



Argyll Estate, Coffs Harbour Strategic Bushfire Study

NSW Land and Housing Corporation

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Template 2.8.1

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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 4.3 – ‘Planning for Bushfire Protection’. Direction 4.3 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 study area 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 Argyll Estate.

The key findings of this study are that the study area 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 within the area to be rezoned for and, the small extent of internal bushfire hazard, and the separation of the study area 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.

1. Introduction

This Strategic Bushfire Study has been prepared for the Planning Proposal developed by the NSW Land and Housing Corporation (LAHC) which contemplates rezoning and uplift of the social housing estate known as “Argyll Estate”. This study provides an assessment of the proposed rezoning and amendment to the Local Environment Plan (LEP) with 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 (DA) process for subsequent proposals on Bush Fire Prone Land (BFPL).

1.1 Background

The Argyll Estate (the study area) (Figure 1) is located within the Coffs Harbour Local Government Area and situated in close proximity to the Coffs Harbour town centre. The study area is currently zoned R2-low-density residential under the Coffs Harbour LEP, with some smaller areas zoned RE1 – public recreation (Figure 2).

LAHC have identified the estate as a priority for renewal to better meet the needs of tenants and the local community, with renewal of this area supporting the NSW Government’s 20-year Economic Vision for Regional NSW policy and Coffs Harbour City Council's Local Growth Management Strategy's Infill Program.

The planning proposal to support this renewal has identified areas within the estate suitable for rezoning to medium density residential (R3) zoning (Figure 3). Other areas have also been identified in the indicative growth scenario, to be achieved through duplex development, or amalgamation of individual lots to facilitate redevelopment (Figure 4). Future development will be enabled by amendment to the Coffs Harbour LEP.

1.2 Aims and Objectives

The aim of this study is to review the planning 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 19-hectare social housing estate known as “Argyll Estate”, is situated in close proximity to the Coffs Harbour town centre (Figure 1). The site is generally surrounded by residential and commercial development. Adjacent to the study area, is the Treefern Creek riparian corridor to the south and remanent vegetation to the north. The study area is mapped as vegetation buffer on the Coffs Harbour Council Bush Fire prone land (BFPL) map (Figure 5).

The Estate is currently comprised of:

- 118 ageing social housing cottages and two vacant land lots owned by LAHC;
- 11 social homes owned by Aboriginal Housing Office (AHO); and
- Approximately 68 privately owned homes interspersed throughout the site.



Figure 1: Argyll Estate Study Area

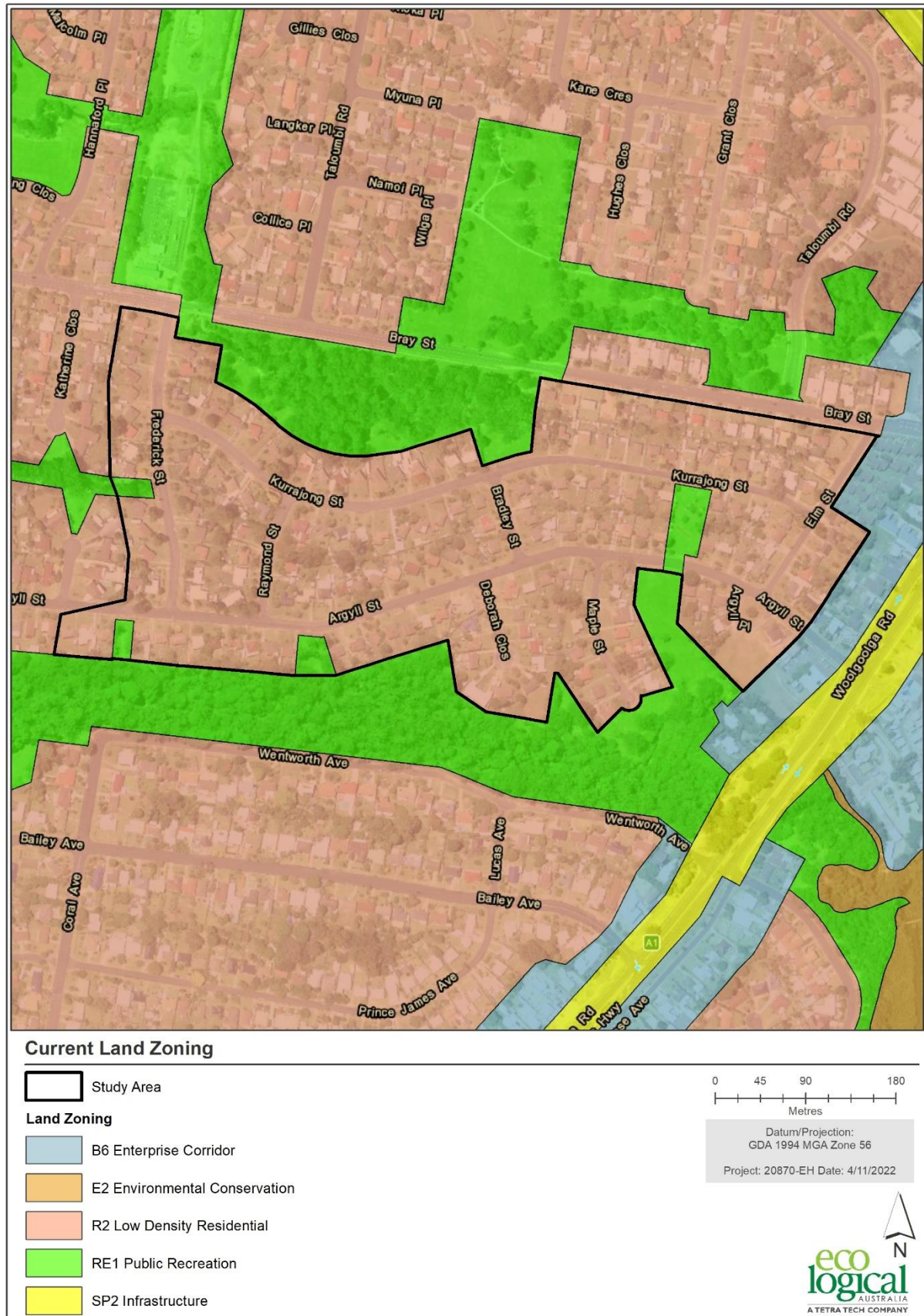


Figure 2: Current Land Zoning

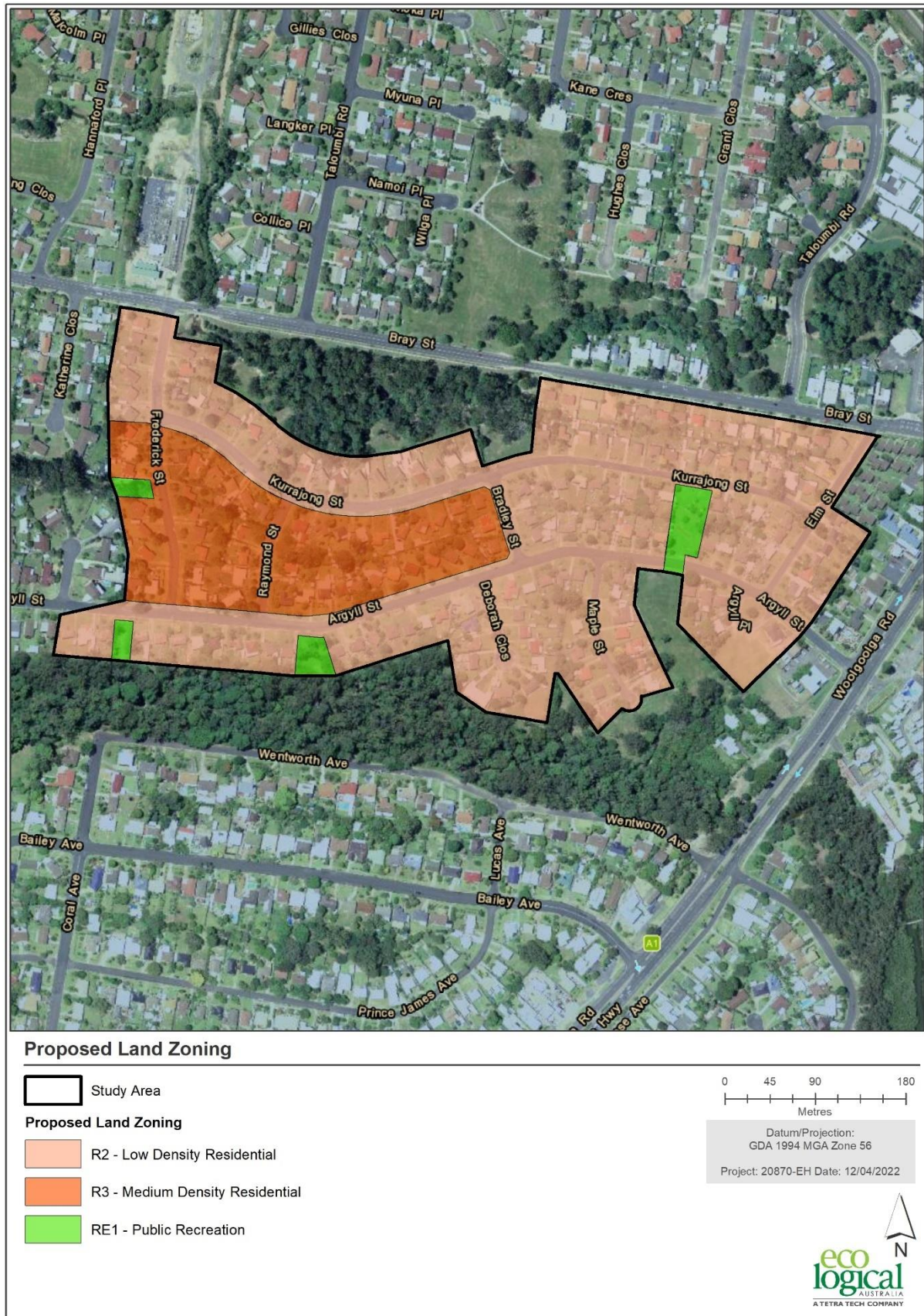


Figure 3: Proposed Land Zoning

Indicative growth scenario

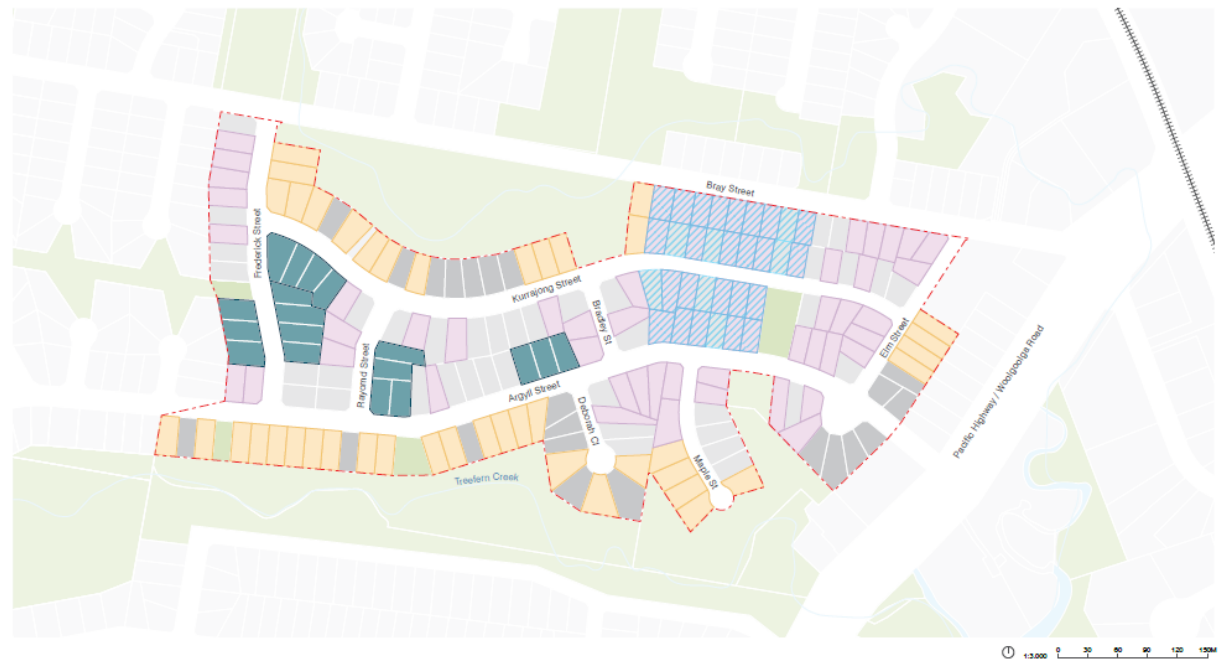
- 197 Existing dwellings
129 LAHC + 68 privately owned
- 460 Total precinct dwellings
- 365 Dwellings on sites currently owned by LAHC
- 95 Dwellings on sites currently Private owned
*assuming 60% take up rate
-
- 263 Additional precinct dwellings

Dwelling type / mix summary - LAHC sites

Type	Total number of dwellings
Single	42
Duplex	138
RFB (4-storey)	185*
Total	365

Assumptions

- * Single dwelling - Private: 4 bedroom (220m² GFA)
- * Duplex / Semi-detached - Private: 3 bedroom (115m² GFA)
- * RFB - LAHC: mix of 60% 1 bedroom + 40% 2 bedroom - (average 68m² GFA)
- RFB - Private: mix of 50% 1 bedroom + 40% 2 bedroom + 10% 3 bedroom - (average 73m² GFA)



Note

- Approximate existing lot size 630m² (18m x 35m)
- Upzoning to R3 for land north of Argyll Street and south of Kurrajong Street, approximately between Frederick Street and Bradley Street – potential for Residential Flat Buildings on minimum 3-lot amalgamation (sqm TBD).
- Combined flooding, bushfire and ecological constrained sites – potential for single dwelling.
- Duplex / semi-detached typology on all other sites (terrace typology possible on 2+ lot amalgamation).
- Duplex or terrace typology on privately owned lots with 60% take up rate.

Legend

- Argyll Estate Rezoning Investigation Area
- Single dwellings
- Duplex/semi-detached typology
- RFB - 4-storey (3+ lot amalgamation)
- Privately-owned - potential single dwellings
- Privately-owned - potential duplexes
- Sites requiring void at ground level to mitigate flooding impacts

Figure 4: Indicative growth scenario



Figure 5: Bush Fire Prone Land

1.4 Legislative Framework

Under the Ministerial Direction 4.3 (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 4.3 – ‘Planning for Bushfire Protection’ of the EP&A Act. The objectives of Direction 4.3 are:

- *Protect life, property and the environment from bushfire hazards, by discouraging the establishment of incompatible land uses in bushfire prone areas; and*
- *Encourage sound management of bushfire prone areas.*

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

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

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

- 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 AS 3959 and NASH, 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 bush and other fires;*
- *Co-ordination of bushfire fighting and bush fire prevention;*
- *Protection of persons from injury or death, and property from damage, arising from fires;*
- *Protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires; and*
- *Protection of the environment by requiring certain activities to be carried out having regard to the principles of ecologically sustainable development.*

1.5 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 defensible space to be located around buildings;*
- iii provide appropriate separation between a hazard and buildings which, in combination with other measures, minimises material ignition;*
- iv ensure that appropriate operational access and egress for emergency service personnel and residents is available;*
- v provide for ongoing management and maintenance of bush fire protection measures; and*
- vi ensure that utility services are adequate to meet the needs of firefighters.*

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 or proposed land use 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 strategic bushfire study acknowledges that the outcome of any potential development on BFPL resulting from the proposal includes a level of residual risk and considers 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 study; 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 increased residential densities and future development across the site, as shown in Figure 3 and Figure 4. Under the indicative growth scenarios, the proposal would facilitate up to an additional 263 dwellings within the study area, assuming a 60% uptake for privately owned dwellings. This would include a mixture of dwelling typologies including:

- Single dwellings
- Duplex /semi detached dwellings; and
- Residential Flat Buildings – 4 storey.

Future land uses enabled by the planning proposal would be subject to various aspects of PBP, when occurring on BFPL.

Under the Coffs Harbour LEP (2013), R3 land zoning presents additional lands uses that may be permitted with consent, compared to the current land use permissibility under R2 zoning. This includes the potential for the following uses:

- Backpackers' accommodation
- Information and education facilities
- Multi dwelling housing; and
- Residential accommodation.

While not all of these uses are the focus of the renewal and uplift, their potential permissibility does need to be considered in relation to PBP.

As the proposal does not contemplate changes to existing permitted uses in the R2 low density residential zones and RE1 public recreation zone, the R3 zone is therefore the key focus of this assessment.

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 site.

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

Bushfire prone vegetation within a 5 km assessment buffer is shown in Figure 6.6.

As mapped in the existing OEH vegetation mapping (DPIE 2012), forest vegetation is present to the west within the 5 km assessment buffer, along with areas of exotic vegetation. To the east, forested wetlands and forest vegetation is prominent. A summary of the relationship between PBP hazard class and vegetation formation within the study area and surrounds is shown in Table 2.

Further afield to the west, forest vegetation is supported by a number of National Parks (along with a myriad of conservation areas and state forests).

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.

Figure 7 shows the slope across the 5 km assessment buffer, with the presence of gently sloped land to the east and steeper sloped areas to the west and north.

Table 2: PBP hazard class and fuel loads for key vegetation types in the study area and surrounds

PBP Hazard Class	Keith Formation/Classes
Forests	Sydney Coastal Dry Sclerophyll Forests
	Northern Hinterland Wet Sclerophyll Forest
	North Coast Dune Sclerophyll Forest
	North Coast Dry Sclerophyll Forest
	North Coast Wet Sclerophyll Forests
	Coastal Swamp Forest
Tall Heath	Coastal Headland Heaths
	Coastal Wallum Heaths
Forested Wetlands	Coastal Floodplain Wetlands
	Coastal Heath Swamps
Rainforest (Low Hazard)	Littoral Rainforest
	Low hazard vegetation meeting the requirements of A1.10 of PBP
Grasslands	Maritime Grasslands
Freshwater Wetlands	Derived freshwater Wetlands

¹FROM A1.12.8 OF PBP

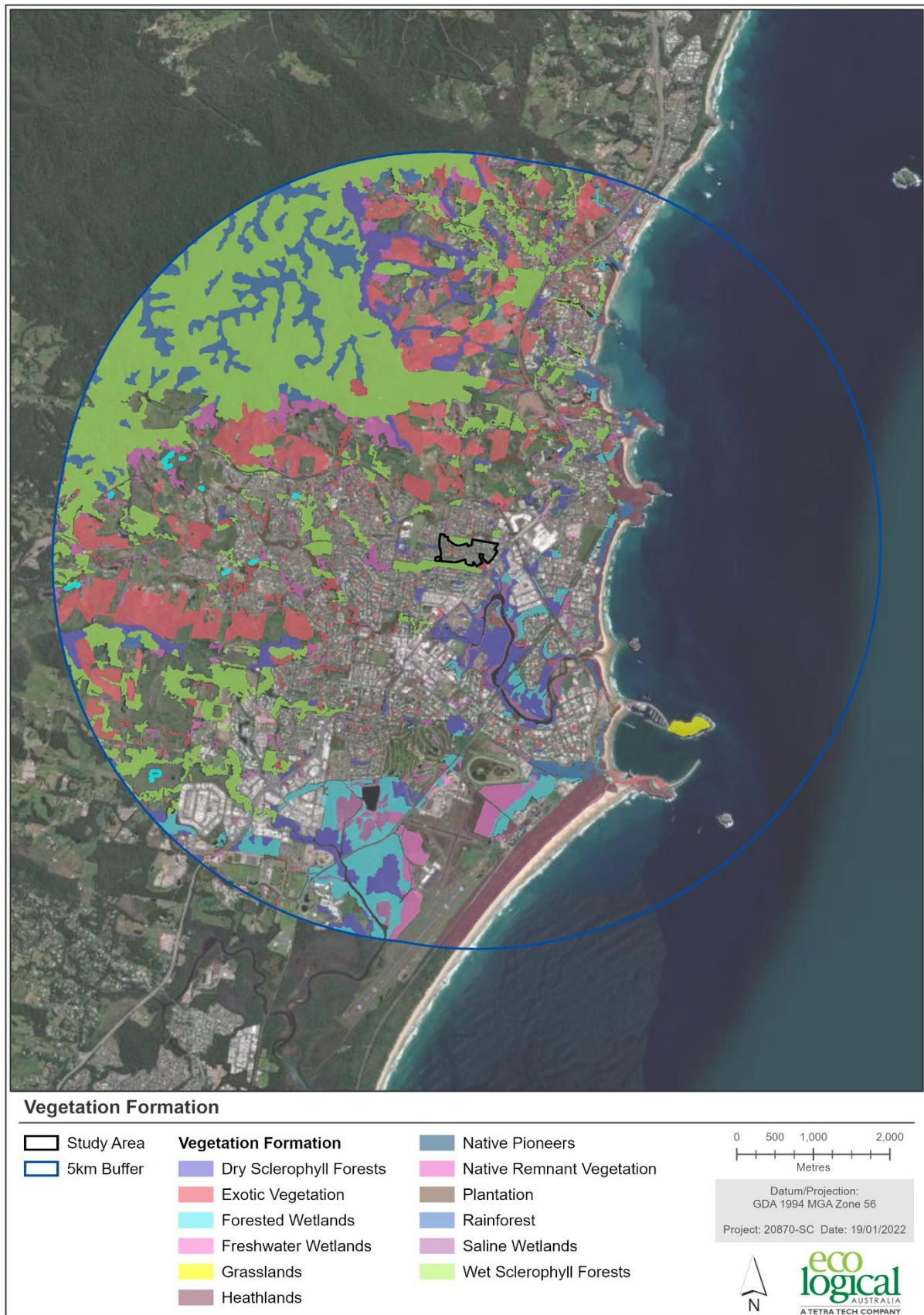


Figure 6: Vegetation formations within the greater Study Area (source: DPIE 2012)

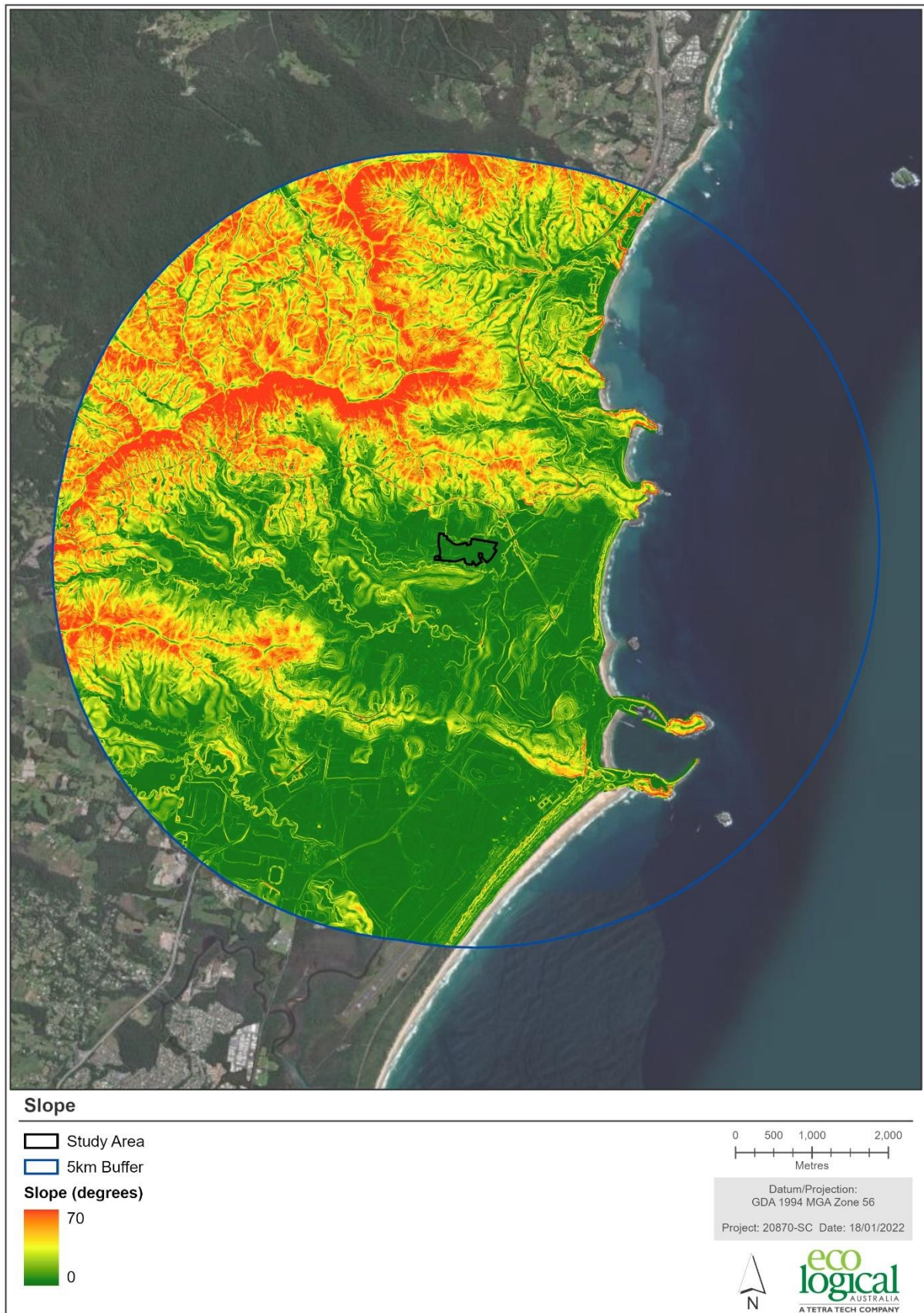


Figure 7: Slope within the Study Area

3.1.3 Bushfire Weather

The study area is situated within the Mid North Coast Bush Fire Risk Management Committee (BFRMC) area. The climate is sub-tropical with higher rainfall in the summer months (BFRMC 2008). While the gazetted bushfire season generally spans October to March, the Mid-North Coast Bush Fire Risk Management Plan (BFRMP) identified the bushfire season generally occurring from September to January, with bushfire conditions most favourable during these months, including strong west to north-westerly winds, high 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 (i.e. $\text{FFDI} \geq 25$), occur on average about 1 day per year based on data analysed from the National Bushfire Weather Data set for Coffs Harbour Airport weather station (station number 059151) which is the closest suitable weather station to the site in the dataset compiled by Lucas (2010).

For the purposes of PBP, the FFDI required to be used for development assessment for the site, is 80, as identified for the Mid-North Coast, which includes the Coffs Harbour LGA. The FFDI 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 Coffs Harbour Airport weather station from the National Historical Fire Weather Dataset 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 Coffs Harbour 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 (1972 to 2020) for Coffs Harbour Airport:

- GEV FFDI for wind directions from the north to south-east was 32;
- GEV FFDI for wind directions from the south-east to south-west was 49; and
- GEV FFDI for wind directions from the south-west to north was 88.

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 broader assessment area, aspects exposed to hazards in the south-west to north are more likely to be subject higher FFDI conditions whilst other directions are likely be exposed to bushfire attack at lower FFDIs. However, given the reduced opportunity for extended fire runs from the west and north, and the presence of only small, fragmented fire catchments providing pathways to the site, exposure of future development to higher fire intensities is unlikely.

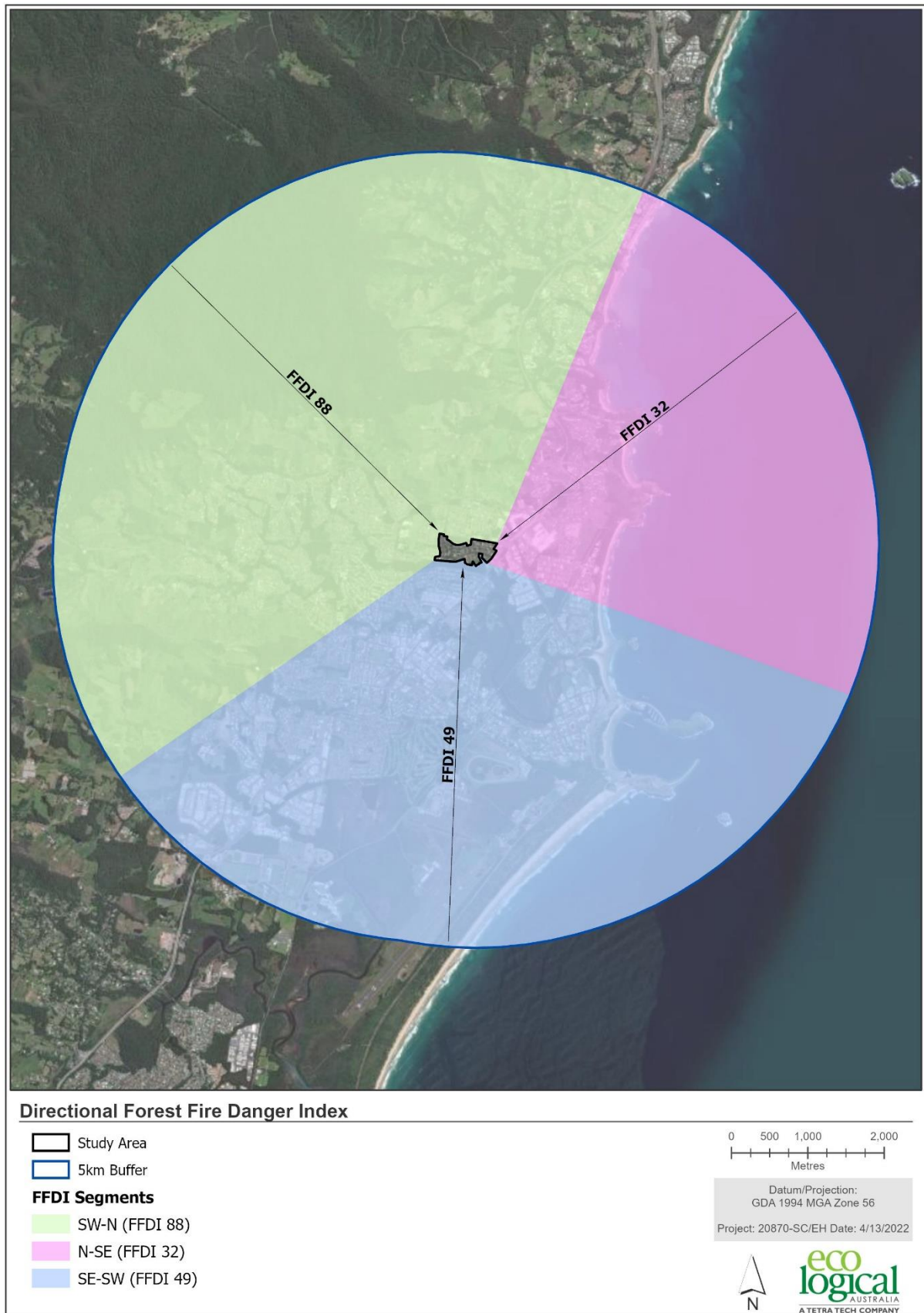


Figure 8: Directional FFDI Analysis

3.2 Bushfire Risk Considerations

The following sections outline considerations informing the bushfire risk exposure of the study area.

3.2.1 Bushfire History

According to the Mid North Coast BFRMP, there are on average of 185 fire incidents per annum, however on average, only two would progress to major fires.

As mapped in the National Parks and Wildlife Service (NPWS) fire history and Rural Fire Service (RFS) fire history mapping datasets (DPIE 2021) (Figure 9), since 1951 very few fires have occurred within the broader study area, and none have been mapped to occur within the study area or immediate surrounds during this time. The most recent fire of note is the McCanns Road fire, situated to the on the western boundary of the 5 km assessment buffer, which occurred in the 2017 fire season.

Whilst this data may not contain all wildfires, the spatial mapping of fire events indicates that the frequency of wildfire within the broader study area is very low, with very few areas subject to repeated wildfire, as indicated in Figure 10. Further, management of the surrounding land as per the BFRMC plan, along with fire mitigation advantages from road infrastructure and urban development, are likely to have contributed to no fires impacting the study area.

3.2.2 Fire Catchment and Spread Scenarios

High level analysis of the potential fire catchments influencing the study area was undertaken and the results of this analysis are displayed in Figure 11. 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 study area. 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 11, larger fire catchments to the north-west of the study area are situated beyond the 2 km buffer and are not connected to the study area due to the presence of roads and urban development. Indeed, the fire pathways with potential to reach the site, are narrow riparian corridors, positioned in a highly urbanised setting, and therefore unlikely to carry any substantial bushfire, that cannot be adequately planned for. Additionally, as per the Mid North Coast Bush Fire Risk Management Plan (BFRMP), there is an Asset Protection Zone adjacent to residential lots along the Treefern Creek riparian corridor.

3.2.2.1 Ignition

The Mid North Coast BFRMP identifies the main sources of ignition as escaped private hazard reduction burns, lightning strikes and arson. Fire ignition scenarios most relevant to the hazard immediately adjacent to the study area are most likely to be lightning strikes and arson. However, given the urbanised setting of the study area, and proximity to emergency response it is unlikely that any ignition would be detected early and swiftly responded to, given the proximity to responding fire services (see Section 5). As such, the potential for ignition is not considered an increased risk for the study area.

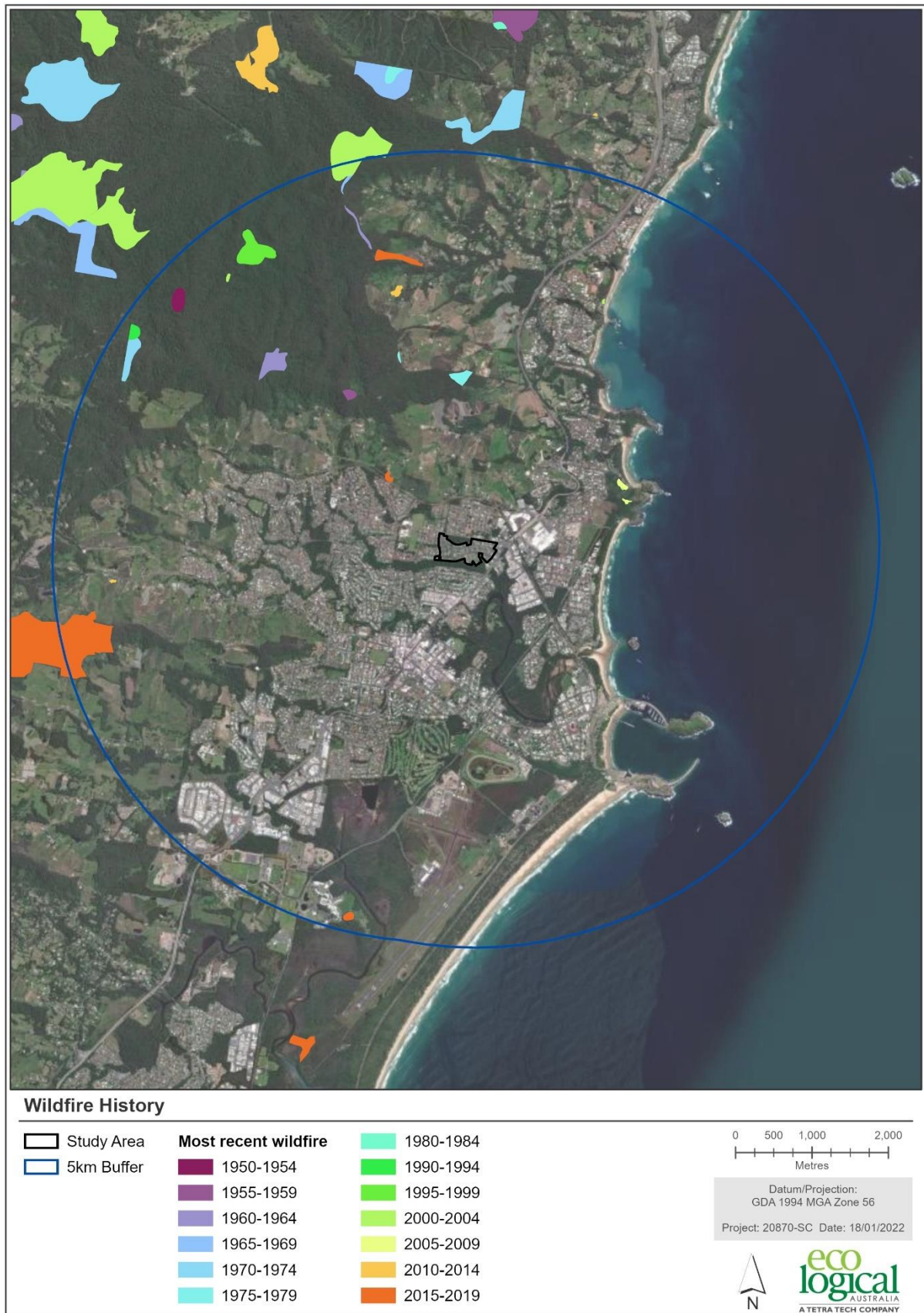


Figure 9: Wildfire history within the study area.

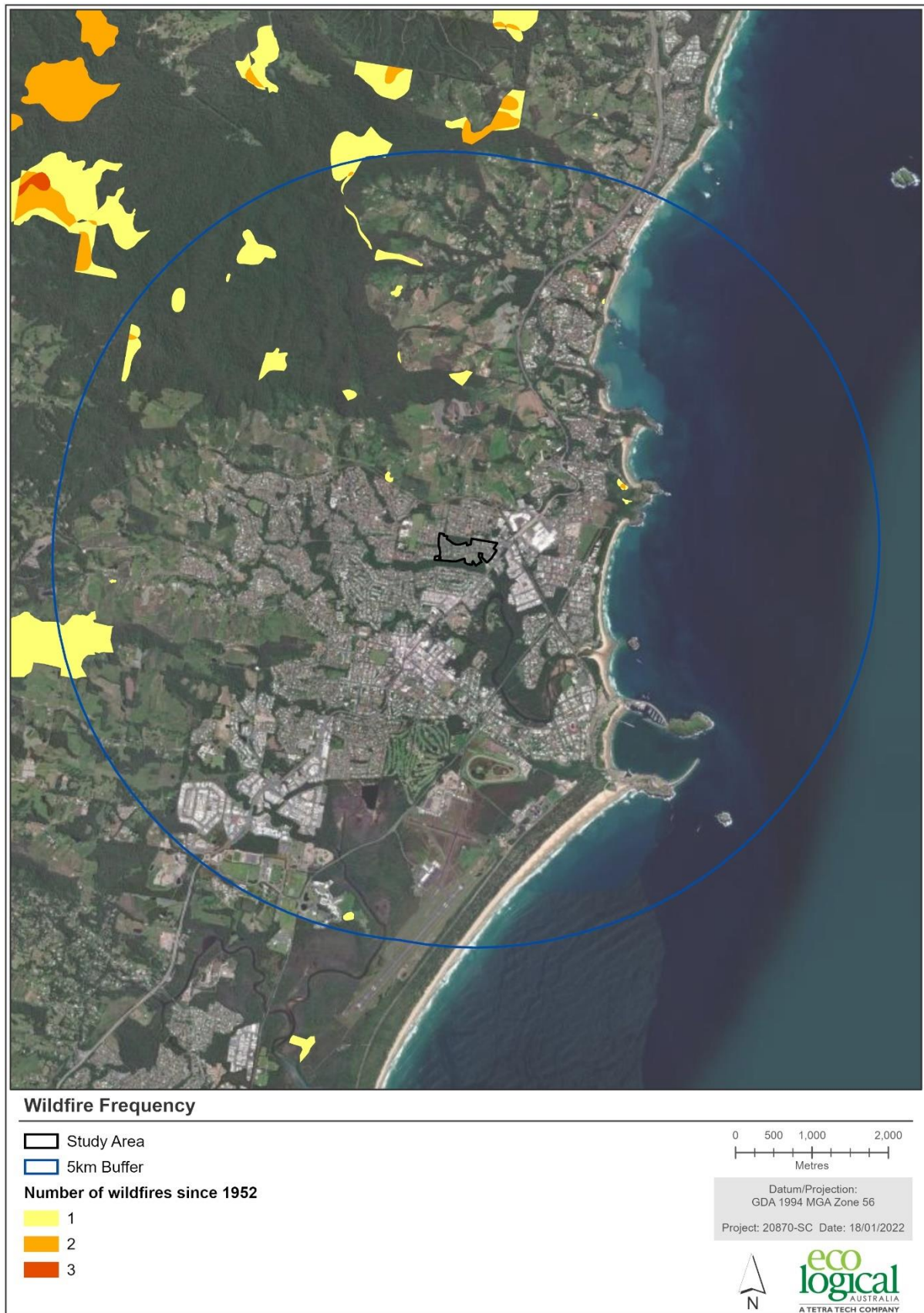


Figure 10: Wildfire frequency since 1951.



Figure 11: Fire catchments influencing the study area.

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.

However, steeper slopes are not present within the study area or adjacent vegetation, and not a consideration for the site. The opportunity for the influence of north to north-westerly winds to influence bushfire behaviour is unlikely given the riparian corridor is situated south of the site and the northern remnant patch is isolated from larger tracts of vegetation.

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 and west of the site may exhibit higher fire intensities due to the prominence of forest vegetation with high fuel loads, coupled with steeper slopes and a fire approach from north-westerly aspects. However, these areas are considerable distance from the study area, and there are several fire mitigation advantages, such as urban development, roads and waterways that disconnect fire pathways from reaching the study area, and also assist in reducing fire intensity. Therefore, these advantages and the proximity or responding emergency services (section 5), direct exposure of future development within the study area to a high intensity bushfire beyond a level that can be planned for is unlikely.

3.3 Summary of Landscape Bushfire Risk Assessment

The landscape bushfire risk assessment for the study area and surrounds considered the bushfire hazard including analysed bushfire weather conditions, fire history, fire catchments, fire pathways, ignition scenarios and potential fire behaviour influencing the site. However, as the location of the study area is afforded mitigation advantages to reduced fire pathways and fire intensity, rezoning and future infill development within the study area is not considered incompatible to the landscape bushfire risk.

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

- The direction of elevated risk from bushfire attack from the north to north-west, is unlikely for the study area due to the disconnection between large hazard areas to the west.
- Fire spread from north-easterly or south-westerly winds, is less likely and based on the FFDI analysis, and likely to be of reduced fire intensity.

- There are significant interruptions to the continuity of bushfire hazard in all directions and existing urban development surrounding the study area assist in mitigating fire attack, particularly to the east and west.
- 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 study area to provide for APZ, a key bushfire protection measure, is assessed in the following section. This is followed by an evaluation of the proposed land uses.

4.1.1 Feasibility of Asset Protection Zones

Based on the bushfire hazard assessment, an assessment of the feasibility of PBP compliant APZs has been undertaken. The indicative APZ requirements are shown in Figure 12. Table 3 includes the minimum dimensions required by the Acceptable Solutions of PBP for residential development (i.e. 29 kW/m²), along with requirements for Special Fire Purpose Development (SFPP).

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

- APZ are based on the requirements of PBP (2019). Bushfire policy and requirements current at the time of development will be applicable.
- Vegetation formation in the assessment is based on existing mapping by (OEH 2012 and ELA 2022) and refined using NearMap imagery.
- Vegetation north of Bray Street (Transect 2 and 3) has been downgraded to 'low hazard', meeting the guidelines outlined in A1.11.1 of PBP (<1 ha and potential fire run not >50 m). This approach has also been applied at Transect 4, with vegetation less than 50 m in width.
- The small patch of vegetation to the west of the subject site has been excluded under A1.10 of PBP as it is less than 1 ha and greater than 100 m separation from any other bushfire prone vegetation.
- Maintained parkland areas to the south of the site, corresponding to the RE1 zone, has been considered managed land under A1.10 of PBP.
- All APZs are assumed to be on land less than 18 degrees.

- Any revegetation within the study area may result in changes to the hazard assessment and APZ requirements.
- Areas of Biodiversity Value encroaching the study area have been assumed as the hazard interface. There may be opportunities to refine the effective slope assessment and hazard interface at the DA stage as part of the infill development process, based on:
 - management of land between the southern lots and riparian vegetation as per the BFRMP, and future open space provisions been considered in this area, subject to biodiversity requirements.
 - management of land between the northern lots and the remnant vegetation patch, subject to biodiversity requirements.

Table 3: PBP Indicative APZ requirements

Transect	Direction from study area	Slope	Vegetation	PBP Required Residential APZ	PBP Required SFPP APZ	Comment
1	North	>0° to 5° downslope	Forest	25 m	79 m	APZ to be provided within the study area.
2a 2b	North	All upslope and flat land	Low Hazard (Rainforest)	9 m	38 m	Hazard separation by existing urban infrastructure (Bray Street). A small portion of SFPP APZ to be provided on study area.
3	North	>0° to 5° downslope	Low Hazard (Rainforest)	12 m	47 m	Hazard separation by existing urban infrastructure (Bray Street).
4	East	>0° to 5° downslope	Low Hazard (Rainforest)	12 m	47 m	Hazard separation provided by existing urban infrastructure (Woolgoolga Road).
5	South-east	>0° to 5° downslope	Forest	25 m	79 m	APZ to be provided within the study area.
6	South-east	>0° to 5° downslope	Forest	25 m	79 m	APZ to be provided within the study area.
All other directions			Managed Land			

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

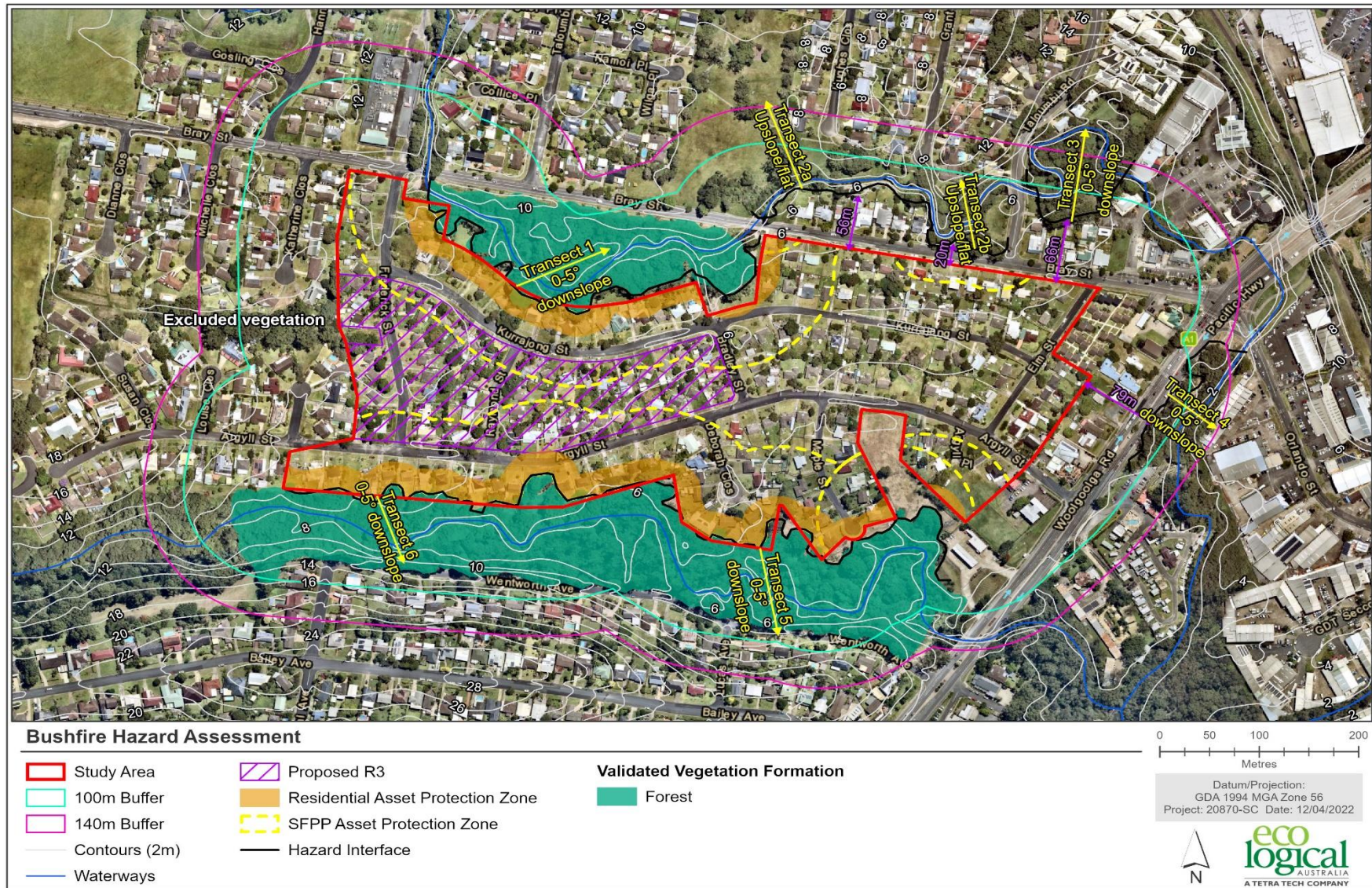


Figure 12: Bushfire Hazard Assessment and APZ requirement

4.1.2 Land use evaluation

Future development on BFPL will need to satisfy the performance criteria identified in PBP for various land uses. 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 4.

4.1.2.1 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 29 kW/m². 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. As per Table 8.2.2 of PBP (Appendix A), this should address considerations around the following issues:

- Population
- Location of building
- Design fire
- Egress
- Car parking
- Other relevant considerations

4.1.2.2 Chapter 5 of PBP – Residential and Rural Residential Subdivision

Increased density 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
- Provision of access and infrastructure requirements according to Table 5.3b of PBP.

4.1.2.3 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.

4.1.2.4 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 / defensible 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.

4.1.3 Summary of land use evaluation

Table 4 below provides a summary of the land use evaluation for differing development types that are permissible within the study area, and in particular, the proposed R3 medium density residential zone. The area to be rezoned is primarily situated outside of the residential APZ requirement and therefore future residential development in this zone is suitable. Future SFPP development should occur outside of the SFPP APZ.

Table 4: Future land use evaluation

Development Type	Assessment Considerations	Suitability
Residential Subdivision		It is anticipated that different residential typologies can comply with PBP, and proposed residential uplift in the R3 zone can meet the AZP requirements of PBP.
SFPP Development	<p>The land use evaluation has considered potential land uses enabled by the rezoning and with consideration to:</p> <ul style="list-style-type: none"> • The risk profile of the site • Proposed land use zones and permitted uses • The most appropriate siting for different land uses based on the risk profile • The impact of the siting of these uses on APZ provision 	<p>Requirements for SFPP development have been considered and suitable areas are feasible in within the study area, within suitable areas outside of the SFPP APZ. Further assessment of suitability will occur on a case-by-case basis at the DA stage.</p>
Buildings of Class 5 to 8 under the NCC /Section 8.3.10 Commercial and Industrial Development		<p>No specific requirements apply however the aims and objectives of PBP can be achieved for future land uses. Where ground floor retail occurs in conjunction with residential development, then PBP requirements for residential development should apply.</p>
Multi-storey residential development		<p>Future development is feasible outside of the 29 kW/m² 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, however this will occur at the DA stage.</p>

5. Access and Egress

As this assessment is for a rezoning proposal, assessment of future internal roads is not possible as future development will primarily be activated as infill development. Therefore, it is unlikely that new road infrastructure within the study area will be proposed. As such, future development will be accessed by the current road network. New development in the proposed R3 zone, and other infill development will need to meet the property access requirements set out in Table 7.4a of PBP (see Appendix B), or if applicable, Table 5.3b of PBP for subdivision.

Current access to the precinct is via Argyll Street, accessed from the Pacific Highway to the east or Joyce Street to the west. Elm Street and Frederick Street via Bray Street to the north also provide additional access points to the study area.

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 residential development is primarily via Argyll Street and Frederick Street. This enables opportunity for egress in multiple directions including:

- east onto Pacific Highway/Woolgoolga Road; and
- north onto Bray Street.
- West via Argyll Street to Joyce Street.

As the Estate is primarily surrounded by urban development, with multiple access routes, 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, the site will remain primarily unincumbered by bushfire and therefore on-site evacuation is also feasible for a large proportion of the study area.

5.2 Evacuation

The need for off-site evacuation for the study area is not considered high, given the lower bushfire risk setting. If off-site evacuation was necessary the study area is serviced by arterial and sub-arterial roads, providing multiple route options that could provide egress to the nearby Coffs Harbour town centre. These options are unconstrained and therefore reliance on emergency services intervention is unlikely.

While the nearest NSP is situated 5 km north of the study area, it is unlikely that travel to a NSP will be required in the event of a bushfire due to the low risk of the study area, proximity to emergency services (see section 6) and proximity to the Coffs harbour town centre (Table 5, Figure 13).

Existing provisions for multiple route options available, and the close proximity to the Coffs harbour Town centre, evacuation is not considered a constraint to the proposal.

Table 5: Existing NSPs in vicinity of study area and additional town centre locations

Neighbourhood Safer Place ¹	Location	Suburb	LGA	Type	Distance (km)	Travel Time (min) ²
Town Centre (non designated NSP)	Coffs Central	Coffs Harbour	Mid North Coast	n/a	2.5 km	6
Town Centre (non designated NSP)	Park Beach Plaza	Coffs Harbour	Mid North Coast	n/a	1.4 km	4
Korora Football Field	Herman Reick Avenue, Korora	Frenchs Forest	Mid North Coast	Open Space	5 km	6

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



Figure 13: Existing Declared Neighbourhood Safer Places

6. Emergency Services

The rezoning proposal will facilitate additional residential development of the Argyll Estate, 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 it is likely that Fire and Rescue NSW (FRNSW), stationed in proximity 3 km south would be in attendance, along with supporting local Rural Fires Services (Table 6, Figure 14). As such, uplift resulting from rezoning is unlikely to require new stations or brigades.

The requirement for additional resources for the region are also assessed as part of ongoing broader emergency management planning, and therefore any projected increase in demand would be considered in broader planning and development contributions, if required.

Table 6: Fire Stations within proximity to the site

Station	RFS/ FRNSW	Distance Km	Time*	Direction
Coffs Harbour FRNSW	FRNSW	3	6 min	South
Mid North Coast Support RFS / Coffs Harbour Fire Control Centre	RFS	4.6	7 min	South

*TRAVEL TIMES ESTIMATED FORM GOOGLE MAPS

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, in relation to emergency services, it is not considered that rezoning will facilitate inappropriate development under the Strategic Planning Principles or exclusion criteria within PBP.



Figure 14: Fire Stations in close proximity to the site

7. Infrastructure

Future development on the study area 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, however it is expected, future development will primarily be activated via infill development.

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, as outlined in Table 7.4 a of PBP are explored below and summarised in Appendix C. Where future development incorporates subdivision additional requirements as outlined in Chapter 5 of PBP will apply, and where SFPP development, Chapter 6 of PBP will apply.

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 study area.

7.2 Electricity and gas

It is expected that future electricity supply to the study area will be underground where possible and compliant with PBP. If existing or future electrical transmission lines to the study area 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. APZ's associated with future development are to be wholly within study area, unless 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 proposal, against the bushfire strategic planning requirements of PBP and based upon the assessment findings in the preceding sections, to determine whether:

- The proposal 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 Chapter 4 of PBP and the Assessment Framework of this Study, as summarised in Table 1. 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

A summary of the evaluation of the proposal against the strategic requirements is provided in Table 7.

Table 7: 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	<p>The risk profile of study area is not uniform. Key findings include:</p> <ul style="list-style-type: none"> There are areas of elevated bushfire risk beyond the Study area that are generally associated with: <ul style="list-style-type: none"> Wooded vegetation (i.e. primarily forest); The study area has limited exposure to the most problematic directions of bushfire attack (i.e. the north- northwest) The areas of elevated bushfire risk in the broader locality are outside and separated from the Study area; The bushfire hazards immediately adjoining the site are generally of a lower threat type, being: <ul style="list-style-type: none"> Forest and low hazard vegetation on slopes no greater than >0-5° downslope and; Constrained to narrow corridors and; Can be adequately mitigated within the area to be rezoned by achievable APZ requirements The bushfire hazards within the Study area are negligible and: <ul style="list-style-type: none"> Disconnected from external bushfire hazards; and low hazard vegetation or vegetation that meets the “low threat” prescriptions of PBP and can therefore be excluded. <p>This Study has identified that the rezoning is suitable given the bushfire risk context, considering:</p> <ul style="list-style-type: none"> 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; 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; and 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 increased residential density, primarily within the proposed R3 zone, and 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.
Minimising reliance on performance-based solutions	The compliance of the rezoning proposal to PBP requirements, minimises reliance on performance-based solutions.

PBP Strategic Planning Principle		Evaluation
Providing adequate infrastructure associated with emergency evacuation and firefighting operations		<p>There are multiple egress points provided by the existing public road network, enabling for off-site evacuation in multiple directions.</p> <p>In addition.</p> <p>Future development has capacity to provide infrastructure for firefighting operations including access and water supply, compliant with PBP.</p>
Facilitating appropriate ongoing land management practices		<p>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.</p>

10. Conclusion & Recommendations

In evaluating the Argyll Estate, Coffs Harbour 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;
- Bushfire protection measures can be accommodated by future development and 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 study area 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.

Future development is to be designed with consideration to bushfire and meet the requirements of bushfire legislation current at the time of development.

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Appendix A – Multi-storey residential requirements

The following Issues and considerations specific to multi-storey residential development are reproduced from Table 8.2.2 of PBP

Table 8: Multi-storey development requirements (adopted from Table 8.2.2 of PBP)

Issue	Specific Concern	Technical Considerations
Population	Impact on existing community and infrastructure.	What capacity does the existing infrastructure have to allow evacuation of existing and proposed residents in the event of a bush fire?
Location of Building	Locating on ridge tops emphasises the risk of convective plume interaction and wind related impacts.	Can the building be located away from ridge tops to areas that have a reduced bush fire exposure? If unavoidable, what is the impact on modelling and risk to the building? Is this risk appropriate for the building and occupant numbers?
Design Fire	Different elements of the flame could have different impacts on different levels of the building; and The whole building could be impacted by ember attack and multiple floors could be alight simultaneously.	What are the flame dimensions including the flame angle? Where is the hottest part of the flame located? How would this impact on the proposed building? How would the warning and suppression systems in the building cope with this?
Egress	Elevations exposed to bush fire risk.	How does the emergency evacuation procedure take account of the location of bush fire prone vegetation?
Building Construction	Performance of the building façade in a bush fire scenario.	What wall and cladding materials are proposed and what is proposed for the openings/penetrations (i.e. windows and doors)? How does the proposed building construction deal with fire spread from the vegetation to the inside of the building? Is compliance with AS 3959 sufficient to ensure that the bush fire risk is mitigated? Is this appropriate for the design fire scenario?
	Balconies may contain external features which could ignite and contribute to building ignition and fuel loads	Are there balconies proposed? What may be stored on the balconies? Can there be restrictions on what is stored on the balconies due to fire risk?
Car Parking	Lower storey car park could be subject to ember attack and high radiant heat loads.	Is the warning and suppression system designed to take account of bush fire impact? Where are exits located? Are they guiding occupants away from the car park?
Other Engineering Considerations	Access for fire fighters may be restricted or challenging; and	What would this mean for fire suppression?

Issue	Specific Concern	Technical Considerations
	Risk implications of floor to floor fire spread.	How would warning and suppression systems take account of this? What would this mean for evacuation?

Appendix B - Access Specifications

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

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

Table 9: Property access requirements (adapted from Table 7.4a of PBP)

Performance Criteria	Acceptable Solutions
firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.
the capacity of access roads is adequate for firefighting vehicles	the capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.
there is appropriate access to water supply.	hydrants are provided in accordance with the relevant clauses of 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.
Firefighting vehicles can access the dwelling and exit the property safely.	at least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road; 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 4 m carriageway width; In forest, woodland and heath situations, rural property access roads have passing bays every 200 m that are 20 m long by 2 m wide, making a minimum trafficable width of 6 m 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 of PBP;

Performance Criteria	Acceptable Solutions
	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;
	A development comprising more than three dwellings has 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 (3.5 m), 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.

Table 10: Performance criteria for access for residential and rural residential subdivisions

Performance Criteria	Acceptable Solutions
The intent may be achieved where:	
firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation	<p>property access roads are two-wheel drive, all-weather roads, and</p> <p>perimeter roads are provided for residential subdivisions of three or more allotments; and</p> <p>subdivisions of three or more allotments have more than one access in and out of the development; and</p> <p>traffic management devices are constructed to not prohibit access by emergency services vehicles; and</p> <p>maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; and</p> <p>all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; and</p> <p>where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; and</p> <p>where access/egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.</p>
the capacity of access roads is adequate for firefighting vehicles	the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.

Performance Criteria	Acceptable Solutions
there is appropriate access to water supply	<p>hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;</p> <p>hydrants are provided in accordance with AS 2419.1:2005;</p> <p>there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.</p>
access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface	<p>perimeter roads are two-way sealed roads; and</p> <p>8m carriageway width kerb to kerb; and</p> <p>parking is provided outside of the carriageway width; and</p> <p>hydrants are located clear of parking areas; and</p> <p>there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and</p> <p>curves of roads have a minimum inner radius of 6m; and</p> <p>the maximum grade road is 15° and average grade is 10°; and</p> <p>the road crossfall does not exceed 3°; and</p> <p>a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</p>
access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating	<p>minimum 5.5m width kerb to kerb; and</p> <p>parking is provided outside of the carriageway width; and</p> <p>hydrants are located clear of parking areas; and</p> <p>roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and</p> <p>curves of roads have a minimum inner radius of 6m; and</p> <p>the road crossfall does not exceed 3°; and</p> <p>a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</p>
firefighting vehicles can access the dwelling and exit safely	<p>No specific access requirements apply in an urban area where a 70 metre unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply).</p> <p>In circumstances where this cannot occur, the following requirements apply:</p> <p>minimum carriageway width of 4m;</p> <p>in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay; and</p> <p>a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and</p> <p>provide a suitable turning area in accordance with Appendix 3; and</p> <p>curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; and</p> <p>the minimum distance between inner and outer curves is 6m; and</p> <p>the crossfall is not more than 10°; and</p>

Performance Criteria	Acceptable Solutions
	<p>maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads; and</p> <p>a development comprising more than three dwellings has formalised access by dedication of a road and not by right of way.</p> <p>Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. the gradients applicable to public roads also apply to community style development property access roads in addition to the above.</p>

Appendix C - Services Specifications

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

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

Table 11: Property access requirements (adapted from Table 7.4a of PBP)

Performance Criteria	Acceptable Solutions
firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.
the capacity of access roads is adequate for firefighting vehicles	the capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.
there is appropriate access to water supply.	hydrants are provided in accordance with the relevant clauses of 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.
Firefighting vehicles can access the dwelling and exit the property safely.	at least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road; 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 4 m carriageway width; In forest, woodland and heath situations, rural property access roads have passing bays every 200 m that are 20 m long by 2 m wide, making a minimum trafficable width of 6 m at the passing bay; A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;

Performance Criteria	Acceptable Solutions
	Provide a suitable turning area in accordance with Appendix 3 of PBP;
	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;
	A development comprising more than three dwellings has 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 (3.5 m), 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.

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

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

Performance Criteria	Acceptable Solutions
surrounding bushland or the fabric of buildings.	<p>all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;</p> <p>connections to and from gas cylinders are metal;</p> <p>polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not used;</p> <p>above-ground gas service pipes are metal, including and up to any outlets.</p>

