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STRATEGIC BUSHFIRE ASSESSMENT

PROPOSED WARRA WARRA ROAD PLANNING PROPOSAL

LGA: Shoalhaven

Lot 2 DP 1126288 and Lot 224 DP 755952

Applicant: Jervis Bay Town Planning

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Version Control

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Site Address	Warra Warra Road & Old Southern Road, South Nowra, Lot 2 DP 1126288 and Lot 224 DP 755952		
Approved By:	Katherine Harris – BPAD L3		
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DISCLAIMER

Utmost care has been taken in the preparation of this report, however there is no guarantee of human error. The intention of this report is to address the submission requirements for Development Applications on bushfire prone land. There is no way Harris Environmental Consulting is liable for any financial losses incurred should the recommendations in this report not be accepted in the final conditions of consent. This bushfire assessment provides a risk assessment of the bushfire hazard as outlined in the PBP 2019 and AS3959 2018. It does not provide protection against any damages or losses resulting from a bushfire event.

EXECUTIVE SUMMARY

PROPOSAL

Harris Environmental has been engaged to provide a Strategic Bush Fire Study (SBFS) for the proposed Cole Street Planning Proposal for Lot 2 DP 1126288 and Lot 224 DP 755952 Warra Warra Road & Old Southern Road, South Nowra.

The current land is undeveloped and zoned E3- Productivity Support.

The proposed rezone is for the following:

- Residential zone (R1) - 202 Lots – 16.2 Ha.
- Conservation zone (C2) – 9.3 Ha.
- Retain existing business zone (E3) – 6.7 Ha

This Strategic Bushfire Study (SFS) has been provided in accordance with the requirements of *Chapter 4 Strategic Planning of Planning for Bushfire Protection 2019 (PBP)*.

ASSET PROTECTION ZONES

All proposed lots can support a building envelope that is not exposed to radiant heat greater than 29 kW/m².

An APZ will be required to be established as part of the development and maintained in perpetuity. The extent of the APZ will depend on the siting of future building envelopes within each proposed residential lot and will be required to be determined as the infill DA stage.

BUSHFIRE LANDSCAPE ASSESSMENT

The most credible bushfire threat to the proposed development originates from the south and east, primarily from the Worrigee Nature Reserve. Bushfires from these areas would generally traverse relatively flat or gently sloping terrain that can support sustained bushfire behaviour.

The proposed development is in an area south of the existing township of South Nowra. The site is located adjacent to the existing commercial area to the north and west with access to the major road network and national park to the east and south.

The subject site location is characterised by a mix of unmanaged and disturbed Forest and Woodland, with Forest vegetation bounding the site on the southeast and northwest.

There is significant history of fires within the subject lot and surrounds. The main bushfire hazard surrounding the subject site consists of Forest on the northwest, northeast, east and south. This bushfire hazard has significant fire runs greater than a kilometre from the east and south.

The proposed development may be exposed to radiant heat, ember attack and localised flame contact from surrounding bushfire-prone vegetation, particularly where forested wetland and woodland vegetation occur. Appropriate bushfire protection measures, including Asset Protection Zones (APZs), adequate firefighting water supplies and safe operational access and egress, will therefore be required to manage the identified bushfire hazards and support the safety of future occupants and emergency services.

LANDUSE

The subject lot is currently mapped as E3 – Productivity Support (Figure 12). The proposal maintains the E3 – Productivity Support and creates R1 - Residential zone for the residential areas and C2 – Conservation Zone for the Forest.

The proposal would increase occupant density; however, these individuals are expected to become familiar with the area and would be able to develop management plans in preparation for a bushfire.

It is important to note that the above descriptions relate to potential future land use outcomes associated with the current zoning framework and do not necessarily reflect the existing condition of the landscape. Based on the current state of the site and surrounding land, the primary bushfire threat remains the forested vegetation to the east associated with the C1 – National Parks and Nature Reserves zoning.

ACCESS

The subject lot is located on Old Southern Road and Warra Warra Road, a two-wheel drive, all weather roads. Roads surfaces and bridges are sufficient to carry fully loaded firefighting vehicles.

The proposal will include perimeter road with a minimum 8m and a maximum 25m of width for proposed residential lots, providing firefighters with frontage access between the bushfire prone vegetation and the proposed new lots (Figure 18).

The roads proposed as part of the development will be required to comply with *Table 5.3b of PBP 2019*.

UTILITIES

Any building envelope on the proposed residential lots will require a reticulated or static water supply outlined in *Planning for Bushfire Protection (2019)*.

A reticulated water supply that includes:

- Fire hydrant, spacing, design and sizing complies with the relevant clauses of
- Australian Standard AS 2419.1:2021.
- Hydrants are not located within any road carriageway.
- Reticulated water supply to urban subdivisions uses a ring main system for areas with
- perimeter roads.
- Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2021

Or a static water supply that will be required to:

- Where reticulated water is not available, static water supplies shall comply with Table 5.3d of PBP (2019);
- Above ground tanks are required to be manufactured of concrete or metal and raised tanks have their stands protected. All above ground water pipes external to the building are required to be metal including and up to any taps. Pumps are to be shielded. Underground tanks should have an access hole of 200 mm and a hardened ground surface within 4 m of the access hole. A suitable connection for firefighting purposes is required such as a 65mm Storz outlet and a gate or ball valve.

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1. PROPOSAL

Harris Environmental has been engaged to provide a Strategic Bush Fire Study (SBFS) for the proposed Planning Proposal for Lot 2 DP 1126288 and Lot 224 DP 755952 Warra Warra Road & Old Southern Road, South Nowra.

This assessment confirms the subject lot is mapped on the Shoalhaven Bush Fire Prone Land Map (BFPLM).

The current land is undeveloped and zoned E3- Productive.

The proposed rezone is for the following:

- Residential zone (R1) - 202 Lots – 16.2 Ha.
- Conservation zone (C2) – 9.3 Ha.
- Retain existing business zone (E3) – 6.7 Ha

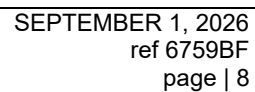
Planning proposals in bushfire prone areas involve the preparation of strategic bushfire studies as described in Chapter 4 of the *Planning for Bushfire Protection 2019 (PBP 2019)*. These studies are provided in the first stage of the planning process which provides an opportunity to apply best practice bushfire mitigation and management strategies for long term future development. The study is undertaken to ensure that future developments are not exposed to an unacceptable risk of bush fire.

This strategic bushfire study involves a landscape assessment of bushfire risk, to provide identification of bushfire risk issues on a macroscale. This study identifies the surrounding natural bushfire hazards and high-risk areas and allow the opportunity to minimise and avoid development in inappropriate areas.

The location of key access routes and direction of travel are designed to consider the bushfire risk. The proposed access network will ensure future developments are not isolated in the event of a bushfire.

This study demonstrates the suitability for development in the context of bush fire risk, and how the proposal can comply with *PBP 2019*, and provide the infrastructure, land management and evacuation for future development.

Figure 1 shows the proposed rezoning and proposed subdivision plan.



2. ASSESSMENT REQUIREMENTS

2.1 Regulation

A planning proposal that intends to alter the council Local Environment Plan (LEP) is required to apply the *NSW Environmental Planning and Assessment Act* (EPA) 1979 s.9.1 (2). Direction 4.4 – Planning for Bushfire Protection applies to planning proposals that affect or are in close proximity to land mapped as Bushfire Prone. As part of this process, consultation with the Development Coordination Authority (DCA) should be sought, with comments provided on a bushfire assessment taking the form of a Strategic Planning Assessment as outlined in *Chapter 4 of PBP 2019*.

Where an application for rezoning includes residential or special fire protection purpose developments on bushfire prone land mapping, an indicative layout should be provided. The aim of the proposal is to demonstrate the compliance with required APZs, and the road network can support the emergency evacuation demands in the event of an emergency. It is important that a new development does not increase the level of bushfire risk to the existing community.

Chapter 4 of Planning for Bushfire Protection 2019 outlines the strategic principles that should apply to the analysis as:

- Ensuring the land is suitable for development in the context of bushfire risk;
- Ensuring new development on bushfire prone land mapping will comply with *PBP 2019*;
- Minimising the reliance on performance-based solutions;
- Providing adequate infrastructure associated with emergency evacuation and firefighting operations; &
- Facilitating appropriate ongoing land management.

3. SITE DESCRIPTION

The subject land is in the Shoalhaven (LGA) and located on the NSW South Coast. The site is located directly south of the Nowra City Township, 6 km south of the City Centre and adjoins the existing industrial and commercial area on the Princes Highway South Nowra as shown in Figure 2.

A broad-scale aerial view of the subject site, as shown in Figure 3, shows the site is located adjacent to the existing commercial area to the north and west and national park to the east and south.

The land the subject of the Planning Proposal is the portion between Old Southern Road and Warra Warra Road, and the adjoining Worrigee Nature Reserve. The land is legally known as Lot 2 DP 1126288 and Lot 224 DP 755952 Old Southern Road, South Nowra (Figure 4). The subject site, the subject of this Planning Proposal, has a total area of approximately 32.39ha.

A bushfire threat exists from the north and west; however, the surrounding landscape in these directions is more fragmented due to existing development and land clearing, which interrupts fuel continuity and reduces the potential for extended fire runs toward the site.

Under a worse-case scenario corresponding to a Forest Fire Danger Index (FFDI) of 100, reflective of an extreme catastrophic fire weather profile, the surrounding landscape presents an inherent risk of high-intensity, unpredictable, and rapid bushfire propagation. To mitigate this hazard, the proposed design incorporates a comprehensive defensible space framework established in accordance with statutory guidelines. This risk offset is achieved through the implementation of the required Asset Protection Zones (APZS), safe operational access and egress to the site, adequate siting and water supply, and arrangement of utility services.

FIGURE 2 LOCATION OF SUBJECT LOT

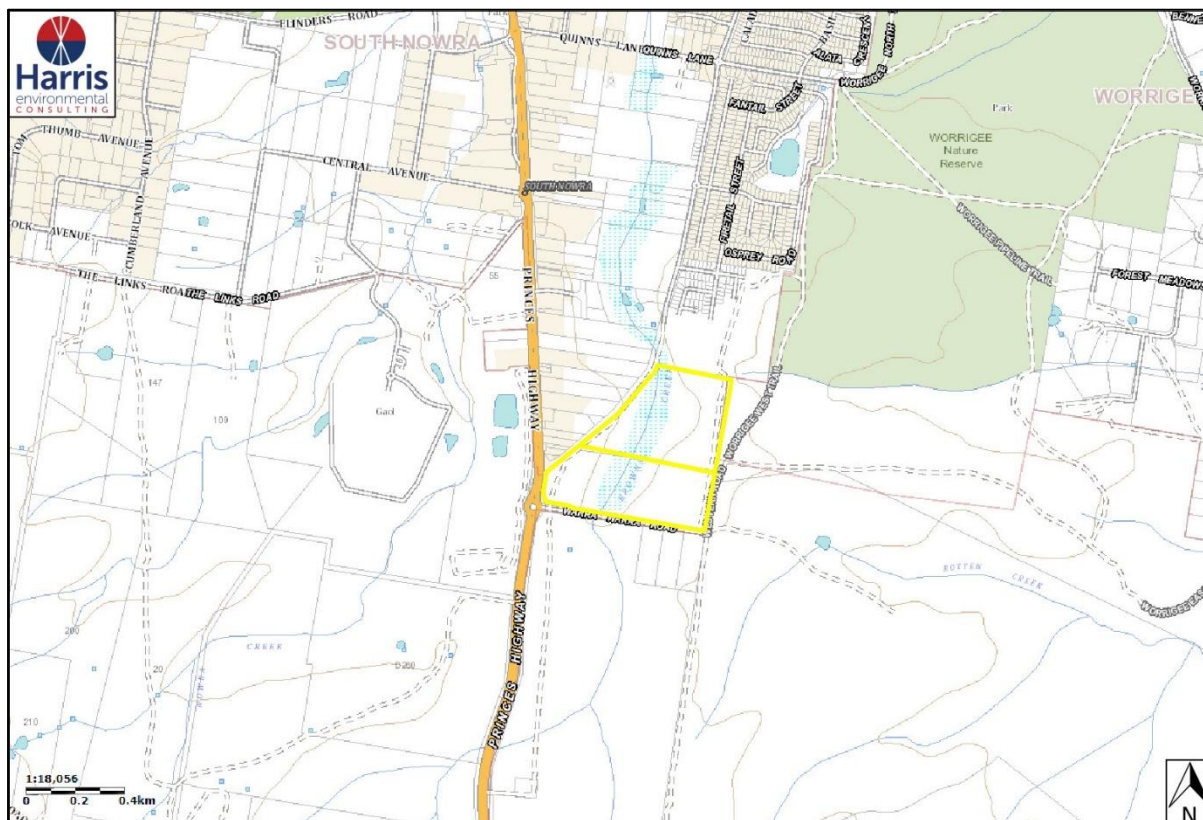


FIGURE 3 BROADSCALE AERIAL VIEW OF THE SUBJECT LOT

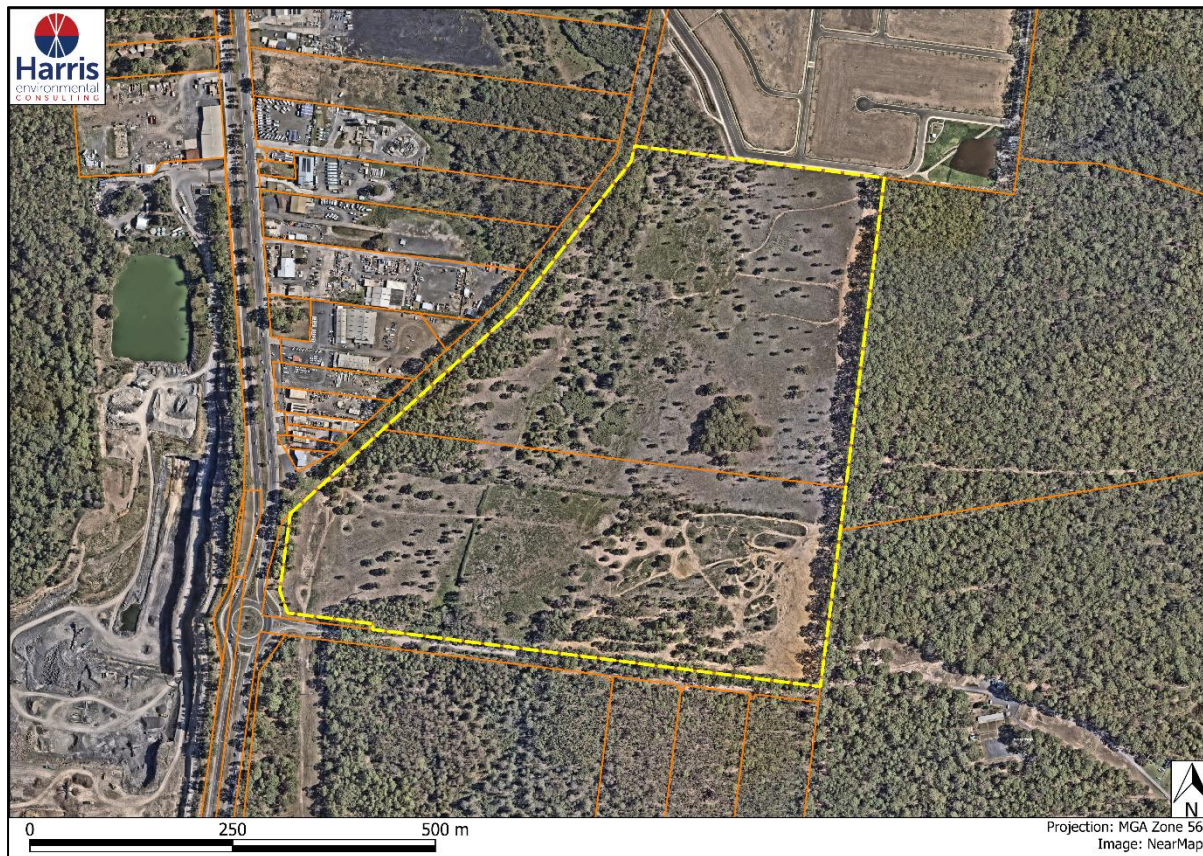
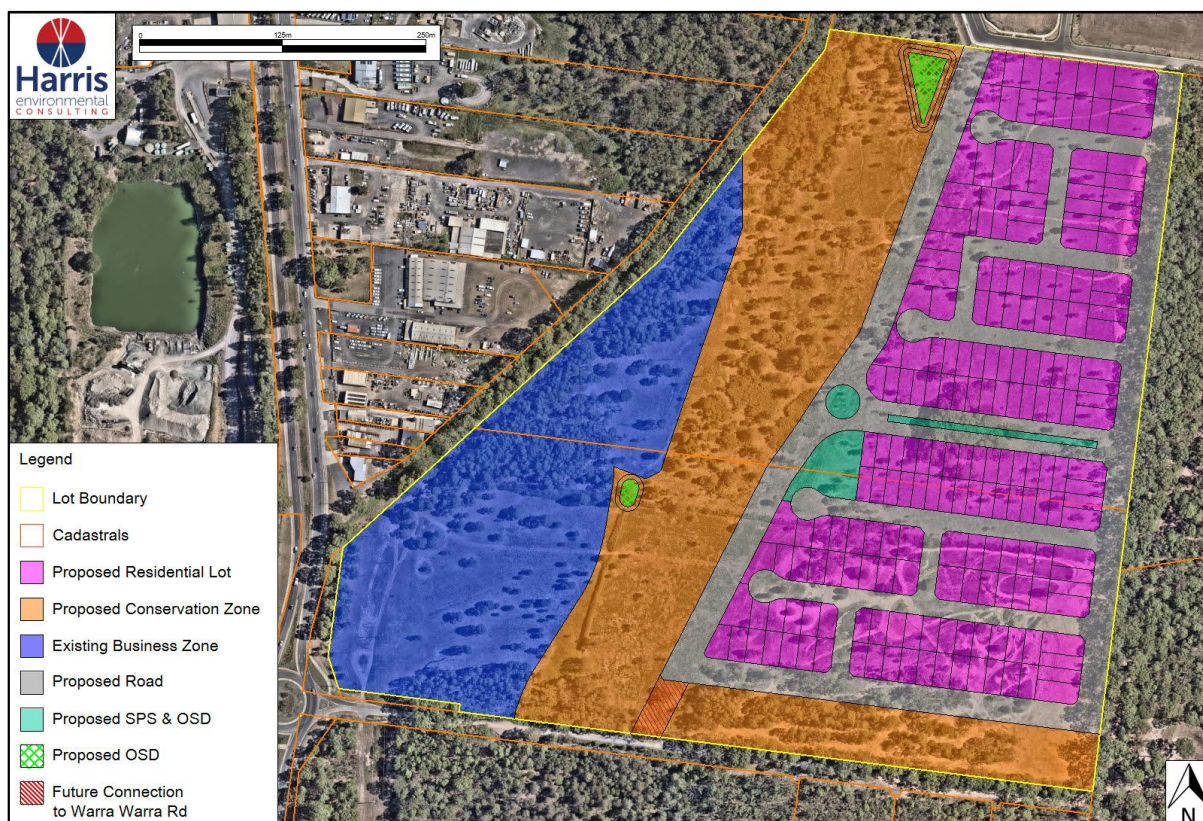


FIGURE 4 CLOSE-UP AERIAL



3.1 Significant Aboriginal Heritage and Environmental Features

As of 31/08/2026, the subject site is identified as having high biodiversity values under the Biodiversity Offsets Scheme under the *Biodiversity Conservation Act 2016* (Figure 5). A basic search of the Aboriginal Heritage Information Management System (AHIMS) conducted on 3/08/2026, identified no-known significant Aboriginal sites or places within a 50 m buffered area of the subject site's boundary. There are also multiple mapped water courses within the subject site (Figure 6).

Therefore, there are no-known Aboriginal heritage features which may act as a constraint to implementing APZs within the subject site.

FIGURE 5 BIODIVERSITY VALUE MAP

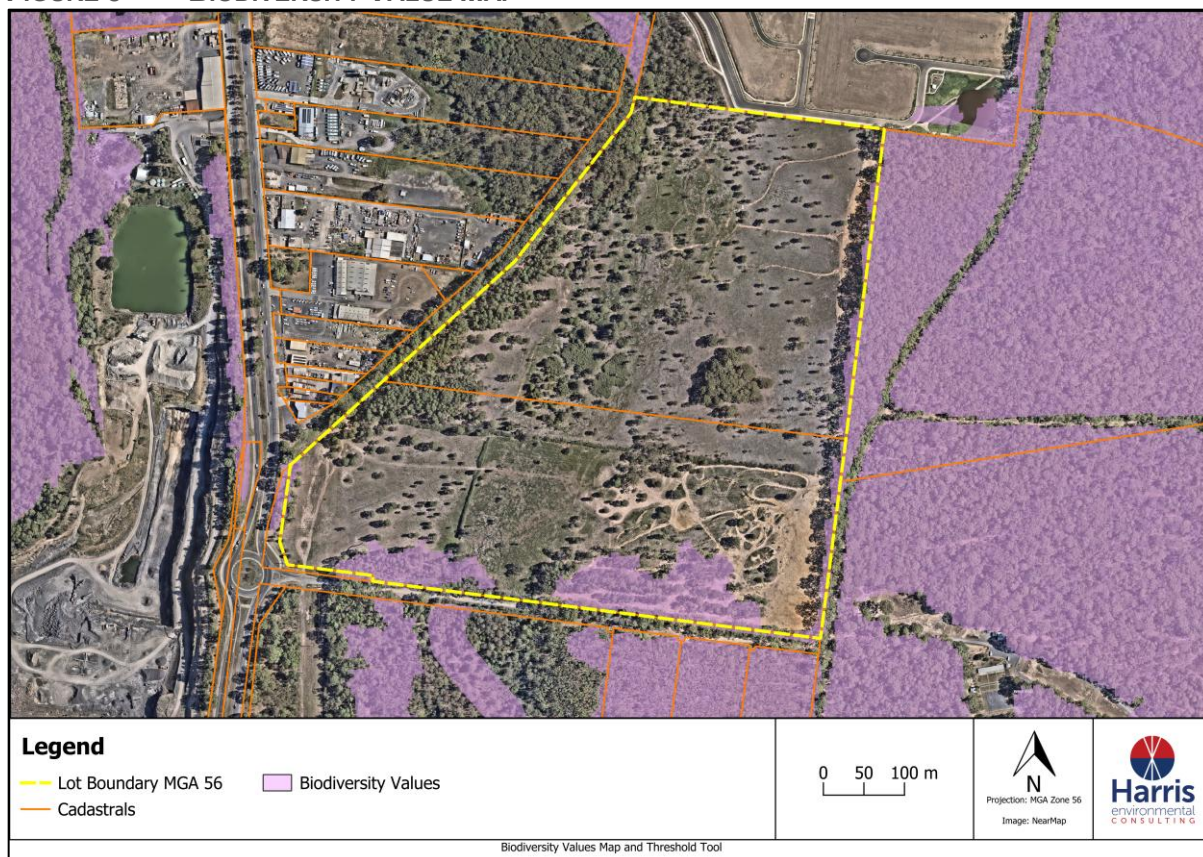


FIGURE 6 HYDROLOGY



4. BUSHFIRE LANDSCAPE ASSESSMENT

A landscape assessment is a fundamental component of a strategic bushfire assessment because bushfire behaviour is strongly influenced by the broader surrounding environment rather than just the immediate site. Understanding the landscape context helps determine how a fire may approach, intensity and impact a development.

In bushfire-prone areas, vegetation, topography and land management patterns across the wider landscape influence fire spread, flame height, ember generation and fire intensity. A landscape assessment examines these factors beyond the site boundary, typically considering surrounding vegetation types, slopes, drainage lines, ridgelines, and potential past fire run pathways. This broader perspective helps identify the likely direction and behaviour of an approaching bushfire.

By analysing these landscape characteristics, the assessment can determine the level of bushfire exposure that a site may experience

4.1 Land Zoning

The surrounding zoning pattern contributes to bushfire protection at a landscape scale by influencing fuel continuity and the potential pathways for fire spread.

The subject lot is currently mapped as E3 – Productivity Support (Figure 12). The proposal maintains the E3 – Productivity Support and creates R1 - Residential zone for the residential areas and C2 – Conservation Zone for the Forest.

The proposal would increase occupant density; however, these individuals are expected to become familiar with the area and would be able to develop management plans in preparation for a bushfire.

The proposed residential land zones do not have the capacity to introduce a large number of visitors to the area that would be unfamiliar with bushfire hazards and procedures.

Based on the surrounding land zoning, C1 – National Parks and Nature Reserves and C2 – Environmental Conservation zones to the east, west and northwest are expected to constitute the primary long-term bushfire threat, as these zonings are intended to retain the existing vegetated landscape and are therefore unlikely to experience substantial vegetation reduction over time.

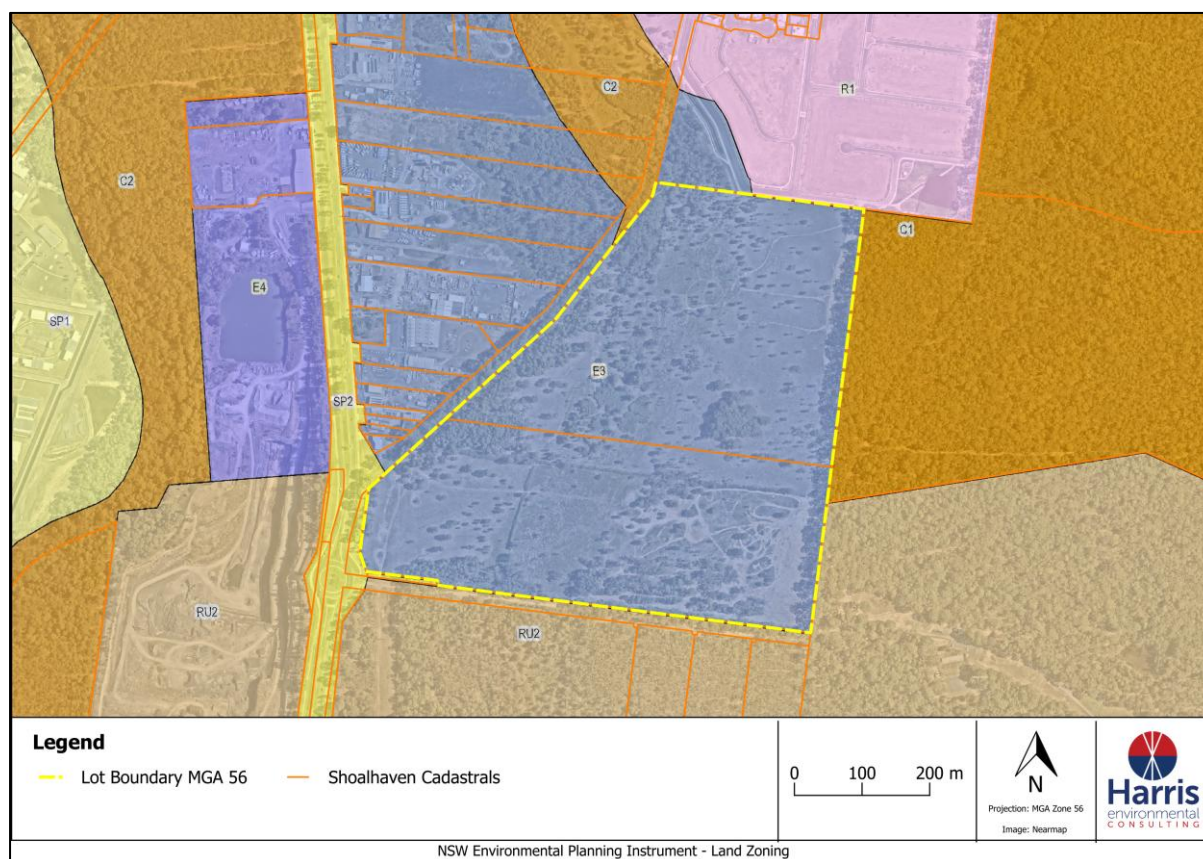
RU2 – Rural Landscape zoning would likely present an intermediate bushfire threat level. This land use is generally associated with agricultural and rural activities, which typically result in portions of the landscape being maintained as grassland (pasture), artificial woodland or remnant vegetation through ongoing land management practices. However, these areas may also contain extant unmanaged vegetation and undisturbed bushland capable of supporting elevated bushfire behaviour.

E3 – Productivity Support, E4 – General Industrial and R1 – General Residential zonings are expected to present the lowest long-term bushfire threat level, as these land uses generally involve substantial vegetation clearing associated with urban or industrial development.

Notwithstanding, isolated areas of retained or re-established vegetation may still occur depending on the final development layout and landscaping outcomes.

It is important to note that the above descriptions relate to potential future land use outcomes associated with the current zoning framework and do not necessarily reflect the existing condition of the landscape. Based on the current state of the site and surrounding land, the primary bushfire threat remains the forested vegetation to the east associated with the C1 – National Parks and Nature Reserves zoning.

FIGURE 7 LAND ZONING



4.2 Vegetation

Vegetation distribution across the broader landscape has a strong influence on bushfire behaviour because it determines the continuity, type and arrangement of fuels that allow a fire to spread. Bushfires generally require continuous vegetation to sustain forward movement. Where vegetation is dense and uninterrupted, fires can develop longer fire runs, generate greater flame heights, and produce higher radiant heat thresholds. Conversely, where vegetation is fragmented by cleared land, roads, or development, the continuity of fuel is reduced and fire spread can be slowed, redirected, or broken into smaller fire fronts.

At the landscape scale, the arrangement of vegetation patches influences the direction and potential length of fire runs towards a site. Large, continuous forest areas can support sustained bushfire behaviour, while landscapes that include agricultural land, rural development, or managed open space can interrupt these fuel pathways and limit the buildup of fire intensity.

At a local scale, the subject site location is characterised by a mix of unmanaged and disturbed Forest and Woodland, with Forest vegetation bounding the site on the southeast and northwest. The most credible bushfire threat to the proposed development is considered to originate from the south and east, primarily from the Worrigeer Nature Reserve. Bushfires from these areas would generally traverse relatively flat or gently sloping terrain that can support sustained bushfire behaviour (Figure 8)

Figure 9 illustrates the subject site and surrounding landscape to a distance of 700 m to identify the likely impact and consequences of bushfire at a broader landscape scale. The primary bushfire threat to the site originates from the vegetation to the northeast, east and south, which is predominantly classified as forest vegetation. Forest represents the highest bushfire risk vegetation category and is largely continuous, allowing for potential fire runs exceeding 700 m toward the site

The proposed development may be exposed to radiant heat, ember attack and localised flame contact from surrounding bushfire-prone vegetation, particularly where forested wetland and woodland vegetation occur. Appropriate bushfire protection measures, including Asset Protection Zones (APZs), adequate firefighting water supplies and safe operational access and egress, will therefore be required to manage the identified bushfire hazards and support the safety of future occupants and emergency services.

FIGURE 8 SHOALHAVEN PLANT COMMUNITY TYPES

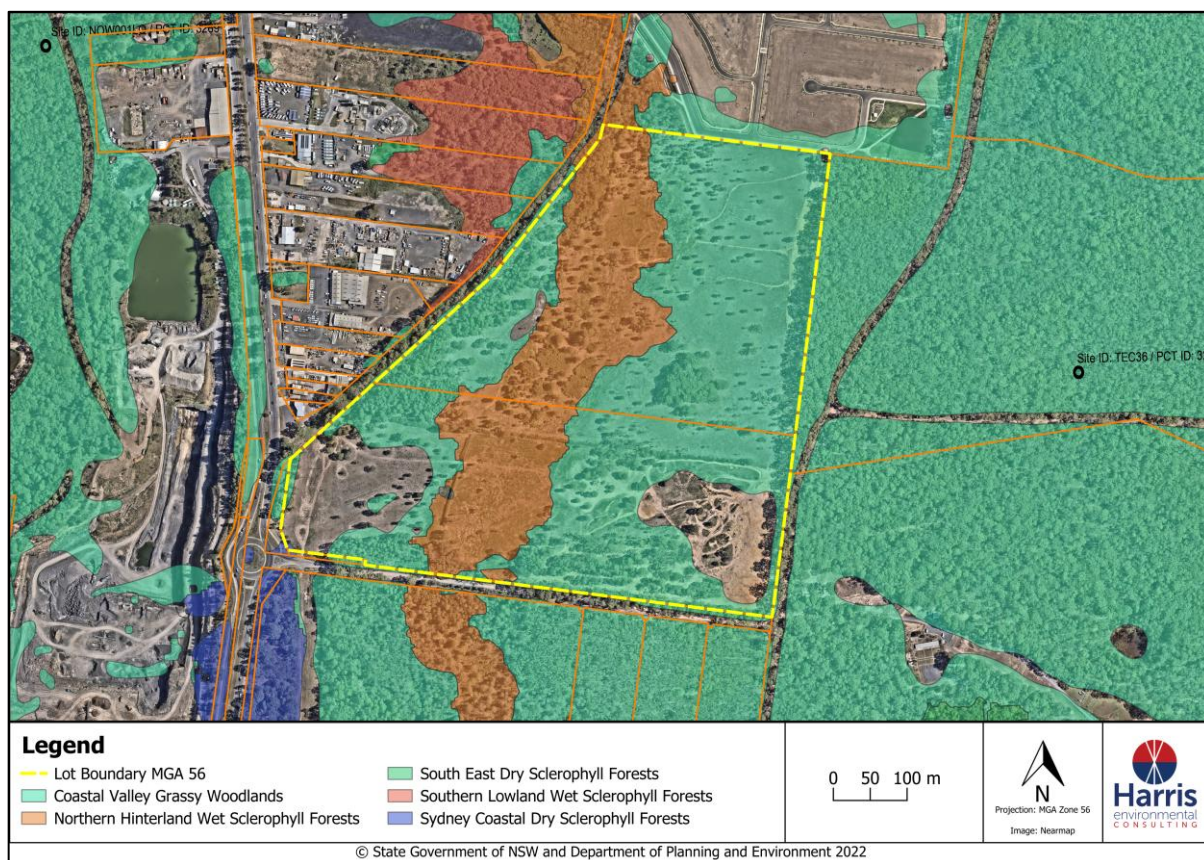
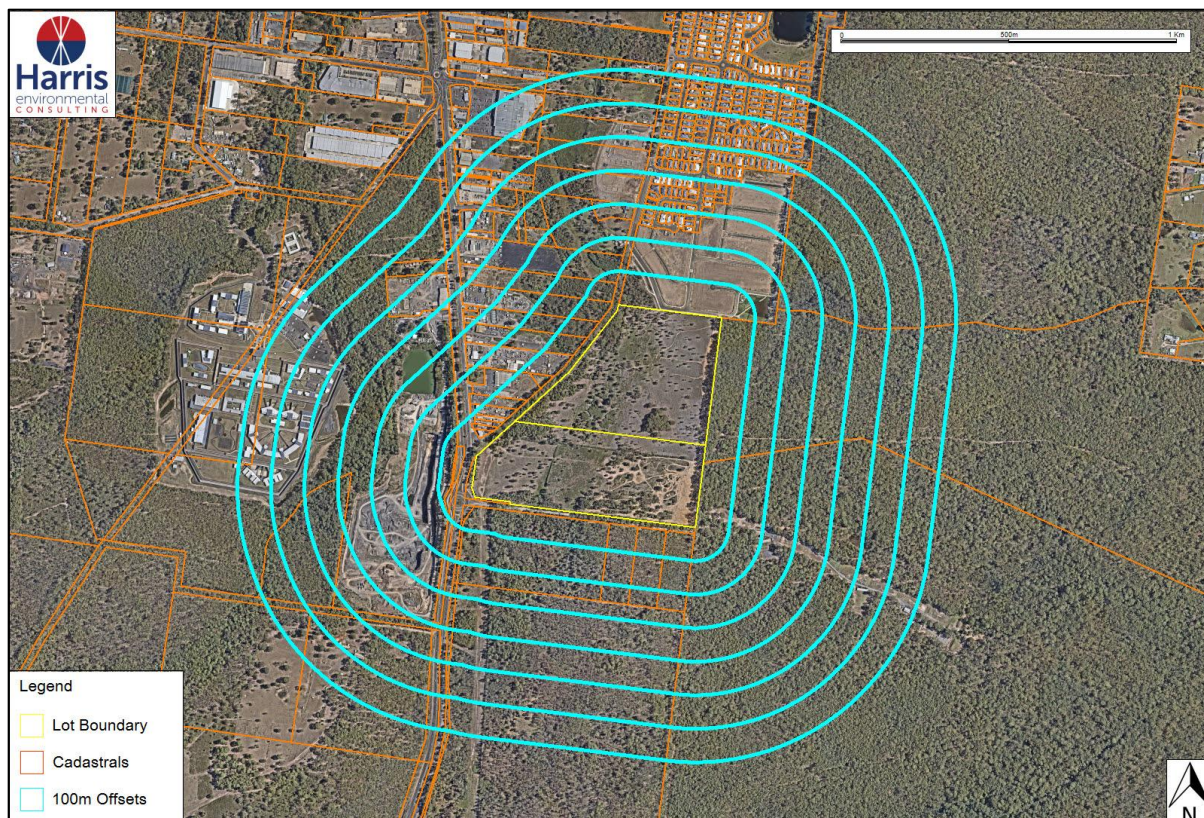


FIGURE 9 VIEW OF VEGETATION WITHIN 700M OF SITE



4.3 Bushfire Prone Land

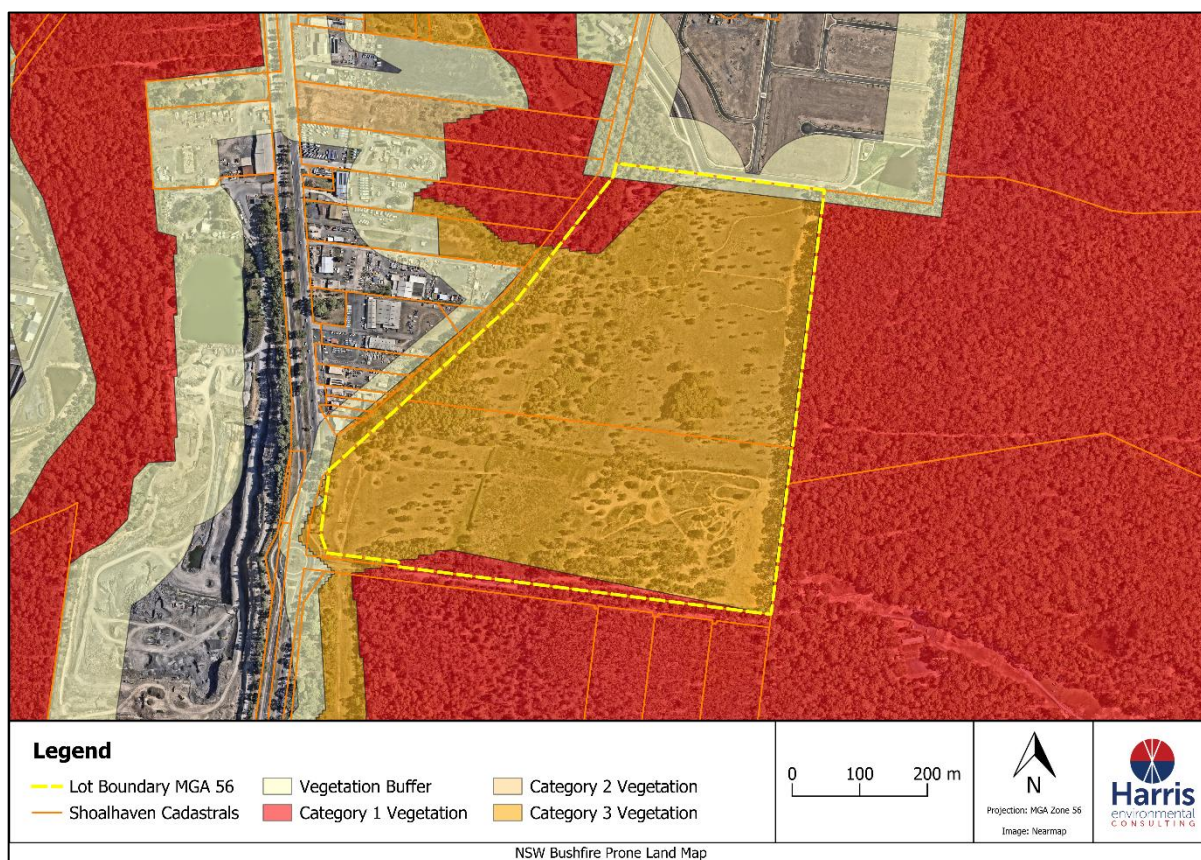
The subject site is mapped “Vegetation Buffer”, “Vegetation Category 1” and “Vegetation Category 3” across the subject site as shown in Figure 10.

Category 1 Vegetation comprises high-risk, highly combustible fuel types with an elevated propensity for sustained, fully developed crown fires and prolific ember generation. This category encompasses continuous canopy formations and dense understory complexes, specifically including Dry and Wet Sclerophyll Forests, Woodlands, Heaths, Forested Wetlands and Timber Plantations.

Category 3 Vegetation is classified as a medium-risk bushfire hazard, presenting an intermediary threat profile that exceeds Category 2 (and excluded non-hazardous areas) but remains lower than the high-intensity risk associated with Category 1. Strategically designated as dark orange on the BFPL map, this classification primarily encompasses flash fuel and sparse canopy ecosystems including Grasslands, Freshwater Wetlands, Semi-Arid Woodlands, Alpine Complexes, and Arid Shrublands.

Based on the bushfire land mapping, the most credible bushfire threat to the proposed development is considered to originate from the continuous areas of “Category 1 Vegetation” to the northwest, east and south.

FIGURE 10 BUSHFIRE PRONE LAND MAPPING



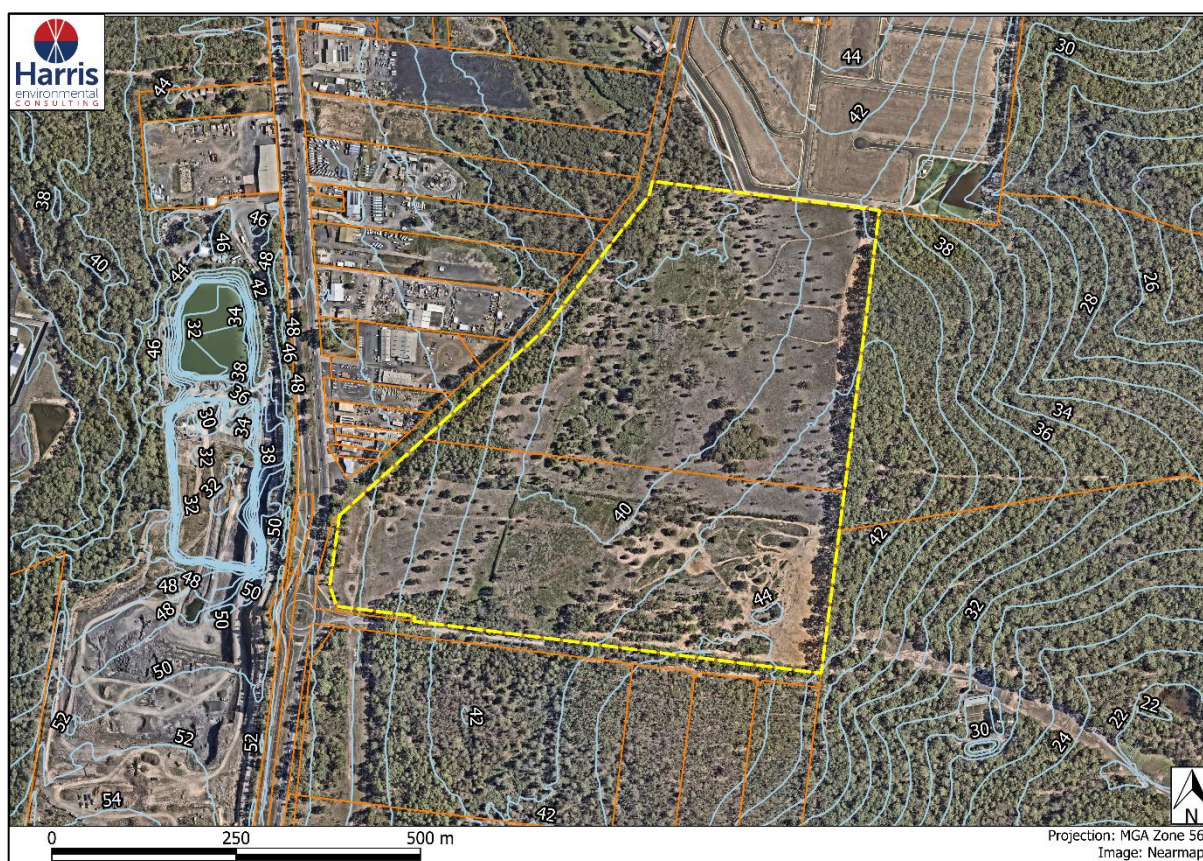
4.4 Topography

Slope is a critical factor influencing bushfire because it affects the rate of fire spread, flame length, and fire intensity. As fire moves upslope, flames are angled close to the unburnt fuel above the fire front, allowing heat to preheat and dry vegetation ahead of the fire. This process can significantly accelerate fire spread and fire intensity. For this reason, the slope beneath the vegetation that is burning is particularly important, as it directly affects how the fire behaves as it travels through fuel.

As illustrated in Figure 11, the site and surrounding landscape exhibit a consistent east–west topographic gradient, with the land generally falling towards the east and rising towards the west. The site therefore forms part of a predominantly east-facing slope, with Worrigee Nature Reserve occupying the lower-lying terrain to the east.

This topographic configuration is relevant to bushfire behaviour, as a fire approaching the site from the east would travel upslope towards the west. Upslope fire travel can increase the rate of forward spread, flame length and fire intensity due to enhanced pre-heating of fuels ahead of the fire front. Accordingly, the eastern interface represents the principal direction of potential bushfire exposure and is an important consideration in determining appropriate bushfire protection measures.

FIGURE 11 SLOPE



4.5 Fire History

Fire history is an important component of a strategic bushfire assessment because it provides insight into the likelihood, frequency and behaviour of bushfires across the landscape. The recorded fire history for the subject site and surrounding landscape is sourced from the National Parks and Wildlife Service (NPWS) Fire History – Wildfires and Prescribed Burns sourced from the NSW SEED Portal. The recorded fires include the following for last 10 years:

1. 1986-87 Prescribed Burn;
2. 1987-88 Prescribed Burn;
3. 1989-90 Prescribed Burn;
4. 1990-91 Wildfire;
5. 1991-92 Wildfire;
6. 1993-94 Wildfire;
7. 1996-97 Wildfire;
8. 2004-05 Wildfire;
9. 2010-11 Prescribed Burn;
10. 2019-20 Wildfire.

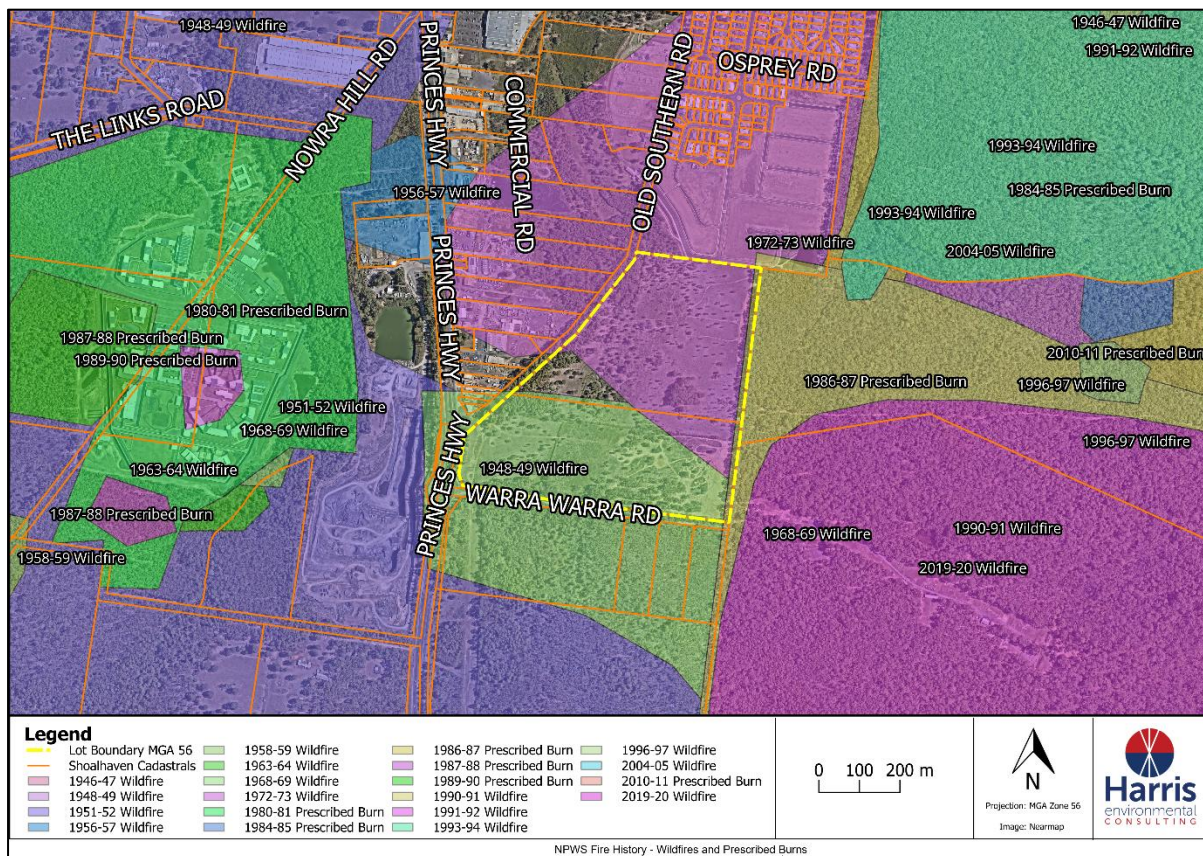
The Shoalhaven Bush Fire Management area can experience significant fire activity at any time of the year (Figure 12). The area has an average of 20 major fires per year, with an average of 600 fires occurring per year. The main sources of ignition in the Shoalhaven are arson, lighting and accidental fires.

The National Parks and Wildlife Service (NPWS) Fire History and Prescribed Burns database identified 16 recorded wildfires within the surrounding area of the site over a 62-year period (1958–2020). This equates to an average wildfire frequency of approximately 0.26 fires per year, or approximately one wildfire every 3.9 years.

Two recorded wildfires have directly impacted the subject site:

- The 1948–49 wildfire burnt across approximately the southern half of the subject site.
- The 1972–73 wildfire burnt across approximately the northern half of the subject site (Figure 10).

FIGURE 12 FIRE HISTORY



4.1 Potential Fire Behaviour

The subject lot is part of the Illawarra Bush Fire Management Committee (BFMC) area as part of Shoalhaven Local Government Area (LGA). The weather/climate for this area is often described as is generally mild with average temperatures ranging from 15.5oC in June to 26.5oC in January. Rainfall is more pronounced in Summer/Autumn with average annual rainfalls of 1110mm in Nowra and 1270mm in Milton (Shoalhaven BFMC Bush Fire Risk Management Plan, 2018).

Bushfire season in the area occur primarily between September and March each year, when the north-westerly winds prevail in the area accompanied by high daytime temperatures and low relative humidity (Shoalhaven BFMC Bush Fire Risk Management Plan, 2018). Frequently dry lightning storms also occur during the bush fire season. The Shoalhaven can experience significant fire activity at any time of the year and fires in isolated parts of the LGA may burn for several days or weeks (Shoalhaven BFMC Bush Fire Risk Management Plan, 2018).

The surrounding Forest vegetation represents the principal bushfire hazard to the subject site, occurring to the northwest, west, east and south, with the most significant potential fire runs extending from the east and south immediately adjoining the subject lot. The extensive and relatively continuous forest fuel across these areas provides sufficient fuel continuity for a bushfire to establish, develop and maintain a sustained fire front prior to reaching the site. Under elevated fire danger conditions, this may result in increasing fire intensity, flame length, rate of forward spread and ember generation as the fire approaches the development interface.

The most credible bushfire threat is considered to originate from the south and east, particularly from the adjoining Worrigeer Nature Reserve. Bushfires approaching from these directions may develop significant fire intensity where supported by continuous forest fuels, dry fuel conditions and elevated fire-weather conditions. The relatively flat to gently sloping terrain across portions of the fire run would allow the fire front to maintain forward momentum, while any local increases in slope may further influence the rate and direction of fire spread.

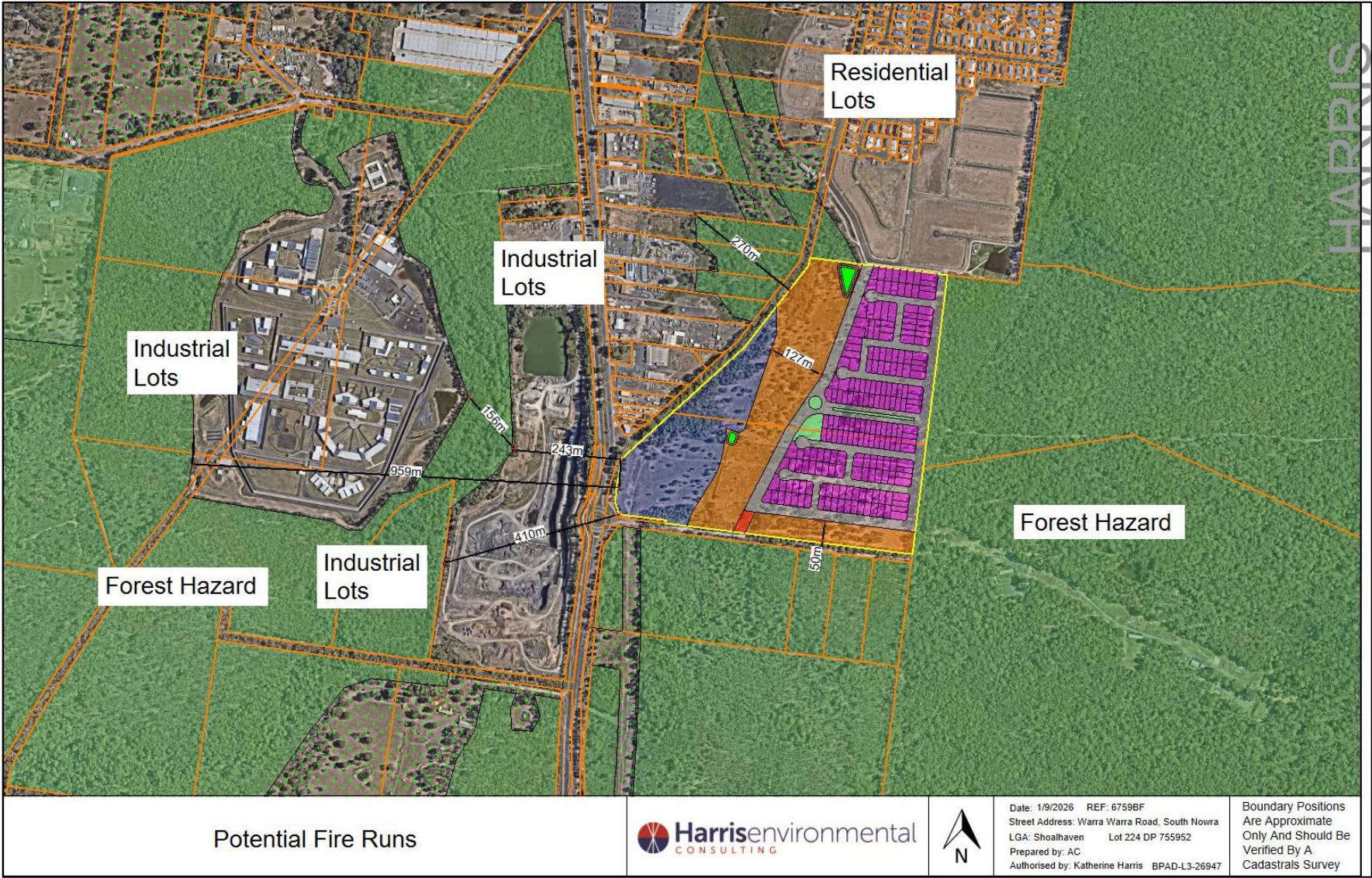
Under severe fire-weather conditions, including high temperatures, low relative humidity and strong winds, fire behaviour within the surrounding forest may become more rapid and intense. The prevailing north-westerly winds experienced during the principal bushfire season have the potential to drive fire towards the site from the eastern and southern forested areas, depending on the prevailing wind direction at the time of an event. Wind-driven fire may produce increased flame lengths, higher rates of spread and significant ember production, with burning embers capable of travelling ahead of the main fire front and initiating spot fires within or beyond the development area.

The proposed C2 Environmental Conservation land within the central portion of the site is intended to retain the existing vegetated landscape. Consequently, this vegetation is expected to remain a potential fuel source over the longer term. However, the relatively short fire run through this area and generally gentle terrain would limit the opportunity for a fire to develop the same level of sustained intensity associated with the longer forest fire runs to the east and south.

Overall, the potential fire behaviour affecting the site is expected to be dominated by forest fire travelling from the south and east, with the principal bushfire mechanisms being radiant heat, ember attack and localised flame contact. The extent and continuity of surrounding forest vegetation, the length of available fire runs and prevailing fire-weather conditions may

contribute to increased fire intensity and ember generation as a fire approaches the development interface. Accordingly, the proposed development may be exposed to these bushfire hazards, and appropriate protection measures, including the provision of Asset Protection Zones (APZs), an adequate water supply for firefighting and safe operational access, will be required to manage the identified risks.

FIGURE 13 POTENTIAL FIRE RUNS



5. BUSHFIRE THREAT ASSESSMENT

5.1 Vegetation formation within 140 m of proposed development

The bushfire vegetation formations within 140 m of the subject site are shown in Figure 14. The 140 m setback is identified as a red line. Only the vegetation within the setback is required to be classified when any development application is sought. The following bushfire vegetation formations have been identified.

The vegetation within the site and to the northwest of the subject lot has been mapped as “Northern Hinterland Wet Sclerophyll Forests”, “South East Dry Sclerophyll Forests” and “Southern Lowland Wet Sclerophyll Forests” (DPE, 2022). Upon site inspection and in accordance with Planning for Bush Fire Protection (2019), this vegetation is classified as “Forest”. This includes the vegetation to the east and south of the subject lot mapped as “Coastal Valley Grassy Woodlands” (DPE, 2022).

The small parcels of vegetation to the southeast of the subject lot have been classified as Remnant Vegetation under section A1.11.1 of the PBP.

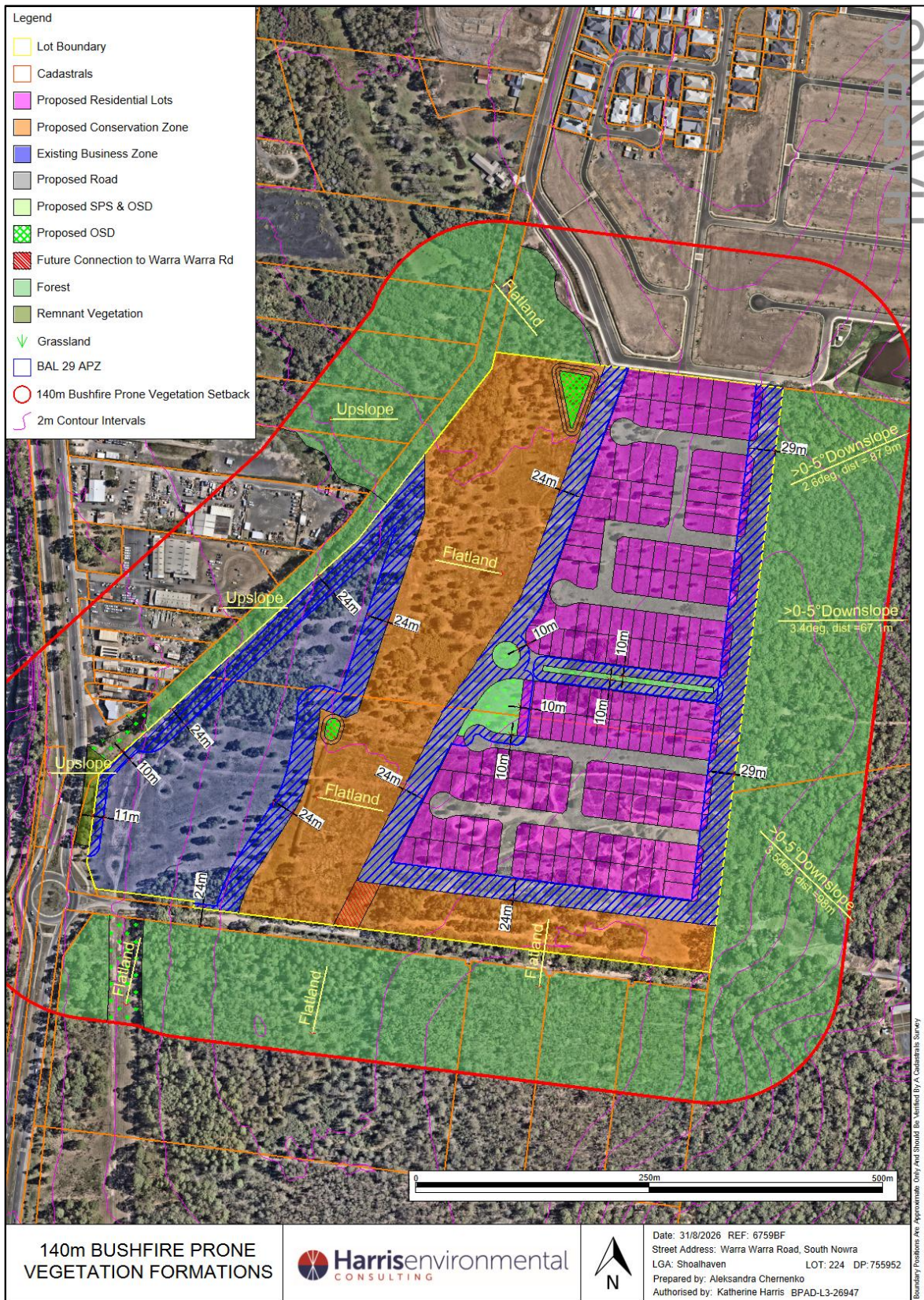
“Remnant vegetation is a parcel of vegetation with a size of less than 1 Ha or provide a potential fire run that could threaten buildings not exceeding 50 m. These remnants are considered a low hazard and APZ setbacks and building construction standards for these may be the same as for Rainforest.”

There is an area proposed to be a Stormwater Pump Station (SPS) and On-Site Detention (OSD) within residential zone. This area can be classified as grassland and should be kept mown.

All other vegetation within the lots and on adjoining lands on the east is classified as Grassland in accordance with PBP (2019).

Photos 1-6 show the surrounding vegetation in Appendix II

FIGURE 14 BUSHFIRE PRONE VEGETATION WITHIN 140 METRES



5.2 Asset Protection Zones (APZ)

Table A1.12.2 *PBP 2019* provides APZs for 'Minimum distances for APZs – residential development, FFDI 100 areas' and has been used to assess the width of the required APZ for the development using the vegetation and slope data identified.

A Fire Danger Index (FDI) of 100 and flame temperature of 1090 K was used for the residential development.

Table 1 and Figure 15 provide the BAL 29 APZs from the existing vegetation within the lot and the vegetation surrounding the site.

All proposed residential lots can support a building envelope that is not exposed to radiant heat greater than 29 kW/m².

An APZ will be required to be established as part of the development and maintained in perpetuity. The extent of the APZ will depend on the siting of future building envelopes within each proposed residential lot and will be required to be determined as the infill DA stage.

TABLE 1 APZ DETERMINATION

	Vegetation Formation	Effective Slope	BAL 29 required APZ	BAL Req.
LOT 1				
Centre	Forest	Flatland/ Upslope	24 -<33 m	BAL 29 or less
	Grassland	Flatland/ Upslope	10 -<15 m	
Northwest	Forest	Flatland/ Upslope	24 -<33 m	
Northeast	Managed	-	-	
East	Forest	0-5° Downslope	29 -<40 m	
South	Forest	Flatland/ Upslope	24 -<33m	
West	Forest	Flatland/ Upslope	24 -<33m	
Southwest	Remnant	Flatland/ Upslope	11 -<16 m	
	Grassland	Flatland/ Upslope	10 -<15 m	

FIGURE 15 APZ



5.3 Relevant Construction Standard

The following was determined for this site:

Relevant fire danger index.....	FDI 100 (Illawarra/ Shoalhaven)
Relevant grass fire danger index.....	GFDI 130
Flame temperature.....	1090 K

A dwelling on each subject lot would be required to be constructed to the relevant BAL construction as specified by AS3959 - 2018 Construction for Buildings in Bushfire Prone Areas and/or *NASH Standard Steel Framed Construction in Bushfire Areas* (2014). New construction must also comply with the construction requirements in Section 7.5 of *Planning for Bush Fire Protection 2019*.

5.4 Emergency Management

Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/ brigades will have to be demonstrated. The proposal should utilise the *NSW Rural Fire Service – “Guidelines for the Preparation of Bush Fire Evacuation Plans”* & ‘*Bush Fire Survival Plan*’ to consider emergency management. In the event of emergency, the plan should make users familiar with the RFS Bush Fire Alert Levels and use their Bush Fire Survival Plan. The impact on the ability of emergency services to carry out fire suppression in a bush fire emergency should not be hindered by the development and the proposed access should aid in providing routes for accessing the hazards.

5.5 Adequate Water and Utility Services

Any building envelope on the proposed residential lots will require a reticulated or static water supply outlined in *Planning for Bushfire Protection (2019)*.

A reticulated water supply that includes:

- Fire hydrant, spacing, design and sizing complies with the relevant clauses of
- Australian Standard AS 2419.1:2021.
- Hydrants are not located within any road carriageway.
- Reticulated water supply to urban subdivisions uses a ring main system for areas with
- perimeter roads.
- Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2021

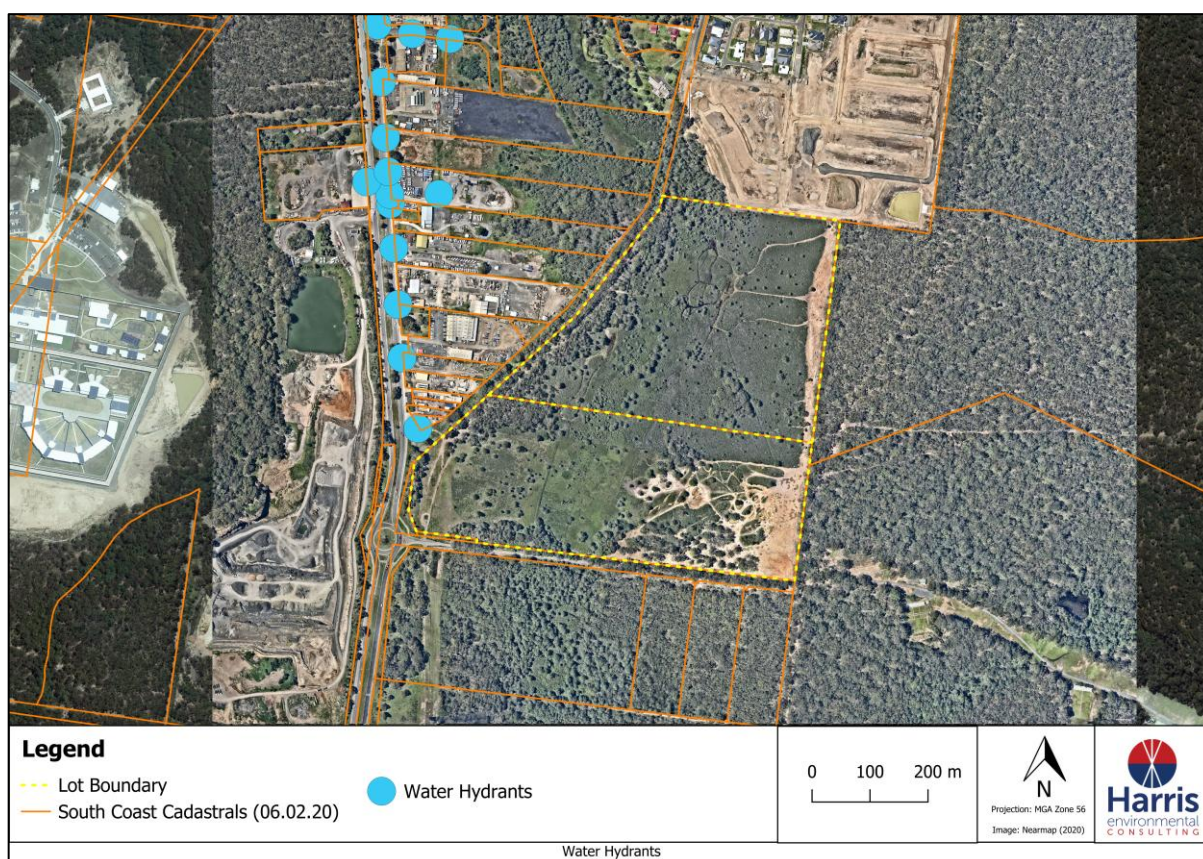
Or a static water supply that will be required to:

- Where reticulated water is not available, static water supplies shall comply with Table 5.3d of PBP (2019);
- Above ground tanks are required to be manufactured of concrete or metal and raised tanks have their stands protected. All above ground water pipes external to the building are required to be metal including and up to any taps. Pumps are to be shielded. Underground tanks should have an access hole of 200 mm and a hardened ground surface within 4 m of the access hole. A suitable connection for firefighting purposes is required such as a 65mm Storz outlet and a gate or ball valve.

Any bottled gas will be installed and maintained in accordance with AS1596 and the requirements of the relevant authority. If gas cylinders need to be kept close to the buildings, the release valves must be directed away from the building and away from any combustible material. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used.

Any electrical transmission lines, if above ground, will be managed in accordance with specifications issued by the respective energy provider.

FIGURE 16 HYDRANT LOCATION



5.6 Safe Operational Access

The PBP (2019) requires the provision of safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

The subject lot is located on Old Southern Road and Warra Warra Road, a two-wheel drive, all weather roads. Roads surfaces and bridges are sufficient to carry fully loaded firefighting vehicles.

The proposal will include perimeter road with a minimum 8m and a maximum 25m of width for proposed residential lots, providing firefighters with frontage access between the bushfire prone vegetation and the proposed new lots (Figure 17).

The roads proposed as part of the development will be required to comply with *Table 5.3b of PBP 2019*. This includes:

General Requirements:

- Property access roads are two-wheel drive, all-weather roads.
- Perimeter roads are provided for residential subdivisions of three or more allotments.
- Subdivisions of three or more allotments have more than one access in and out of the development.
- Traffic management devices are constructed to not prohibit access by emergency services vehicles.
- Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient.
- All roads are through roads.
- Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end.
- Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; where access/egress can only be achieved through forest, woodland and heath vegetation.
- Secondary access shall be provided to an alternate point on the existing public road system.
- One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.

Perimeter Roads:

- Are two-way sealed roads.
- Minimum 8m carriageway width kerb to kerb.
- Parking is provided outside of the carriageway width.
- Hydrants are located clear of parking areas.
- Are through roads, and these are linked to the internal road system at an interval of no greater than 500m.
- Curves of roads have a minimum inner radius of 6m; the maximum grade road is 15 degrees and an average grade of not more than 10 degrees; the road crossfall does not exceed 3 degrees; and a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
- 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 indicate load rating clearly.
- Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.
- Hydrants are provided in accordance with the relevant clauses of *AS 2419.1:2021 - Fire hydrant installations System design, installation, and commissioning*.

Non-Perimeter Roads:

- Minimum 5.5m carriageway width kerb to kerb.

- Parking is provided outside of the carriageway width.
- Hydrants are located clear of parking areas.
- Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.
- Curves of roads have a minimum inner radius of 6m.
- The road crossfall does not exceed 3 degrees; and
- A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

Property Access Roads:

- 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.
- If lots are not within access of a hydrant and will require a static water supply, the access is required to comply with the requirements of Table 7.4a of *Planning for Bushfire Protection 2019*, which are:
 - A minimum carriageway width of four metres;
 - provide enough turning room for a fire tanker that requires an inner minimum turning radius of 6 m and outer minimum radius of 12 m;
 - a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;
 - Curves a minimum inner radius of six metres;
 - The minimum distance between inner and outer curves is six metres;
 - The cross fall is not more than 10 degrees;
 - Maximum grades for sealed roads do not exceed 15 degrees (28 per cent) and not more than 10 degrees (18 percent) for unsealed roads;
 - The internal road surfaces and bridges have a capacity to carry fully loaded firefighting vehicles (23 tonnes) and provide signage that clearly indicates the bridge capacity; and
 - There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.

[illegible]

5.7 Landscaping

Appendix 4 (*PBP 2019*) provides guidelines for landscaping and Bushfire Provisions within the APZ. To incorporate bushfire protection measures into future development, the owner is advised to consider the following:

- Avoid planting trees species with rough fibrous bark or which retain/shed bark in long strips or retain dead material in their canopy.
- Avoid planting deciduous species that may increase fuel at surface/ground level by the fall of leaves.
- Avoid climbing species to walls and pergolas.
- Locate combustible materials such as woodchips/mulch, flammable fuel stores (LPG gas bottles) away from the building.
- Locate combustible structures such as garden sheds, pergolas, and materials such as timber furniture away from the building.
- Ensure any vegetation planted around the house is a suitable distance away so these plants do not come into physical contact with the house as they mature.
- The property should be developed to incorporate suitable impervious area surrounding the house, including courtyards, paths, and driveways.

The APZ is to be managed as an IPA. The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous. In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well-maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity.
- trees at maturity should not touch or overhang the building.
- lower limbs should be removed up to a height of 2m above the ground.
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided.
- shrubs should not be located under trees.
- shrubs should not form more than 10% ground cover: and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide, grass should be kept to no more than 100mm in height); and

leaves and vegetation debris should be removed.

6. HOW THIS PROPOSAL MEETS DEEMED TO SATISFY

This study provides an analysis of the compliance of the indicative subdivision to demonstrate the proposal can meet PBP 2019 requirements. Any future subdivision will be required to meet the requirements of the PBP 2019 Tables 5.3A, 5.3B and 5.3C. The following Tables 2, 3 and 4 provide the performance criteria, acceptable solution, and comment on this proposal's demonstration of compliance. Indicative design is conceptual and will be required to comply at DA stage.

TABLE 2 PBP 2019 TABLE 5.3 A COMPLIANCE

Performance criteria		Acceptable Solution	Demonstration of compliance
Asset Protection Zones	Potential building footprints must not be exposed to radiant heat levels exceeding 29kw/m ² on each proposed lot.	APZ is determined in accordance with Tables A1.12.2 based on 100 FDI.	Can comply
	APZ's are managed and maintained to prevent the spread of a fire towards the building.	In accordance with the requirements of Appendix 4.	Can comply
	APZ is provided for perpetuity	Is wholly within boundaries of the development site.	Can comply
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees.	Can comply Development area and proposed APZs are located on lands with slopes less than 18 degrees.
Landscaping	Landscaping is managed to minimise flame contact, reduce heat levels, minimise embers and reduce the effect of smoke on residents and fire fighters.	Landscaping in accordance with Appendix 4.	Will be required to comply.

TABLE 3 PBP 2019 TABLE 5.3 B COMPLIANCE

Performance criteria		Acceptable Solution	Demonstration of compliance
Access (General Requirements)	Firefighter vehicles are provided with safe, all-weather access to structures and hazard vegetation.	Property access roads are two-wheel drive, all weather roads; Perimeter roads are provided for residential subdivisions of three or more allotments Subdivisions of three or more allotments have more than one access in and out of the development; Traffic management devices are constructed to not prohibit access by emergency service vehicles	Can comply

Perimeter Road		Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 m in length, incorporate a minimum 12 metre outer radius turning circle, and a clearly sign posted as a dead end. Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; Where access/egress can only be achieved through forest, woodland 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.	Will be required to comply
	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 2419.12005. There is suitable access for a Category 1 fire appliance to within 4 of the static water supply where no reticulated supply is available	Will be required to comply
Perimeter Road	Perimeter 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; 8 m carriageway width kerb to kerb; Parking is provided outside of the carriageway width and Hydrants are located clear of parking areas; There are through roads, and these are linked to the internal road system at an interval of no greater than 500 m; Curves of roads have a minimum inner radius of 6 m, The maximum grade of the road is 15 degrees and average grade is 10 degrees; The road cross fall does not exceed 3 degrees. A minimum vertical clearance of 4 m to any overhanging branches is provided.	Will be required to comply

Non-Perimeter Roads	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating.	Minimum 5.5 m width kerb to kerb. Parking is provided outside of the carriageway width. Hydrants are located clear of parking areas. Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500 m; Curves of the roads have a minimum inner radius of 6 m, The road cross fall does not exceed 3 degrees. A minimum vertical clearance of 4 m to any overhanging obstructions, including tree branches, is provided.	Will be required to comply
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TABLE 4 PBP 2019 TABLE 5.3 C COMPLIANCE

Water Supply	Adequate water supplies is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available; Or a 5,000 litres minimum static water supply for firefighting purposes is provided for each occupied building where no reticulated water is available.	Will be required to comply
	Water supplies are located at regular intervals: and; The water supply is accessible and reliable for firefighting operations.	Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005. Hydrants are not located within any road carriageway. Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	
	Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	
	The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps; Above-ground water storage tanks shall be of concrete or metal.	
Electricity Services	Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where practicable, electrical transmission lines are underground; Where overhead, electrical transmission lines are proposed as follow: • 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 <i>Guideline for Managing Vegetation Near Power Lines</i>.	Will be required to comply

Gas Services	Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 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; If gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion; Polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used; Above-ground gas service pipes external to the building are metal, including and up to any outlets.	Will be required to comply
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7. PBP 2019 BUSH FIRE STRATEGIC STUDY CONSIDERATIONS

This assessment addresses the broader strategic bushfire protection requirements for proposed rezoning as required by the Environmental *Planning and Assessment Act 1979* s.9.1 (2). Direction, 4.4 Consideration of the bushfire risk, evacuation, and environmental constraints which may affect bushfire protection strategy are identified as critical issues in *Section 4.4.1 of 'Planning for Bush Fire Protection (PBP) (RFS 2019)*. Table 4.2.1 (PBP 2019) provides the specific assessment considerations for a bush fire strategic study.

Compliance demonstration to Table 4.2.1 requirements is provided below in the following tables:

- Table 5 likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader landscape.
- Table 6 most appropriate locations within the masterplan area or site layout for the proposed land use.
- Table 7 existing and potential proposed networks both within and external to the masterplan area.
- Table 8 future impact of new development on emergency services.
- Table 9 issues associated with infrastructure and utilities.
- Table 10 new development on adjoining landowners and their ability to undertake bushfire management.

TABLE 5 LANDSCAPE ASSESSMENT

Considerations	Comments
The bushfire hazard in the surrounding area including: • Vegetation • Topography • Weather	The subject lot consists of unmanaged forest vegetation throughout the site, with large portions of cleared and disturbed land and driving tracks. It is overgrown in disturbed areas, predominantly by grass. This vegetation is currently a mix of Heath and Forest and is expected to remain consistent within this vegetation distribution. The main bushfire hazard surrounding the subject site consists of Forest on the northwest, northeast, east and south. The Forest on the east, south and west is separated by a proposed perimeter road. Overall, the land exhibits a flat topography across the site. The surrounding vegetation is also relatively flat, with the vegetation to the east located 0-5 degrees downslope of the subject site. The area experiences a mild climate with peak rainfall in the summer and autumn months. Prevailing weather conditions associated with the bush fire season usually coincide with north-westerly winds accompanied by high daytime temperatures and low relative humidity.
The potential fire behaviour that might be generated based on above	The bushfire hazard has significant fire runs greater than a kilometre from the east and south. The potential for a catastrophic fire is high. Furthermore, the northwest hazard interfaces the rehabilitated wetland. The bushfire risk posed by the Forest hazard is considered greater than other vegetation hazard based on the available fuel load and significant ember production.

	The potential fires will be managed with perimeter access, APZ and BALs.
Any history of bushfire in the area	There is significant history of fires within the subject lot and surrounds. Within the site, fires occurred in the bushfire season in 1948/49, 1951/52, 1968/69 and 1972/73.
Potential fire runs into the site, and the intensity of such runs	Based on the surrounding landscape, there are 2 main fires runs into the sites from the northwest and the southeast. The development plan has identified a rehabilitated wetland to remain within the site. The Wetland is considered a forest hazard and is connected to the hazard on the north and could potentially allow fire to penetrate into centre of the subject site. Potential fires runs are diminished on the north where the existing residential area is being developed. Any potential fires will be managed with perimeter access, APZ and BALs.
The difficulty in accessing and suppressing a fire, the continuity of bushfire hazards or fragmentation of landscape fuels and the complexity of the associated terrain.	The subject site benefits from being located along the Princes Highway, a major through road in South Nowra. The site proposed perimeter roads and through roads throughout the area provide safe access and egress in an emergency. Future roads within the development can meet all acceptable solutions for access and water. Any potential fires will be required to be managed with APZ and BALs

TABLE 6 LAND USE

Assessment Considerations	Comments
The risk profile of different development layout based on the above landscape study	Indicative design is conceptual and has the ability to comply with PBP at DA stage based on proposed development layout and surrounding landscape.
The proposed land use zones and permitted uses	Residential development has the ability to comply with acceptable solutions within the subject site.
The most appropriate siting of different land uses based on risk profiles within the site (i.e not locating development on ridge tops, SFPP development to be located in lower risk areas of the site	Residential development has the ability to comply with acceptable solutions within the subject site.
The impact of the siting of these uses on APZ provision	Residential development has the ability to comply with acceptable solutions within the subject site.

TABLE 7 ACCESS AND EGRESS

Assessment Considerations	Comments
The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile	The subject site benefits from being located along the Princes Highway, a major through road in South Nowra. The site proposed perimeter roads and through roads throughout the area provide safe access and egress in an emergency. Future roads within the development can meet all acceptable solutions for access and water.
The location of key access routes and direction of travel	The direction of travel away from the hazard is provided by proposed perimeter roads in all directions to the main through road of the Princes Highway.
The potential for the development to be isolated in the event of a bushfire	The potential for development to be isolated is low. The subject site is linked to multiple through roads and

	adjacent to the existing residential development to the north,
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TABLE 8 EMERGENCY SERVICES

Assessment Considerations	Comments
Consideration of the increase in demand for emergency services responding to a bushfire emergency, including the need for new stations/brigades	The subject site is located within the existing residential area of South Nowra. The development is not expected to significantly increase the demand for emergency services. The development access will meet all requirements of PBP 2019 at the DA stage.
Impact on the ability of emergency services to carry out fire suppression in a bushfire emergency	The development will comply with will meet all requirements of PBP 2019 at the DA stage

TABLE 9 INFRASTRUCTURE AND UTILITIES

Assessment Considerations	Comments
The ability of the reticulated water system to deal with a major bushfire event in terms of pressures, flows and spacing of hydrants	Fire hydrant, spacing, design and sizing will comply with the relevant clauses of Australian Standard AS 2419:1:2005.
Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines ect	The location and design of gas services will be installed in accordance with AS/NSZ 1596:2014 and the requirements of relevant authorities. The location of the electricity services will be provided so that the possibility of ignition of the surrounding bushland or the fabrics of the buildings is limited

TABLE 10 ADJOINING LAND

Assessment Considerations	Comments
Consideration of the implications of a change in land use on adjoining land, including increased pressure on BPMS through the implementation of Bushfire Management Plans	This proposal does not affect the bushfire protection of the district as the proposal will meet PBP 2019 requirements at the DA stage.

8. SUMMARY OF RECOMMENDATIONS:

- All proposed lots can support a building envelope that is not exposed to radiant heat greater than 29 kW/m².
- An APZ will be required to be established as part of the development and maintained in perpetuity. The extent of the APZ will depend on the siting of future building envelopes within each proposed residential lot and will be required to be determined as the infill DA stage.
- A future dwelling on each subject lot would be required to be constructed to the relevant BAL construction as specified by AS3959 - 2018 Construction for Buildings in Bushfire Prone Areas and/or *NASH Standard Steel Framed Construction in Bushfire Areas* (2014). New construction must also comply with the construction requirements in Section 7.5 of *Planning for Bush Fire Protection 2019*.
- The roads proposed as part of the development will be required to comply with General Requirements, Perimeter Roads, Non-Perimeter Road and Property Access of *Table 5.3b* of *PBP 2019*.
- Any building envelope on the proposed residential lots will require a reticulated or static water supply outlined in *Planning for Bushfire Protection (2019)*.
A reticulated water supply that includes:
 - Fire hydrant, spacing, design and sizing complies with the relevant clauses of
 - Australian Standard AS 2419.1:2021.
 - Hydrants are not located within any road carriageway.
 - Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
 - Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2021

Or a static water supply that will be required to:

- Where reticulated water is not available, static water supplies shall comply with Table 5.3d of PBP (2019);
- Above ground tanks are required to be manufactured of concrete or metal and raised tanks have their stands protected. All above ground water pipes external to the building are required to be metal including and up to any taps. Pumps are to be shielded. Underground tanks should have an access hole of 200 mm and a hardened ground surface within 4 m of the access hole. A suitable connection for firefighting purposes is required such as a 65mm Storz outlet and a gate or ball valve.
- Any bottled gas will be installed and maintained under AS1596 and the relevant authority's requirements.
- Any electrical transmission lines, if above ground, will be managed in accordance with specifications issued by the respective energy provider.

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APPENDIX I ~ DEFINITION OF ASSET PROTECTION ZONES

Vegetation within the APZ should be managed in accordance with APZ specifications for the purposes of limiting the travel of a fire, reducing the likelihood of direct flame contact and removing additional hazards or ignition sources. The following outlines some general vegetation management principles for APZs:

- 1) Discontinuous shrub layer (clumps or islands of shrubs not rows);
- 2) Vertical separation between vegetation strata;
- 3) Tree canopies not overhanging structures;
- 4) Management and trimming of trees and other vegetation in the vicinity of power lines and tower lines in accordance with the specifications in "Vegetation Safety Clearances" issued by Energy Australia (NS179, April 2002);
- 5) Maintain low ground covers by mowing / whipper snipper / slashing; and
- 6) Non-combustible mulch e.g., stones and removing stores of combustible materials;
- 7) Vegetation to be planted should consist of fire retardant/fewer flammable species strategically located to reduce attack from embers (i.e., as ember traps when in small clumps and short wind breaks).

APPENDIX II ~ DEFINITIONS & ABBREVIATIONS

Asset Protection Zone- A fuel reduced area surrounding a buffer zone between a bushfire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required APZ varies with slope, vegetation and FFDI.

AS3959-2019: Australian Standard AS 3959:2018 Construction of buildings in bush fire-prone areas.

Bush fire prone area- an area of land that can support a bush fire or is likely to be subject to bushfire attack, as designated on a bush fire prone land map.

Bush fire prone vegetation (BFPV) – A map prepared by Council in accordance with RFS guidelines and defining area of vegetation by BFPV categories.

Bushfire prone land map (BFPL) A map prepared in accordance with RFS guidelines and certified by the Commissioner of the NSW RFS under section 146 (2) of the Environmental Planning and Assessment Act (1979)

BFSA: Bush fire safety authority.

Effective Slope: The land beneath the vegetation which most significantly affects fire behaviour, having regard to the vegetation present.

Fire Danger Index (FDI) The chance of a fire starting, its rate of spread, its intensity and the difficulty potential for its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects.

Fire hazard: the potential for land to carry a bush fire, utilizing materials or fuels that can be ignited.

Grasslands- Grassed areas capable of sustaining a fire. Under Australia standard 3959 Construction of buildings in bushfire -prone areas, identified as low open shrubland, hummock grassland, closed tussock grassland, tussock grassland, open tussock, sparse open tussock, dense sown pasture, sown pasture, open herbfield and sparse open herb field. Grass, whether exotic or native, which is regularly maintained at or below 10 cm in height (includes maintained lawns, golf course, maintained public reserves, parklands, nature strips and commercial nurseries) are regarded as managed land.

Inner Protection Area (IPA): the component of an APZ which is closest to the asset (measured from unmanaged vegetation). It consists of an area maintained to minimal fuel loads so that a fire path is not created between the hazard and the building.

Managed land- Managed land is land that has vegetation removed or maintained to limit the spread and impact of bushfire. It may include existing developed land (i.e. residential, commercial or industrial) roads, golf course fairways, playgrounds or sports fields, vineyards, orchards, cultivated ornamental gardens, and commercial nurseries.

PBP 2019: Planning for Bushfire Protection 2019.

APPENDIX III ~ PHOTOS

Photo 1 View of Forest on south from Warra Warra Road



Photo 2 View East of Warra Warra Road with vegetation within the site and south of the road



Photo 3 View of Forest vegetation and Tracks within the subjects site



Photo 4 View North of the end of Warra Warra Road to vegetation east of the site



Photo 5 View of Forest on eastern adjoining lot



Photo 6 View of Grassland, Woodland and Forest mix within west of the subject site

