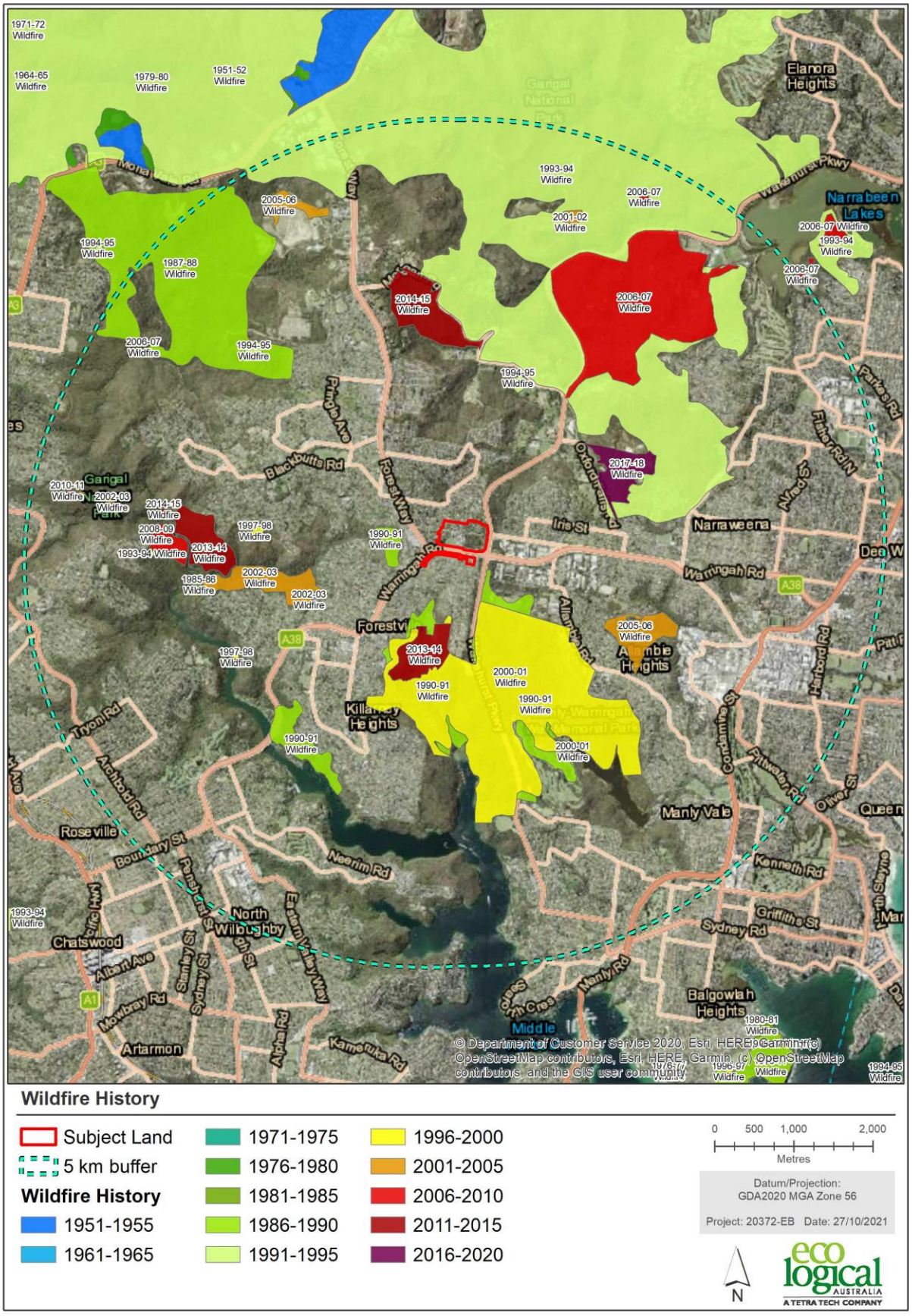

Figure 8: Wildfire history within the study area.

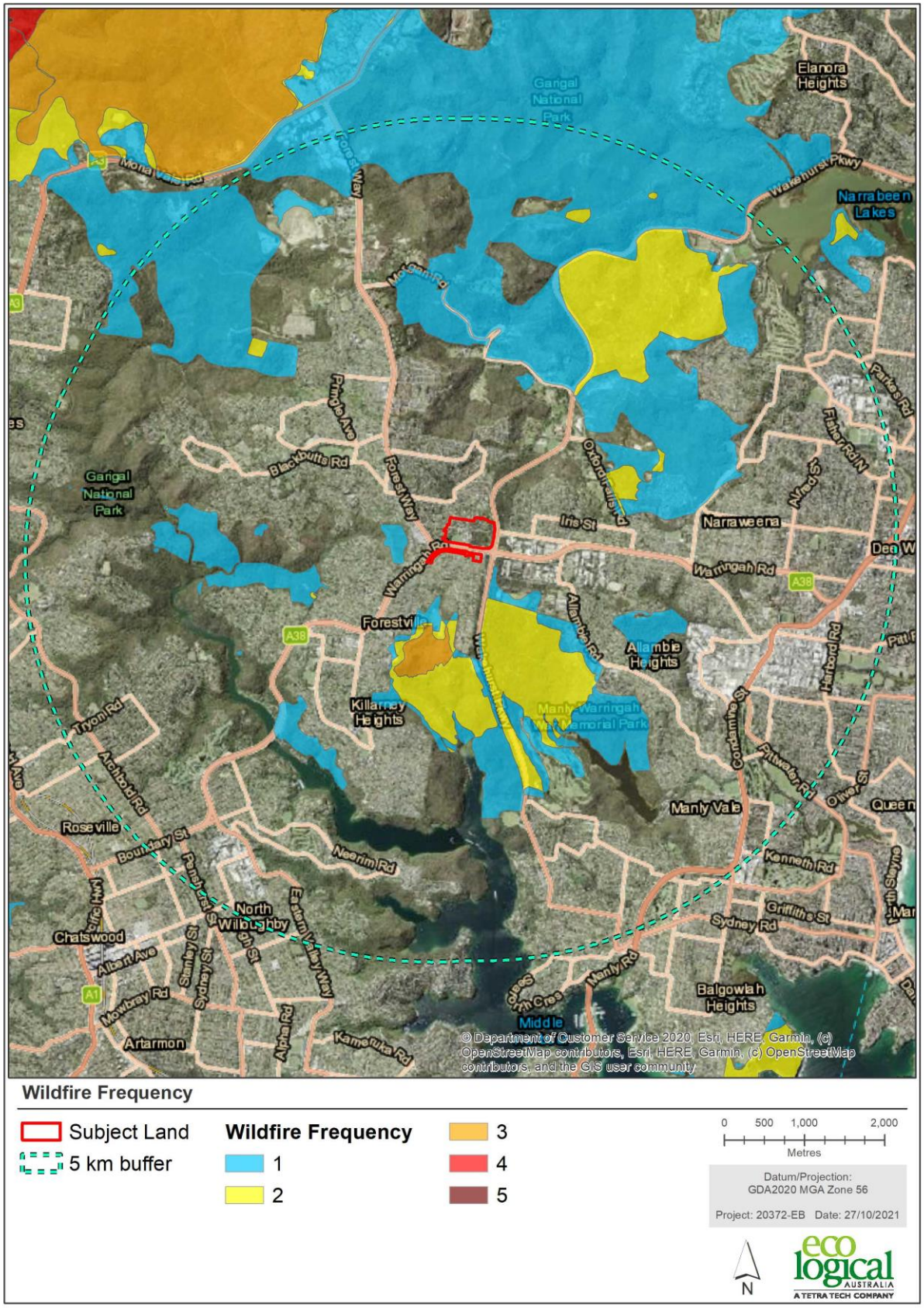

Figure 9: Wildfire frequency since 1951.

Figure 10: Fire catchments influencing the subject land.

3.2.3 Potential Fire Behaviour

Whilst each bushfire event is different, fire spreads by responding to changes in fuel, terrain, and weather conditions. Therefore, based on weather analysis, 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 to westerly winds, particularly during warmer summer months; and/or
- Moving upslope on steeper vegetated areas.

3.2.3.1 Bushfire Intensity

Fire intensity across the study area is expected to vary based on the hazard (vegetation type, fuel load and terrain) and the directional FFDI outputs derived from the weather analysis discussed in Section 3.1. Bushfire intensity is a significant determinant of risk to life and property and the controllability of bushfires and therefore important in the consideration of the bushfire risk context, however other factors such as burn duration / residence time are also important considerations.

Based on the directional FFDI, vegetation type and terrain, fire activity north-west of the site may exhibit higher fire intensities due to the prominence of forest and heath vegetation with high fuel loads, coupled with steeper slopes and a fire approach from north-westerly aspects. However, there are fire mitigation advantages, such as waterways and roads that would assist in reducing fire intensity and disrupting fire pathways from reaching the subject land. Therefore, these advantages, coupled with existing management practices (section 3.2.4), and the proximity or responding emergency services (section 5), direct exposure of future development within the subject land to a high intensity bushfire beyond a level that can be planned for is unlikely.

3.2.3.2 Potential for Extreme Fire Behaviour

Extreme fire behaviour / weather events are often unpredictable, however are increasingly prevalent in fire events where extreme fire intensities achieved. Research into the occurrence of extreme fire behaviour is emerging, however it is anticipated that these events will increase under future climate scenarios. Therefore, it is possible for extreme fire behaviour to occur within the broader study area if local conditions are favourable to produce phenomena such as:

- Spotting/firestorm;
- Fire tornado/whirls;
- Lateral vortices;
- Junction zones (Jump fires);
- Eruptive fires;
- Conflagrations;
- Downbursts; and
- Pyro-convective events.

3.2.4 Ignition and Fire Spread Scenarios

The Warringah Pittwater BFRMP identifies the main sources of ignition in the committee area are of a suspicious nature. This may be via deliberate ignition (e.g. arson or illegal burns). Other fire ignition sources could include accidental anthropogenic sources, lightning strikes or arcing of powerlines. Fire activity in the study area may be initiated by any of the above sources, with deliberate ignition a consideration for bushland areas along the urban interface. However, the urban interface is subject to various management regimes as outlined in the BFRMP, including the presence of Strategic Fire Advantage Zones (SFAZs), Asset Protection Zones (APZs) and Land Management Zones (LMZs).

Fire management, coupled with the fragmentation of fire paths, as discussed in section 3.2.2, means direct fire spread to the subject land is significantly mitigated, particularly as the feasibility of onsite APZs will increase the current available setback. Further, while fire spread scenarios vary in each direction, no fires have progressed to the subject land and therefore, the above ignition sources and potential fire pathways are not considered an increased risk for the proposed development that cannot be reduced by mitigation.

3.3 Summary of Landscape Bushfire Risk Assessment

The landscape bushfire risk assessment for the subject land and surrounds considered the bushfire hazard including analysed bushfire weather conditions, fire history, fire catchments influencing the site, potential fire behaviour and fire ignition scenarios.

The location of the subject land is afforded mitigation advantages to reduced fire pathways and intensity, including the presence of road infrastructure and existing urban development. Fire management activities occurring in close proximity to the site would also help to mitigate fire pathways to the site.

In evaluating the landscape bushfire risk, the following high-level observations are made:

- The direction of elevated risk from bushfire attack is from the north-west, due to higher FFDI, historical patterns of bushfire spread, more expanse of bushfire hazard and predominant north-westerly winds during days of elevated bushfire weather.
- Fire spread from north-easterly or south-westerly winds, is less likely and based on the FFDI analysis, is likely to be of reduced fire intensity.
- There are significant interruptions to the continuity of bushfire hazard in all directions, provided by the Wakehurst Parkway, Frenchs Forest Road West and Warringah Road.
- Existing urban development to the west and south-west will also assist in mitigating all forms fire attack, including ember attack.
- The hazard surrounding the subject land is identified for management under the existing BFRMP.
- Fire history mapping supports a lower risk of bushfire spread reaching the site.

4. Land Use Assessment

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

4.1 Risk profile

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

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

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

4.1.1 Feasibility of Asset Protection Zones

Based on the bushfire hazard assessment, including areas of planned vegetation change shown on the Brick Pit Reserve concept plan (Appendix A) an assessment of the feasibility of PBP compliant APZs has been undertaken. The indicative APZ requirements are shown in Figure 11-14. Table 4 includes the minimum dimensions required by the Acceptable Solutions of PBP for residential development (i.e. 29 kW/m^2) and SFPP development (i.e. 10 kW/m^2). For Bantry Bay, this includes the current hazard scenario, and also the future hazard scenario if the Brick Pit Reserve concept plan is implemented.

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

- Vegetation formation in the assessment is based on existing mapping by (OEH 2016, SMEC 2015 and ELA 2018) and refined using NearMap imagery.
- Excluded vegetation to the west of the site can meet the requirements of section A1.10 of PBP – single area of vegetation less than 1 hectare in area and greater than 100 m separation from other areas of category 1 or 2 vegetation.
- Vegetation along the southern boundary of the northern site, adjacent to Warringah Road, can meet the requirements of section A1.10 of PBP – strips of vegetation less than 20 m in width and not within 20 m of the site or other areas of category 1, 2 or 3 vegetation. Or alternatively, this area will be considered managed land as development is activated.
- Retained vegetation along the eastern boundary of the northern site, between the Northern Beaches Hospital (NBH) and Wakehurst Parkway can meet the requirements of section A1.11 of

PBP, whereby remnant vegetation less than 1 Ha is considered low hazard and rainforest APZ setbacks have been applied.

- Vegetation north of the northern site boundary, corresponding to the RE1 zone has been considered managed land.
- Vegetation in the areas of Transect 1 meets the requirements of A1.9 (Exotic Vegetation) of PBP and therefore has been assessed as exotic vegetation, with vegetation formation converted to rainforest as per Table A1.9 of PBP.
- APZs relating to the vegetation hazard influencing NBH have not been mapped as the site is existing as the rezoning proposal does not contemplate any change in use of this site.
- Future vegetation within the Brick Pit Reserve, Bantry Bay is based on the preliminary concept plan prepared for the site (Appendix A) and includes a downgrade of the existing Forest hazard to Freshwater Wetland/Low Hazard in accordance with PBP. Changes to this plan may alter the hazard assessment and APZ requirements. If the concept plan for Bantry Bay is implemented, the APZ requirement is reduced and would no longer encroach into the rezoning area.
- All APZs are assumed to be on land less than 18 degrees;
- Additional revegetation within the subject land may result in changes to the hazard assessment and APZ requirements.

Table 4: PBP Indicative APZ requirements

Transect	Vegetation	Slope	Residential APZ[1]	SFPP APZ[2]	Comment
1	Low Hazard	>5-10° downslope	18 m	57 m	Approximately 90 m separation from hazard interface provided by existing residential development.
2	Forest	>15-20° downslope	56 m	100 m	APZ provided by road corridor and within subject land. APZ for SFPP development extends into the R3 zone north of Frenchs Forest Road west.
3	Forest	>15-20° downslope	56 m	100 m	APZ provided by road corridor and within subject land. APZ for SFPP development extends into the R3 zone north of Frenchs Forest Road west.
4	Forest	>10-15°downslope	39 m	100 m	APZ provided by road corridor and within subject land. APZ for SFPP development extends into the R3 zone north of Frenchs Forest Road west.
5	Forest	Upslope/flat	24 m	67 m	APZ provided by road corridor and within subject land. APZ for SFPP development extends into the R3 zone north of Frenchs Forest Road west.

Transect	Vegetation	Slope	Residential APZ[1]	SFPP APZ[2]	Comment
6	Low Hazard	Upslope/flat	11 m	38 m	APZ provided by road corridor and within subject land. APZ for SFPP development extends into the R3 zone north of Frenchs Forest Road west.
7	Low Hazard	Upslope/flat	11m	38m	APZ provided by Warringah Road
8a	Forest	>0-5° downslope	29 m	79 m	**Current** APZ impacts future residential and SFPP development within the B1 and R3 Zone west of Bantry Bay Road (Figure 12)
8b	Forest	>0-5° downslope	29 m	79 m	**Future** APZ provided by road and managed land based on future hazard assessment based on the Brick Pit Reserve Concept Plan (Figure 13)

[1] Table A1.12.2 from PBP 2019, [2] Table A1.12.1 from PBP 2019

Figure 11: Bushfire Hazard Assessment and APZ requirement, overall.

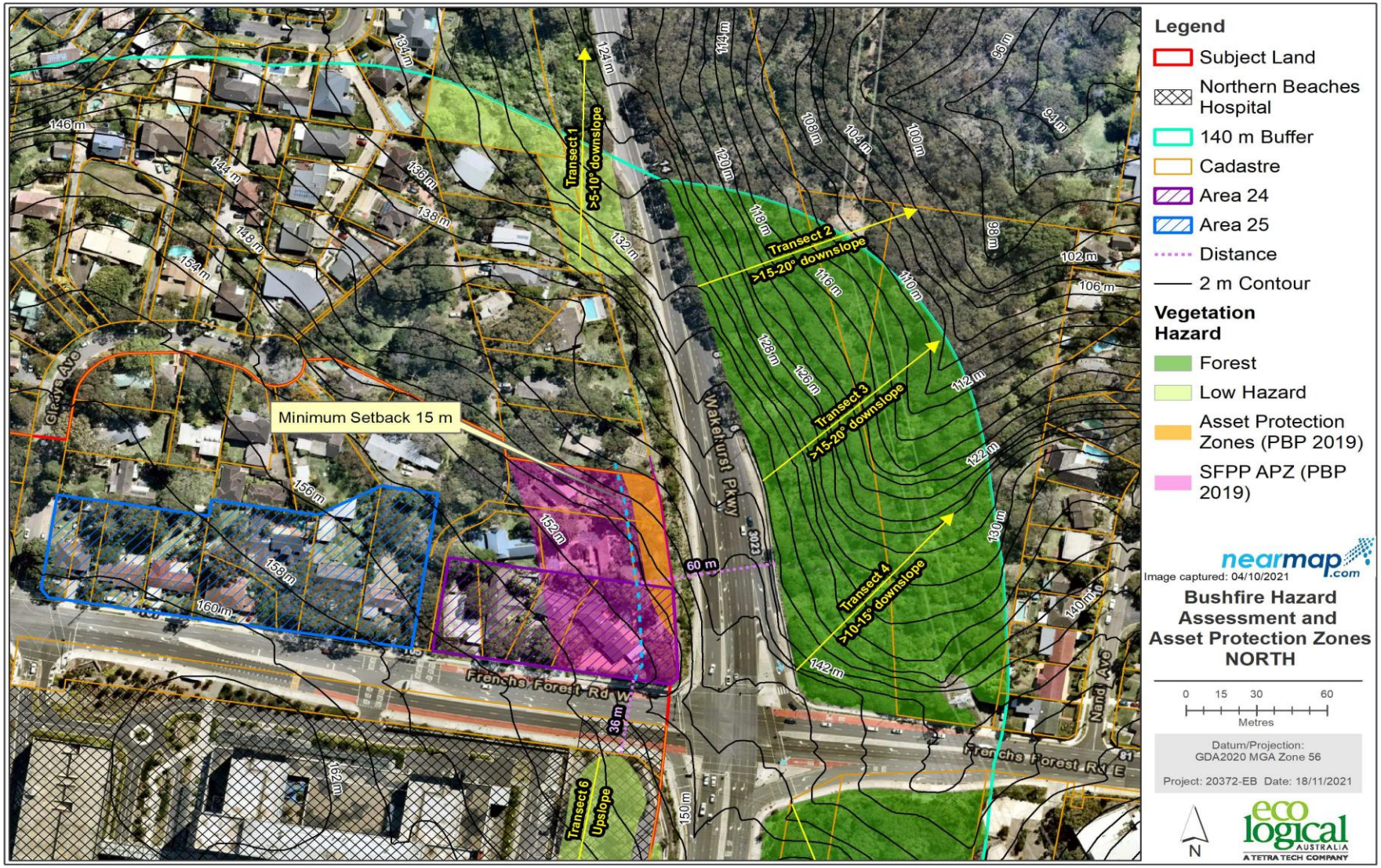

Figure 12: Bushfire Hazard Assessment and APZ requirement, North.

Figure 13: Bushfire Hazard Assessment and APZ requirement for current conditions, South

Figure 14: Bushfire Hazard Assessment and APZ requirement, future hazards South.

4.1.2 Land use evaluation

Future development on BFPL will need to satisfy the performance criteria identified in PBP for various land uses. At a precinct level, it is expected that future land uses enabled by rezoning can accommodate the acceptable solutions identified in PBP to minimise reliance on performance solutions at the DA stage. A summary of these requirements is outlined below and evaluated for the structure plan in Table 5.

4.1.2.1 Chapter 5 of PBP – Residential and Rural Residential Subdivision

Mixed use residential development is envisaged for much of the precinct, and therefore it is anticipated that future land uses will be subject to the requirements outlined in Chapter 5 of PBP. Following rezoning and as part of the DA process, future development will need to demonstrate the suitability of the proposed subdivision, the following provisions will need to be considered:

- Provision of compliant APZs;
- Access and egress within the developable land and along the adjoining public road system shall include safety provisions for attending emergency service vehicles and evacuating residents;
- Subdivision design shall include perimeter roads separating developable lots from hazardous bushland areas;
- Access is to be ensured for maintenance of APZ and other fire mitigation activities;
- Firefighting water supply and associated firefighting equipment (i.e., pump and hose) for each dwelling in addition to any reticulated water supplies; and
- Provision of access and infrastructure requirements according to Table 5.3b of PBP.

4.1.2.2 Chapter 6 of PBP – SFPP Development

Special Fire Protection Purpose (SFPP) provisions will be applicable to future uses such as seniors living, childcare centres, tourist accommodation and any other development specified as SFPP under s.100B (6) of the RF Act or Section 46 of the RF Reg. These developments would need to meet the criteria outlined in Section 6 of PBP including:

- Increased APZ setbacks;
- Provision of a Bush Fire Emergency Management and Evacuation Plan; and
- Provision of suitable access and utilities according to Tables 6.8a-c of PBP.

4.1.2.3 Section 8.3.1 of PBP - Buildings of Class 5 to 8 under the NCC /Section 8.3.10 Commercial and Industrial Development

As per the NCC building classification system, buildings such as offices, shops, factories, warehouses, and other commercial or industrial facilities on BFPL have no specific bushfire requirements, and as such Australian Standard AS 3959-2018 and the National Association of Steel-framed Housing (NASH) Standard '*Steel Framed Construction in Bushfire Areas 2014*' are not deemed to satisfy (DTS) provisions. However, such developments still need to meet the aims and objectives of PBP and consider the following:

- Provision of appropriate APZ / defendable space;
- Provision of safe access to/from the public road system for egress and evacuation;
- Provision of suitable emergency and evacuation arrangements for occupants;
- Provision of adequate water supply to protect the building, and the location of gas and electricity supplies so as they do not contribute to the bushfire risk; and
- Provision for the storage of hazardous materials away from any hazards.

In meeting the objectives of PBP, best practice is for such developments to meet the requirements of BAL-29 in regard to APZ dimensions. General access and infrastructure requirements listed in Table 7.4a of PBP should also be considered. Where future mixed-use development includes residential development, bushfire protection measures residential requirements outlined in chapter 5 of PBP (for subdivision) or chapter 7 of PBP (for infill development) will apply. Where future mixed-use development includes SFPP uses, bushfire protection measures should be consistent with the provisions outlined in Chapter 6 of PBP.

4.1.2.4 Section 8.3.11 – Public Assembly Buildings

Where a public building has a floor space greater than 500m^2 it may be considered an assembly building, and due to the evacuation of a large number of people, this type of development is generally treated as SFPP. This could include future community and recreation facilities. To meet SFPP requirements, future developments of this nature on BFPL would need provisions for APZs that meet a maximum Radiant Heat Flux (RHF) of 10Kw/m^2 and a construction standard of BAL-12.5, along with other requirements as per Section 4.1.2.2.

4.1.2.5 Section 8.2.2 Multi-storey residential development

Buildings exceeding three storeys in height are considered to be multi-storey buildings by PBP and are required to comply with the performance criteria within Chapter 5, including the requirement for an APZ which meets a threshold of 29kW/m^2. In addition, the following issues need to be considered as per Table 8.2.2 of PBP.

- Higher residential densities for evacuation
- Avoiding locating high rise buildings in higher elevations or on ridge tops;
- Increased demand on road infrastructure during evacuation;
- Higher external façade exposed to bushfire attack;
- Additional fuel loading from car and storage facilities;
- Potential for balconies and external features to trap embers and ignite combustible materials;
- Increased exposure to convective heat due to height.

A performance based solution including a bushfire design brief is required for Development Applications pertaining to multi-storey residential developments on bushfire prone land.

4.1.2.6 Summary of land use evaluation

Table 5 below provides a summary of the land use evaluation for differing development types.

Table 5: Future land use evaluation

Development Type	Assessment Considerations	Suitability
Residential Subdivision	The land use evaluation has considered potential land uses enabled by the rezoning and with consideration to: • The risk profile of the site • Proposed land use zones and permitted uses	It is anticipated that different residential typologies can comply with PBP
SFPP Development		Requirements for SFPP development have been considered and suitable areas are feasible in within the precinct, with suitable areas outside of the SFPP APZ

Development Type	Assessment Considerations	Suitability
Buildings of Class 5 to 8 under the NCC /Section 8.3.10 Commercial and Industrial Development	• The most appropriate siting for different land uses based on the risk profile • The impact of the siting of these uses on APZ provision	No specific requirements apply however the aims and objectives of PBP can be achieved for future land uses. Where ground floor retail occurs in conjunction with residential development, then PBP requirements for residential development should apply.
Public Assembly Buildings		Requirements for SFPP development have been considered and there are suitable areas outside of the required SFPP APZ.
Multi-storey residential development		Future development is feasible outside of the 29kW/m^2 APZ or greater and other relevant considerations can likely be addressed in design, therefore future multi-storey development is achievable. Future development will need to consider design aspect and material at detailed design to comply with the requirements in section 8.2.2 of PBP.

5. Access and Egress

As this assessment is for a rezoning proposal, assessment of future internal roads is not possible. However, it is anticipated that as future development is activated, it will include the provision of additional access compliant with the requirements of PBP (Appendix B). As shown in Figure 15, current access to the precinct is via Warringah Road for the areas south of Warringah Road, and Frenchs Forest Road West for areas north of Warringah Road). An additional access point from Warringah Road also enables access to the Northern Beaches Hospital.

5.1 Evaluation of Access and Egress

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

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

The study area is serviced by arterial and sub-arterial roads which would provide egress options for future occupants as well as ingress for emergency services. In regard to the location of key routes and direction of travel, ingress and egress to the proposed town centre is primarily via Frenchs Forest Road West. This enables opportunity for egress in multiple directions including:

- west on to Frenchs Forest Road W and connection to Forest Way;
- east onto Frenchs Forest Road W and connection to Wakehurst Parkway north and;
- east onto Frenchs Forest Road and connection to Wakehurst Parkway south or Warringah Road eastbound.

Frenchs Forest Precinct is surrounded by arterial and sub-arterial roads and as such, is setback from any contiguous vegetation hazard. Therefore, the need for evacuation is reduced and the potential for future development to be isolated during a bushfire event is considered highly unlikely. Additionally, given the nature of the rezoning, most of the site will remain unincumbered by bushfire and therefore on-site evacuation is also feasible and is further discussed in section 5.2.

Figure 15: Current Access Hierarchy (source: Jacobs, 2020)

5.2 Evacuation

The need for off-site evacuation for the Precinct is not considered high, given the lower bushfire risk setting. If off-site evacuation was necessary the Precinct is serviced by arterial and sub-arterial roads, providing multiple route options that could provide egress to nearby NSP's or other evacuation points. These options are generally unconstrained and therefore reliance on emergency services intervention is unlikely.

There are currently several Neighbourhood Safer Places (NSPs) located within close proximity and multiple directions to the site (Table 6) (Figure 16). Additionally, preliminary mapping of open space and built NSP's setback requirements indicates that both NSP types are feasible within the Precinct (Figure 17). NSP requirements are detailed in Appendix C.

Therefore, as most of the precinct will be unincumbered by bushfire and the need for offsite evacuation is reduced, along with onsite evacuation opportunities increasing bushfire resilience and multiple route options available, evacuation is not considered a constraint to the rezoning proposal.

Table 6: Existing NSPs in vicinity of study area

Neighbourhood Safer Place[1]	Location	Suburb	LGA	Type	Distance (km)	Travel Time (min)[2]
Patanga Reserve	Patanga Road, Frenchs Forest	Frenchs Forest	Northern Beaches	Open Space	1.4	4
Bambara Reserve (Belrose Oval) and Belrose Community Centre	Bambara Road, Frenchs Forest	Frenchs Forest	Northern Beaches	Open Space & Building	1.7	4
Lionel Watts Oval	Blackbutts Road, Frenchs Forest	Frenchs Forest	Northern Beaches	Open Space	2	4
Forestville Memorial Hall	3 Starkey Street, Forestville	Forestville	Northern Beaches	Building	2.6	5
Allambie Heights School – Community Centre	155 Allambie Road, Allambie Heights	Allambie Heights	Northern Beaches	Building	3.1	7
Belrose Public School	26 Ralston Avenue, Belrose	Belrose	Northern Beaches	Building	3.4	6
Killarney Heights Oval	119 Starkey Street, Killarney Heights	Killarney Heights	Northern Beaches	Open Space	3.9	7
North Balgowlah Community Centre	10 Bardoo Avenue, North Balgowlah	North Balgowlah	Northern Beaches	Building	5.2	8
Truman Reserve	Toronto Avenue, Cromer	Cromer	Northern Beaches	Open Space	6.4	12

[1] accessed from https://www.rfs.nsw.gov.au/plan-and-prepare/neighbourhood-safer-places; [2] estimate using Google Maps

Figure 16: Existing Declared Neighbourhood Safer Places

Figure 17: Preliminary NSP setback requirements

6. Emergency Services

The rezoning proposal will facilitate the future development of the Frenchs Forest Precinct and Town Centre. Therefore, to gauge the suitability of rezoning with regard to emergency management, the objectives and strategic planning principles of PBP relating to emergency management, were reviewed with consideration to the future ability to meet:

a. Increase in demand for emergency services responding to a bushfire emergency including the need for new stations / brigades; and
b. Impact on the ability of emergency services to carry out the suppression in a bushfire emergency.

Regarding the demand for emergency services, ELA has reviewed the quantity of existing emergency services in proximity to the site and notes that there are three RFS Brigades close by as shown in Figure 18 and detailed in Table 7. Additional Fire and Rescue NSW (FRNSW) resources are also stationed in proximity at Forestville and Dee Why. As such, future development resulting from rezoning is unlikely to require new stations or brigades. The requirement for additional resources for the region is also assessed as part of broader emergency management planning, and therefore any projected increase in demand facilitated by rezoning is expected to be accounted for in broader planning and development contributions.

Table 7: Fire Stations within proximity to the site

Station	RFS/ NSW FR	Distance Km	Time	Direction
Forestville Fire Station	FRNSW	2.4	5 min	South-west
Beacon Hill RFS	RFS	3.9	8 min	East
Davidson RFS	RFS	3.9	7 min	West
Belrose RFS	RFS	3.3	5 min	North
Dee Why Fire Station	FRNSW	5.6	11 min	East

Regarding the impact of future development on the ability of emergency services to carry out fire suppression in a bushfire emergency, there are no key constraints for future development for access or water supply. The compliance of these aspects will be assessed for each future development against the requirements of PBP.

As such, there is no part of the assessment of the future impact on Emergency Services that suggests the rezoning will facilitate inappropriate development under the Strategic Planning Principles or exclusion criteria within PBP.

Figure 18: Fire Stations in close proximity to the site

7. Infrastructure

Future development on the subject land will need to meet the applicable requirements of PBP relating to infrastructure provision. The general requirements for development are discussed below and are considered achievable for this site. Specific requirements for SFPP developments and subdivision are detailed in PBP.

Strategic planning requirements seek to identify any potential issues associated with infrastructure and utilities. Key considerations on suitability of infrastructure to meet the requirements of PBP include the ability of the reticulated water system to deal with a major 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. These aspects are explored below and summarised in Appendix D. Table 5.3 and Table 6.8 of PBP detail the acceptable solution requirements.

7.1 Water

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

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

7.2 Electricity and gas

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

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

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

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

8. Adjoining Land

The future development contemplated by the Planning Proposal should not compromise any offsite bushfire management works. Given the adherence to PBP that is required, any future development should also not require a change to the bushfire management practices for retained and/or adjoining bushfire prone vegetation. Additionally, there is capacity for all APZ's to be wholly within subject lands or provided by public roads. Therefore, there are no concerns regarding the impact of rezoning on adjoining land.

9. Assessment of Strategic Planning Requirements

This section evaluates the rezoning, against the bushfire strategic planning requirements of PBP (detailed in Section 1.6) and based upon the assessment findings in the preceding sections, to determine whether:

- The rezoning poses an unacceptable risk or provides for inappropriate development;
- Future development can adequately responds to the bushfire threat; and
- Future development can provide adequate bushfire protection measures to reduce the residual risk to an appropriate level.

The evaluation is based upon PBP Chapter 4 and the Assessment Framework of this Study (Section 1.6) and is summarised in Table 8. In addition to evaluating the Proposal against these matters, the evaluation specifically considers:

- Residual risk - the level of residual risk after the application of bushfire protection measures is a key determinant in the strategic assessment of whether proposed development is appropriate;
- Risk to life - an appropriately low residual risk to human life is fundamental;
- Risk to property – the residual risk to property should meet the Acceptable Solutions within PBP;
- Emergency service response - the acceptability of proposed development should not be reliant on emergency service response / intervention;
- Adjoining lands – future development should not be reliant on fuel management on adjoining lands or effect those landowners' ability to undertake such works.

Table 8: Evaluation of the rezoning proposal against the Strategic Planning Principles of PBP (RFS 2019)

PBP Strategic Planning Principle	Evaluation

Ensuring land is suitable for development in the context of bush fire risk	The risk profile of study area is not uniform. Key findings include:
	• There are areas of elevated bushfire risk beyond the Subject Land that are generally associated with:
	  ○ Wooded vegetation (i.e. forest and heath);
	  ○ Larger fire catchments are present to the north, west and south, however fire pathways are not continuous to the subject land and there are restrictions to fire spread by narrow areas of hazard minimising the likelihood of fire spread to the subject land
	  ○ The subject land does not have exposure to the most problematic directions of bushfire attack (i.e. the northwest through to the southwest sector based on FFDI bushfire weather analysis);
	• The areas of elevated bushfire risk in the broader locality are outside and separated from the Subject Land;
	• The bushfire hazards immediately adjoining the site are generally of a lower threat type, being:
	  ○ Wooded vegetation that is disconnected from the site by significant public road infrastructure and APZs; and
	  ○ Can be adequately mitigated by achievable APZ requirements
	• The bushfire hazards within the Subject Land are negligible and:
	  ○ Disconnected from external bushfire hazards; and
	  ○ low hazard vegetation or vegetation that meets the “low threat” prescriptions of PBP and can therefore be excluded.
	This Study has identified that the rezoning is suitable given the bushfire risk context, considering:
	• The lower residual landscape risk exposure of the site;
	• The disconnection of the site from extensive bushfire hazards;
	• Future development being significantly separated from locations with elevated bushfire risk, with separation from adjoining hazards provided by significant public infrastructure, and management practices.
	• Positioning of future SFPP development away from locations of bushfire hazard is achievable;
	• Future land uses can meet or exceed bushfire protection measures as per the Acceptable Solutions of PBP, thus allowing the level of residual risk to be reduced to an acceptable level.
	• Multiple feasible evacuation options .
	• That none of the ‘inappropriate development exclusions’ specified in PBP, are triggered by the rezoning

Ensuring new development on BFPL will comply with PBP	The rezoning will facilitate a variety of land uses that can comply with PBP and bushfire protection measures can adequately be incorporated into future development designs, at subsequent stages in the planning and development assessment process.

PBP Strategic Planning Principle	Evaluation
Minimising reliance on performance-based solutions	The compliance of the rezoning proposal to PBP requirements, minimises reliance on performance-based solutions.
Providing adequate infrastructure associated with emergency evacuation and firefighting operations	There are multiple egress points provided by the existing public road network, enabling for off-site evacuation in multiple directions. In addition, on-site refuge options are feasible and would offer useful redundancy to reduce the level of evacuation risk. Future development has capacity to provide infrastructure for firefighting operations including access and water supply, compliant with PBP. Multiple Rural Fire Service and Fire and Rescue Brigades are located within proximity to the Precinct.
Facilitating appropriate ongoing land management practices	The rezoning and future development contemplated by the Planning Proposal will not restrict appropriate ongoing land management practices, nor will it be reliant on bushfire management of adjoining lands to support bushfire protection.

10. Conclusion & Recommendations

In evaluating the Frenchs Forest rezoning proposal against the bushfire strategic planning requirements of PBP, the following observations are made:

- Future development facilitated by the rezoning will not pose or be subjected to an unacceptable risk; or provide for 'inappropriate development' outcomes;
- The rezoning is consistent with the strategic planning principles of PBP;
- Adequate bushfire protection measures can be provided to reduce the residual risk to an appropriate level; and
- Future development resulting from rezoning will not adversely affect existing development or adjoining landowners and their ability to undertake bushfire management.

In considering these aspects, our assessment of landscape risk demonstrates that the residual bushfire risk influencing the subject land is not unacceptable, and therefore, in combination with the strategic planning principles of PBP being satisfied, future land use outcomes enabled by the rezoning are not considered inappropriate. Therefore, the rezoning proposal is not considered to facilitate inappropriate development and thus, the strategic planning requirements of PBP are complied with for the rezoning.

Key recommendations include:

- That future development is assessed to ensure the level of residual bushfire risk of early stages is not greater than that assessed in this study (i.e., they are afforded temporary bushfire protection measures e.g., APZs and access);
- That future development is designed with consideration to bushfire and meet the requirements of PBP;
- Future development considers opportunities for on-site refuge to increase community resilience to bushfire.

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Appendix A – Brick Pit Reserve Concept

Brick Pit Reserve

Draft only – Subject to Community Consultation late 2021

- Wetland to be constructed to filter stormwater entering Manly Dam catchment
- Access through restored natural areas along boardwalks and trails
- Construction expected to be completed by 31 May 2023

WETLAND PRECEDENTS

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Appendix B – Access Specifications: Subdivision and SFPP Development

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

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

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

Performance Criteria	Acceptable Solutions
The intent may be achieved where:	
firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation	property access roads are two-wheel drive, all-weather roads, and perimeter roads are provided for residential subdivisions of three or more allotments; and subdivisions of three or more allotments have more than one access in and out of the development; and traffic management devices are constructed to not prohibit access by emergency services vehicles; and 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 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 where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; and 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.
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 AS 2419.1:2005; there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.
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	perimeter roads are two-way sealed roads; and 8m carriageway width kerb to kerb; and parking is provided outside of the carriageway width; and hydrants are located clear of parking areas; and there 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 maximum grade road is 15° and average grade is 10°; and the road crossfall does not exceed 3°; and

Performance Criteria	Acceptable Solutions
	a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating	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.
firefighting vehicles can access the dwelling and exit safely	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). In circumstances where this cannot occur, the following requirements apply: minimum carriageway width of 4m; 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 a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and provide a suitable turning area in accordance with Appendix 3; and curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; and the minimum distance between inner and outer curves is 6m; and the crossfall is not more than 10°; and maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads; and a development comprising more than three dwellings has formalised access by dedication of a road and not by right of way. 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.

Appendix C – NSP Criteria

Table 10: Assessment criteria for an NSP (RFS 2017)

Factor	Performance Criteria	Acceptable Solution
Radiant Heat	Building is located and constructed to enhance the chance for survival for humans in attendance from the radiant heat of a bush fire.	Building is situated to prevent direct flame contact, material ignition and radiant heat level of 10kW/m²; or Provide 139 metres separation distance from a bush fire hazard.
	Open Space is located to enhance the chance for survival for humans in attendance from the radiant heat of a bush fire.	Open Space is situated and maintained to prevent direct flame contact, material ignition and radiant heat levels of 2kW/m²; or Provide 310 metres separation distance from a bush fire hazard.
Maintenance of the Site and the Land Adjacent	Area between bush fire hazard and the site is maintained to a level that ensures the radiant heat levels at the Building/Open Space meet the Performance Criteria for Radiant Heat.	The site and land adjacent to the site between the Building/Open Space and the bush fire hazard is managed land or maintained in accordance with NSW RFS document Standards for Asset Protection Zones.

Table 11: Principles for NSP site identification (RFS 2017)

Consideration	Principles
Site Selection	An NSP should provide a safer place for the community.
	The community should be moving away from the bush fire hazard to access the NSP over short distances where possible.
	NSP locations should reflect community need and bush fire risk.
Moving to an NSP	An NSP should not be isolated from the community.
	The community should not be impeded from reaching the NSP area in a bush fire situation.
Capacity	Additional NSPs should be sought where it is likely current or potential NSPs cannot accommodate those likely to use it.
	Demand for use of an NSP reflect a community's level of bush fire preparedness.

Appendix D - Services Specifications

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

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

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

Performance Criteria	Acceptable Solutions
The intent may be achieved where:	
a water supply is provided for firefighting purposes	reticulated water is to be provided to the development, where available; a static water supply is provided where no reticulated water is available.
water supplies are located at regular intervals the water supply is accessible and reliable for firefighting operations	fire hydrant spacing, design and sizing comply with the Australian Standard AS 2419.1:2005; 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 14: 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 (<1000m²)	5000L/lot
Rural-residential lots (1000-10,000m²)	10,000L/lot
Large rural/lifestyle lots (>10,000m²)	20,000L/lot
Multi-dwelling housing (including dual occupancies)	5000L/dwelling

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