

A decorative background element on the left side of the page, consisting of several concentric, irregular contour lines in a light grey color, resembling a topographic map. The lines are more densely packed in some areas and more spread out in others, creating a sense of depth and terrain.

Bushfire Strategic Study: Callala Bay Expansion Area

Sealark Pty Limited

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Abbreviations

| Abbreviation | Description |
|--------------|------------------------------------------------|
| AHD | Australian Height Datum |
| APZ | Asset Protection Zone |
| BFMC | Bush Fire Management Committee |
| BFPL | Bush Fire Prone Land |
| BRMP | Bushfire Risk Management Plan |
| DCP | Development Control Plan |
| DEM | Digital Elevation Model |
| ELA | Eco Logical Australia |
| EP&A Act | Environmental Planning and Assessment Act 1979 |
| FFDI | Forest Fire Danger Index |
| GEV | Generalised Extreme Value |
| IPA | Inner Protection Area |
| LGA | Local Government Area |
| NPWS | National Parks and Wildlife Service |
| NSP | Neighbourhood Safer Place |
| NSW | New South Wales |
| OPA | Outer Protection Area |
| PBP | Planning for Bushfire Protection |
| RFS | Rural Fire Service |
| RF Act | Rural Fires Act 1997 |
| t/ha | Tonnes per hectare |

1. Introduction

1.1 Background

This Strategic Bushfire Study (the Study) contributes to the Planning Proposal for Callala Bay Expansion Area (herein referred to as 'site') being prepared for public exhibition by Shoalhaven City Council.

The site is identified as Bushfire Prone Land by Shoalhaven City Council and certified by the Commissioner of the NSW Rural Fire Service. Therefore, Council must address Ministerial Direction 4.4 issued under Section 9.1 of the Environmental Planning and Assessment Act, 1979 and Planning for Bushfire Protection 2019 (PBP).

The minimum components of a Study are listed in Table 4.2.1 of PBP have been provided herein with additional information where necessary.

1.2 Site

The Callala Bay Expansion area (site) is made up of the following lots;

- part lot 2 DP 775060;
- Lots 9, 10, 11, 17, 18 DP 253793, and
- Lots 599-628 DP 11388.

As shown in **Figure 1**, the site is approximately 36.8 ha in area and is bordered to the east by land zoned R1 - General Residential, to the north is a native forest, to the west Callala Beach Road and to the south part land zoned RU2 – Rural Landscape / part Emmett Street.

The Site is identified under Shoalhaven Local Environment Plan 2014 as a “Deferred Matter” and the previous Shoalhaven Local Environment Plan 1985 applies and identifies the Site as a 1(d) Rural (General Rural) Zone.

The Site’s northern boundary is on a ridge line that forms the current northern boundary of the Callala Bay township and is a water catchment that generally runs southwards towards Jarvis Bay. North of this ridge line water flow is generally eastward towards Wowley Creek. The approximate height of this ridge line is 20 m Australian Height Datum (AHD) and in general the Site falls southward towards Emmett Street. Included in the Site are several paper subdivision lots which front Callala Beach Road.

Callala Bay township is restricted to the south and east by Jarvis Bay, and to the south-west by a substantial wetland and low-lying flood liable land. The land to the north is forested and is a biobank site.

Nearby villages of Callala Beach, Myola and Currarong rely on services/shops of the town. (see **Figure 1**).

1.3 Study Area

The Study Area includes bushfire risk assessment within 5 km of the Site (**Figure 2- Figure 6**) which is located within Part Lot 2 DP 775060 and Part Lot 212 DP 1177757 and owned solely by Sealark Pty Limited.

1.4 The Planning Proposal

The Callala Bay Expansion Area Planning Proposal seeks to rezone the Site to achieve the following outcomes:

- Residential lot sizes ranging from 400m² to 1,935m²;
- Public reserves;
- A drainage reserve; and a
- Biobank site.

The Site is identified in the Shoalhaven Growth Management Strategy, 2012 as an area to support further expansion of Callala Bay. The Strategy identified approximately 35 ha of land to the north and west of the town as potential urban expansion and recommended investigation of expansion of Callala Bay to the west and resolving of the existing small lot rural subdivision in association with any rezoning.

Initial scoping investigations indicate a capacity of approximate 374 resident lots, with supporting public and drainage reserves (**Figure 1**). Assuming 2.3 persons per dwelling, the expansion area could accommodate in the order of 860 residents. A Masterplan is shown in **Figure 2**.

The Planning Proposal considers bushfire risks strategically in the landscape and the capacity of the Site to comply with the Acceptable Solutions within PBP and other related bushfire requirements.

1.5 Aims and objectives.

The Study provides an assessment of the landscape bushfire risk and the residual risk for development following the provision of Bushfire Protection Measures (BPMs). It includes the following strategic assessment requirements from PBP:

- ensuring land is suitable for development in the context of bush fire risk;
- ensuring new development on Bush Fire Prone Land (BFPL) will comply with PBP;
- minimising reliance on performance-based solutions;
- providing infrastructure associated with emergency evacuation and firefighting operations; and
- facilitating appropriate ongoing land management practices.

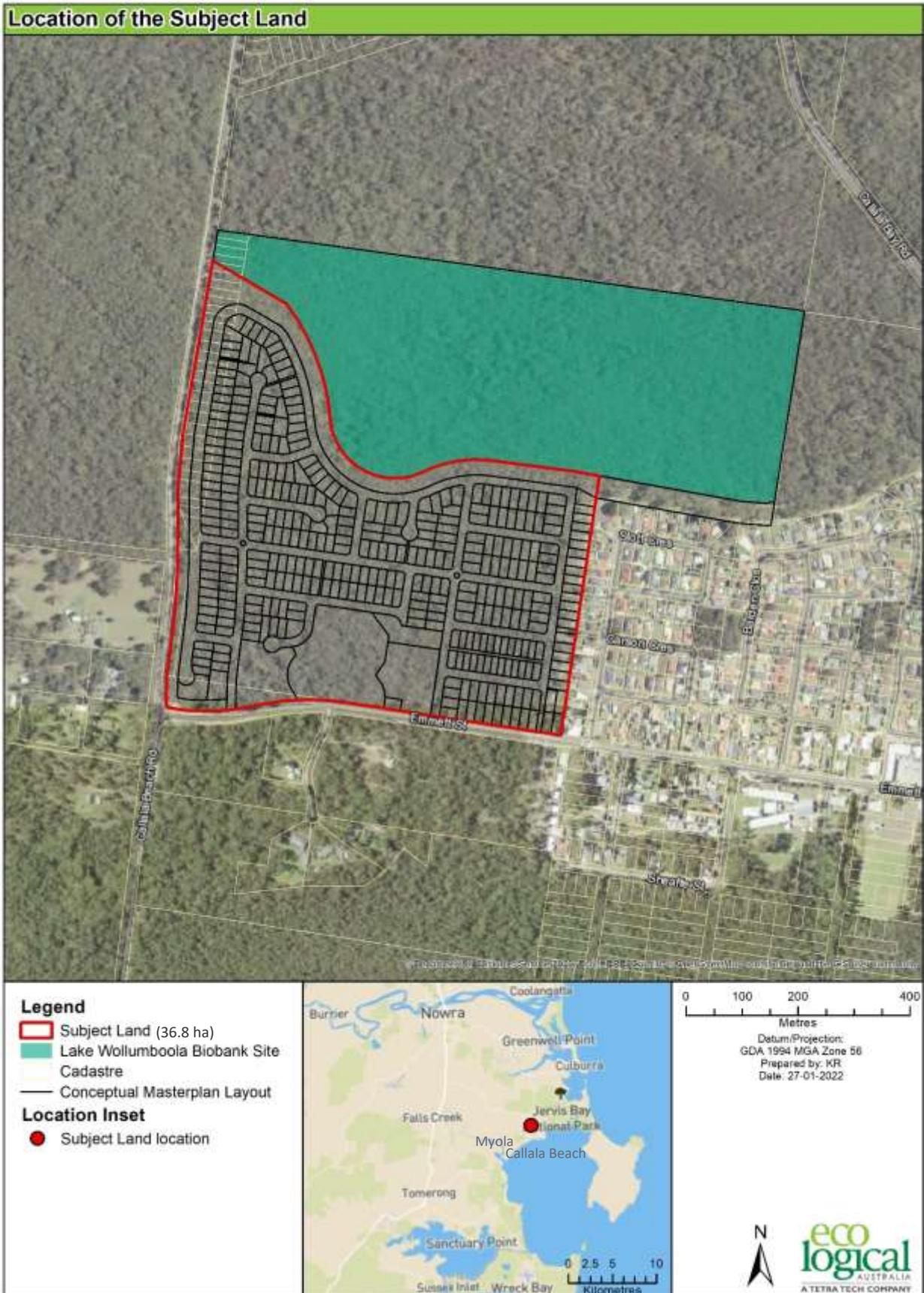


Figure 1: Location of site

2. Bushfire landscape risk

The landscape bushfire risk includes assessment of bushfire hazard, potential fire behaviour and bushfire history within the Study Area.

2.1 Bushfire hazard

The Site is located within a wider area of Bush Fire Prone Land (**Figure 6**) which extends to the north, north-west and south and has the potential to expose the Site to larger sized bushfires. Larger potential fire catchments (as occurs to the north and west of the Site) increase the risk of landscape-wide bushfires which are typically more difficult to control and pose higher community risk.

The bushfire hazard abutting the Site is classified below using the PBP assessment methodology for vegetation and slope.

2.1.1 Vegetation

The Site is within a landscape comprised predominantly of Sydney Coastal Dry Sclerophyll Forests (north) and North Coast Wet Sclerophyll Forests (west and south). There are small pockets of managed rural holdings with compliant Asset Protection Zones (APZ) to the south-west and south (**Figure 3**). Although these APZs may constrain wildfire spread, they have conservatively been classified as ‘forest’. The spatial extent and continuity of these vegetation types (forests) has the potential to support higher intensity and difficult to control fires.

A 3.7 ha patch of forest within the Site boundary is to be retained to preserve several threatened orchids (ELA 2019). Also a 20 m corridor of ‘forest’ will be retained as a visual buffer to the west of the site between the proposed perimeter road and Callala Beach Road. Whilst this vegetation is reasonably separated from the western ‘bushfire catchment’ it is conservatively classified as ‘forest’.

Vegetation has been classified into Keith Formations and Keith Class (Keith 2004) and assigned a potential total fuel load (tonnes / hectare) using Table A1.2.8 from PBP (see **Figure 3** and **Table 1**). Fuel loads, structure and composition are an important contributor to wildfire behaviour.

Table 1: Vegetation formation, class and fuel loads for the Study Area

| Vegetation formation | Keith Class | Surface and elevated (t/ha) | Overall fuel including bark and canopy (t/ha)* |
|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------------|
| Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland | Southern Lowland Wet Sclerophyll Forests (WSF); Coastal Swamp Forest; Central Gorge Dry Sclerophyll Forest (DSF); Sydney Coastal DSF; South Coast Sands DSF; Blackbutt Tall Forest; North Coast WSF; Sydney Montane DSF | 22 | 36.1 |

*Overall fuel load including Bark and Canopy from Table A1.12.8 from PBP 2019

2.1.2 Topography and slope

The land is gently sloping and low lying with ‘all upslopes and flat land’ to the north-west and ‘>0-5 degrees downslope’ in all other directions.

Figure 4 (elevation map) shows that for a fire to approach the site from a distance (e.g. a larger fire) from the most adverse direction of bushfire attack in the locality (north – west - south-west) it would be predominantly burning downhill or across slope. Whilst these downhill slopes are typically gentle, they nevertheless mitigate the fire intensity to some extent. There are no steeper slopes or potential for uphill fire spread toward the development within close proximity of the Site.

Figure 5 illustrates the slope variation across the site and landscape (5km).

2.1.3 Bushfire weather

The timing and length of bushfire seasons is driven by seasonal climate and weather factors. However, the behaviour of fires is also strongly influenced by the weather conditions at the time the fire is burning.. The historical weather patterns within the Shoalhaven provide an understanding of the potential bushfire behaviour, and its direction, intensity, and rate of spread.

The Shoalhaven region experiences mild temperatures throughout the year, with higher mean temperatures from November to March. Rainfall is variably distributed throughout the year, with a drier season typical from mid-winter to mid-summer. This pattern normally supports a predominantly spring to summer fire season with slightly higher rainfall during the months preferred for fuel reduction burning (i.e. autumn and early winter).

Relative humidity is also variable, with higher humidity recorded in summer and early autumn, probably as a result of the higher incidence of on-shore winds. However, very low relative humidity can occur these same months and significantly increase bushfire risk.

The weather data (BoM 2016), local knowledge of fire weather patterns, and previous analysis of weather within the area (ELA 2013a), indicate that:

- Adverse fire weather conditions are most common in early spring, sometimes with a slight lessening in late spring and early summer and then building to another peak in mid to late summer;
- Southerly ‘blusters’ may adversely affect fire behaviour;
- Strong onshore winds may adversely affect fire behaviour during higher bushfire risk periods almost at any time outside of winter;
- Forest Fire Danger Index (FFDI) calculated from Point Perpendicular data is often significantly less than that of Nowra; and
- The Study Area will have both inland and coastal influences.

Climate change is expected to bring longer bushfire season to parts of Australia, with an increasing number of extreme fire weather days..

Table 2: FFDI for a 1 in 50-year event

| Weather Station | Max Recorded FFDI | All directions | N to SE | SE to SW | SW to N |
|-----------------|-------------------|----------------|---------|----------|---------|
| Nowra | 120 | 117 | 47 | 64 | 117 |

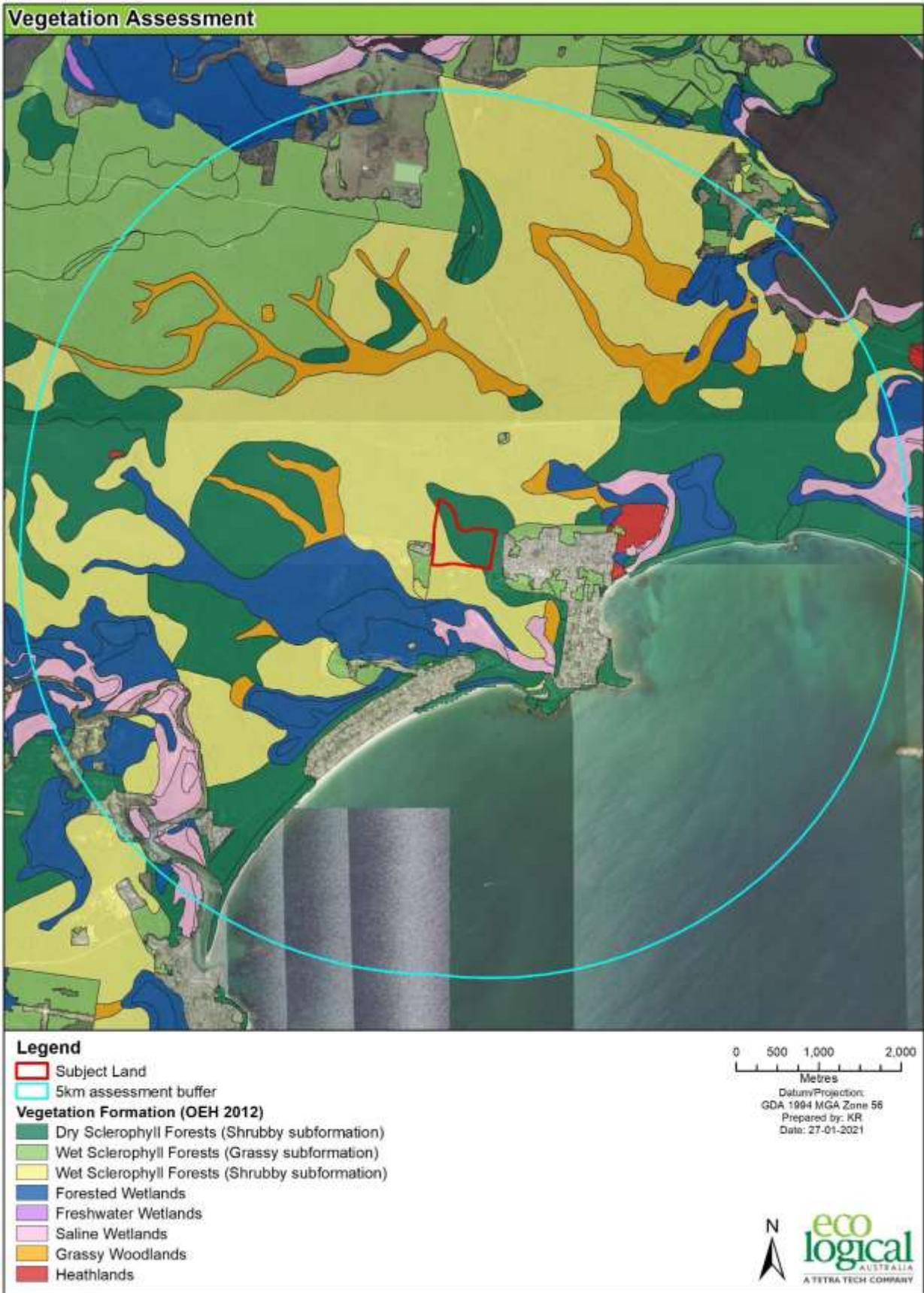


Figure 3: Vegetation map

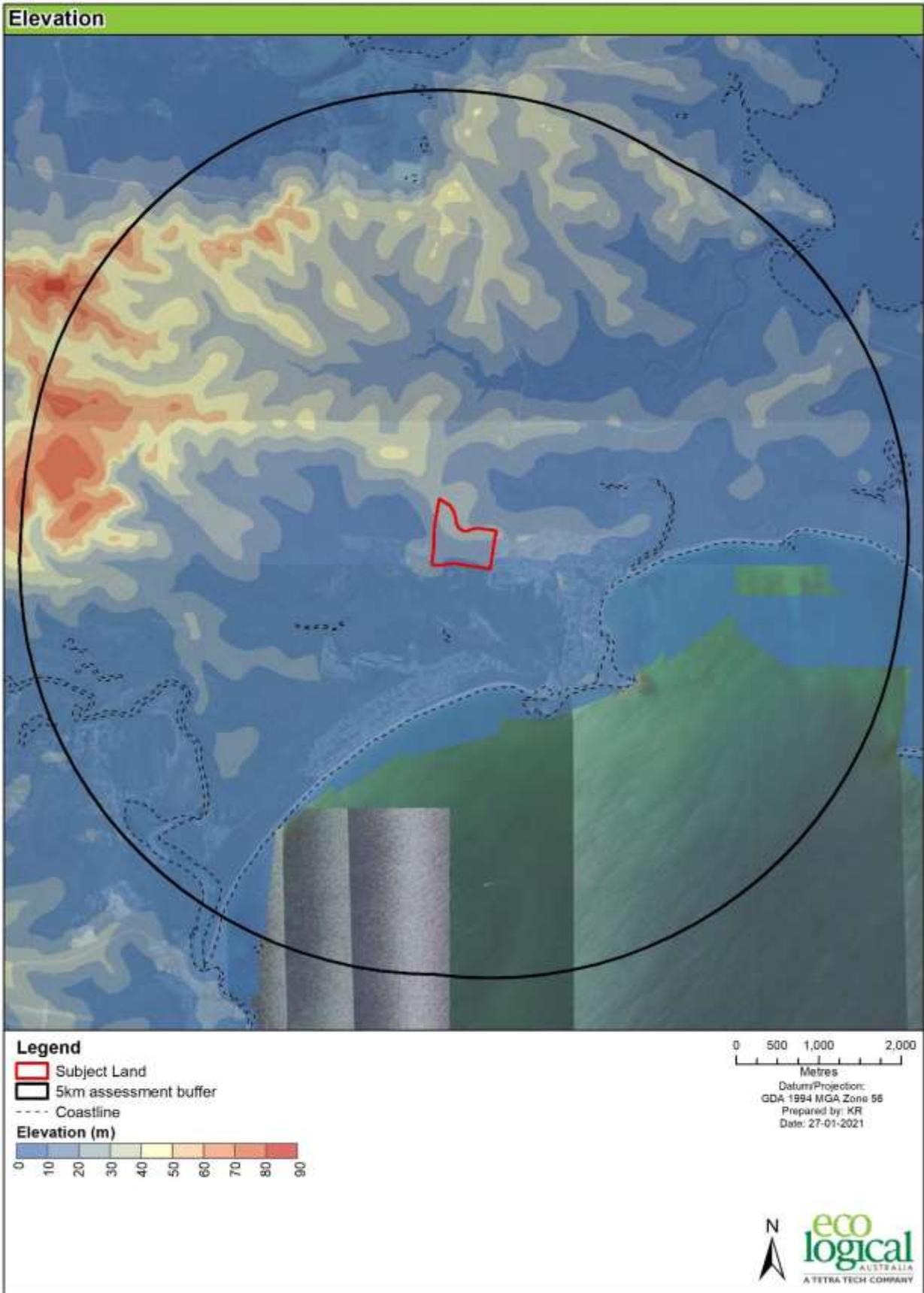


Figure 4: Elevation map

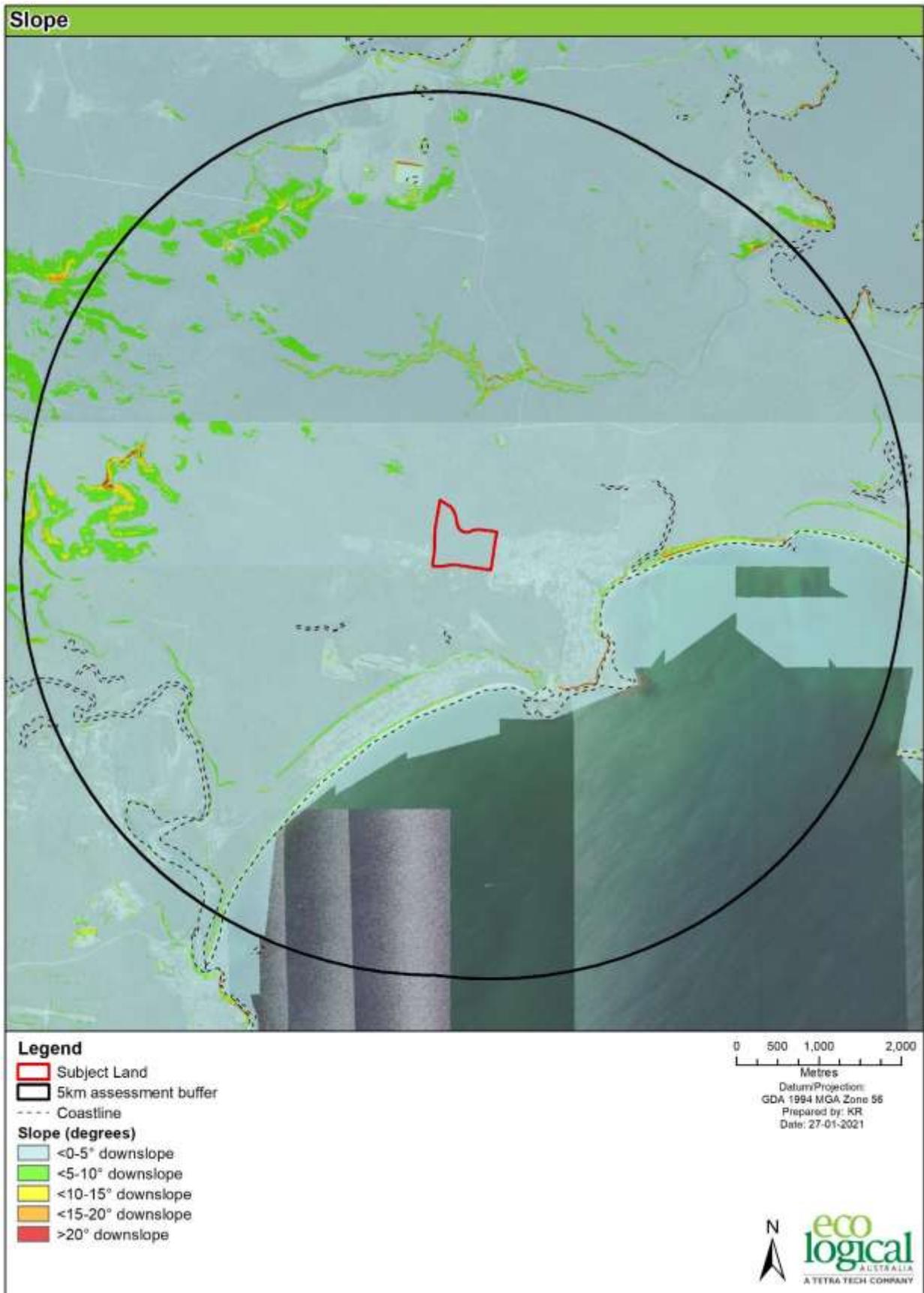


Figure 5: Slope

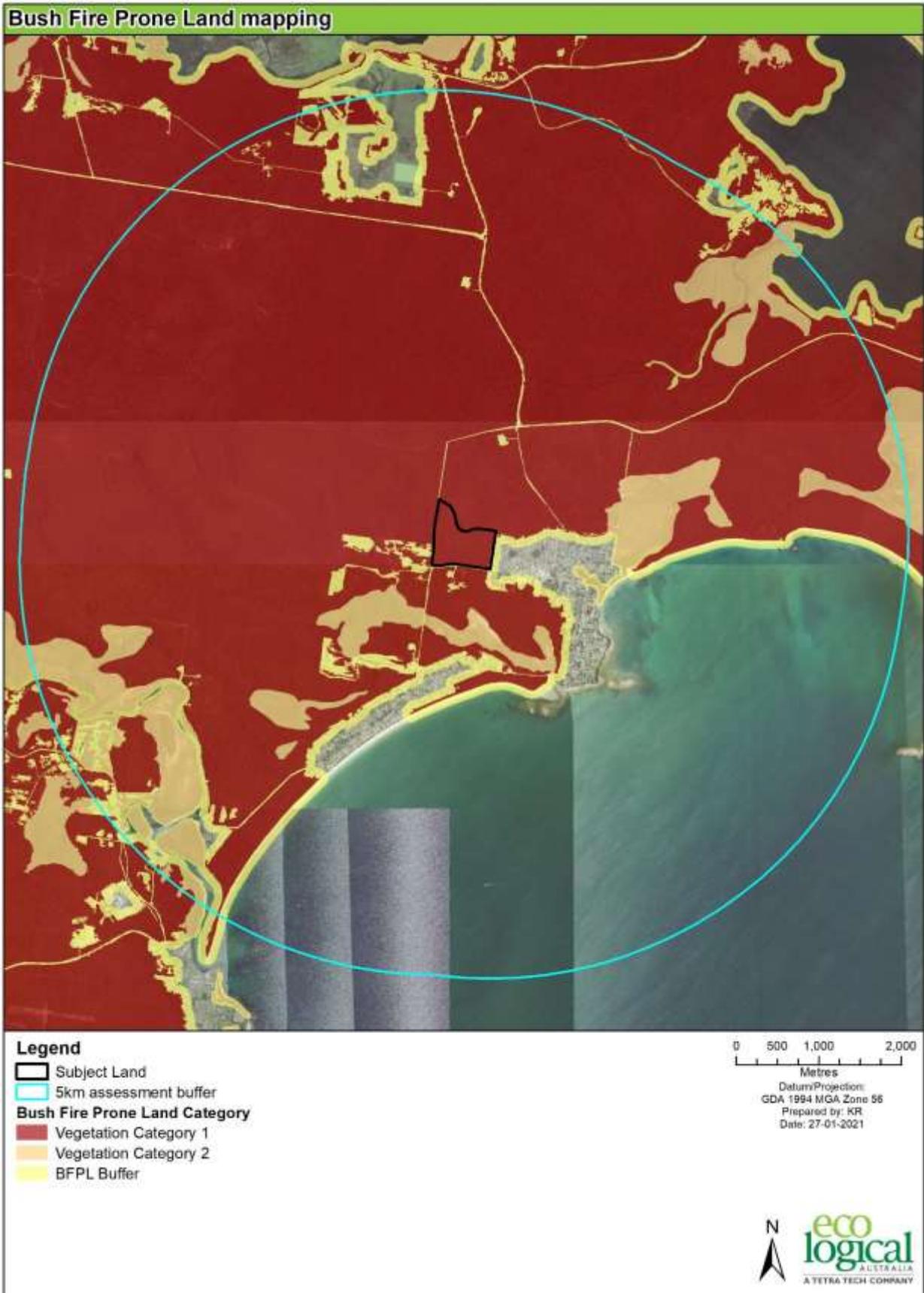


Figure 6: Bush Fire Prone Land Map

2.2 Potential fire behaviour

Uncontrollable fire intensities can occur in the forest vegetation abutting the Site particularly to the north, west and the south.

All native vegetation communities have the potential to burn at uncontrollable intensities unless they are burned at a very high frequency e.g. annually. This frequency of burning is rarely feasible and is inappropriate within the biobanking Site adjoining the north and not likely feasible within the private lands to west and south.

Given the infrequent burning typically prescribed for forest vegetation (e.g. >5-7 years depending on specific forest type) the Site is at risk of higher intensity bushfire in most years. However, this is the premise that PBP assumes and the Acceptable Solution Bushfire Protection Measures are prescribed to meet this risk to buildings and there is nothing unusual in the landscape fire behaviour potential.

2.3 Bushfire history

The Shoalhaven Local Government Area (LGA) has on average 600 bush fires per year, of which an average of twenty fires can be considered to be major fires requiring response by two or more fire authorities. The Shoalhaven can experience significant fire activity any time of the year and fires in isolated parts of the LGA may burn for several days or weeks.

Across these LGAs the main sources of fire ignition are identified as:

- Lightning Strikes;
- Arson; and
- Accidental ignitions (i.e. escaped pile burns, burning without a permit or associated construction activities).

Any of these potential ignition sources are possible in the vicinity of the Site.

Figure 7 shows the wildfire frequency within the Study Area for the past 10 years from the NPWS fire history mapping data set. The locality has a history of deliberate ignitions in the forests to the west (Rod Rose pers. comm.¹) and this pattern may continue at least until Comberton Grange and Worrigeer South is developed and there is more scrutiny of arson-related activity. The Site is not exposed to a wildfire pathway resulting from terrain and vegetation influences, but it can be expected to be exposed to wildfire at least every 10 years or so (**Figure 8**).

During site construction and operations, the following are potential ignition sources:

- Earth moving equipment;
- Vehicles;
- Power tools (such as welders, grinders);
- Mowers and slashers; and

¹ Rod Rose was the Fire Control Office in the Shoalhaven for 6 years and managed at least 30 fires in the Callala Bay locality. He has also analysed fire history and fire control data in the Shoalhaven for the past 30 years, including on behalf of the RFS, NPWS and DoD.

- Accidental ignitions (such as discarded cigarettes).

These ignition risks are manageable and are not considered to compromise the Planning Proposal.

2.4 Potential landscape-wide fire control lines

The Site benefits from public roads in all directions that have been major control lines at various times in the past (Rod Rose pers. Comm.). These roads provide a landscape fire risk advantage in that fires, on occasion, may be controlled on these public roads before it impacts the Site; these roads are Calalla Beach Road (west), Emmett Road (south), Forest Road (north) and Callala Bay Road (east).

2.5 Summary of landscape bushfire risk assessment

The Site is exposed to a bushfire risk from the nearby forests and higher intensity fires will impact the future development periodically.

The Site benefits from public roads that 'encircle' the locality and provide quality potential fire control lines and these help mitigate the landscape-wide fire risk.

No unusual or adverse landscape bushfire risks have been identified and there is no evidence to suggest the level of protection required by the Acceptable Solution Bushfire Protection Measures within PBP cannot be achieved.

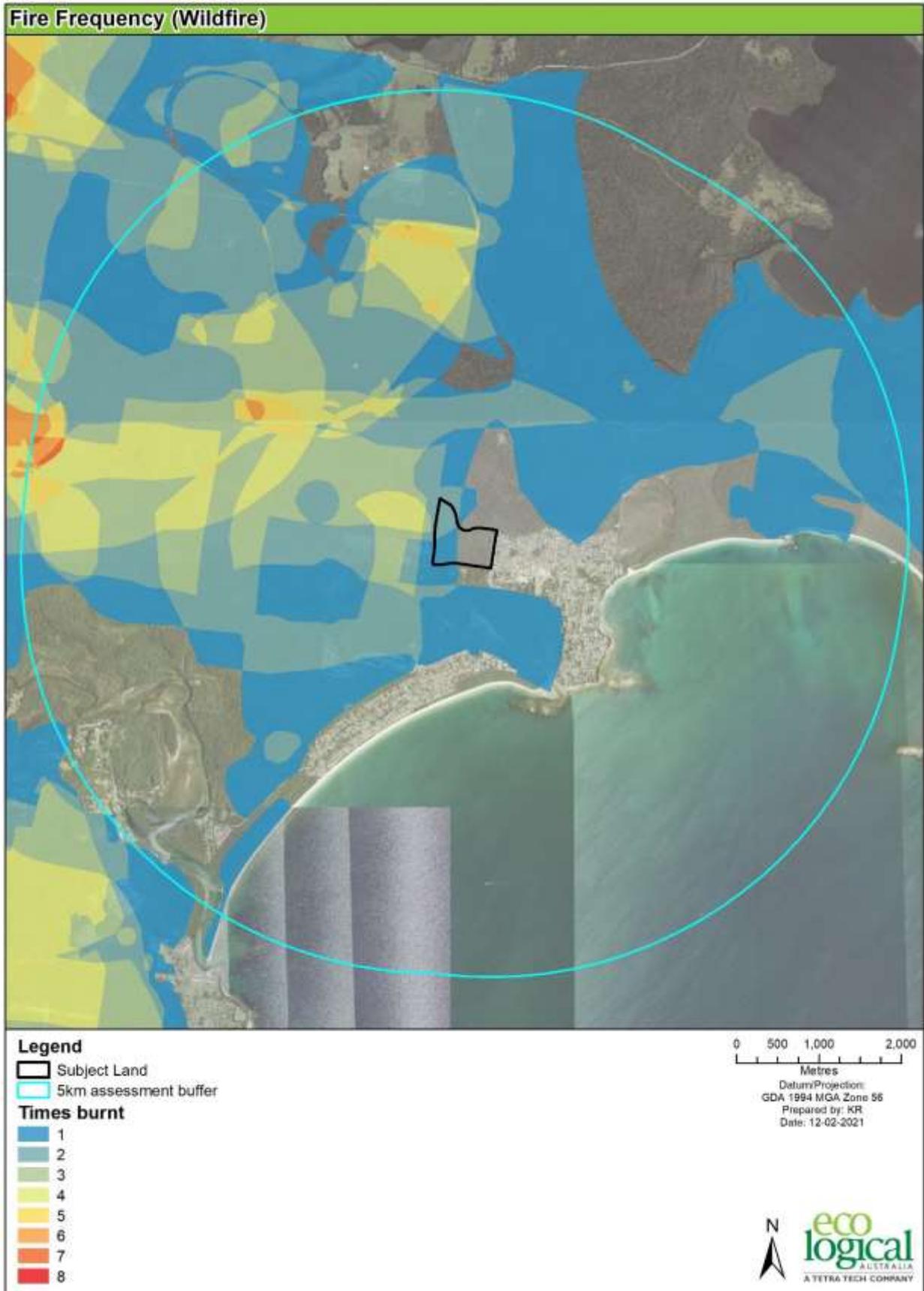


Figure 7: Wildfire frequency

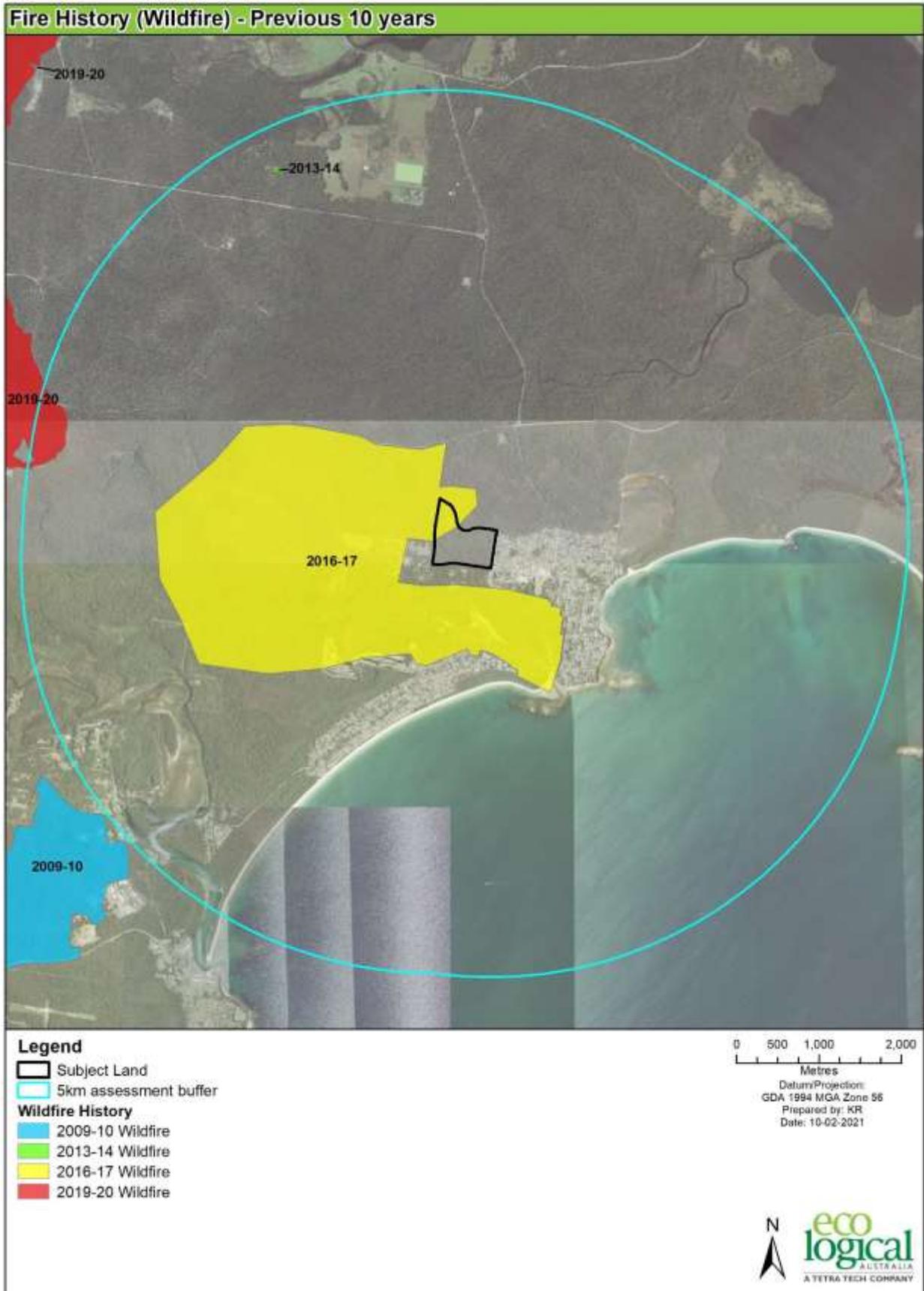


Figure 8: Wildfire history

3. Land use assessment

Residential development and perimeter roads of the proposed Site will provide a more resilient bushland interface than that existing on the western interface of Callala Bay township which was built prior to the current bushfire protection standards. The existing Township (east of Site) has a fire trail to the north and west, whereas the proposal will create a much-improved defensible space and PBP compliant perimeter roads.

Whilst the proposal has bushland on two sides (north and south) and rural lands on the third side (west), the provision of quality perimeter roads within the Site augmented by the traditional fire control lines of Callala Beach Road, Callala Bay Road and Emmett Road (Rod Rose pers. Comm.) potentially provides improved management of the bushfire risk from a land use perspective.

Replacing approximately 20 older dwelling on the western interface of Callala Bay township with a bushland interface of PBP compliant dwellings is advantageous. Also, other older housing stock within the township is separated further from bushland and therefore further from the more intense burning debris attack zones.

The density of housing proposed creates a robust and defensible interface that is much less likely to see fire penetration than rural residential.

4. Feasibility of Asset Protection Zones (APZs)

Figure 9 and **Table 3** show 6 transects used to assess slope and vegetation and the feasibility of APZ under PBP for the Site. The APZ required under PBP for residential subdivision are achievable without the need for alternate solutions or off-site work.

Table 3: APZs required to achieve BAL 29

| Direction (Figure 8) | Transect | Slope ¹ | Vegetation ² | PBP 2019 required APZ (residential) ³ | Available APZ | Comment |
|----------------------|----------|-----------------------|-------------------------|--------------------------------------------------|---------------|-------------------------------------------------------------------------|
| North-east | 1 | >0-5 Degree Downslope | Forest | 29 m | ≥29 m | APZ provided by 40 m public reserve |
| North | 2 | >0-5 Degree Downslope | Forest | 29 m | ≥29 m | APZ provided by 16 m road reserve and 28 m public reserve |
| North | 3 | >0-5 Degree Downslope | Forest | 29 m | 44 m | As above |
| North-west | 4 | Upslope/Flat | Forest | 24 m | ≥24 m | APZ provided by Callala Beach Road carriageway and Site perimeter road. |
| West | 5 | >0-5 Degree Downslope | Forest | 29 m | ≥29 m | As above |
| South | 6 | >0-5 Degree Downslope | Forest | 29 m | ≥29 m | APZ provided by Emmett Street road reserve. |
| Retained Vegetation | N/A | >0-5 Degree Downslope | Forest | 29 m | ≥29 m | APZ provided by road infrastructure and building setbacks. |

¹ Slope most significantly influencing the fire behaviour of the site having regard to vegetation found as per PBP.

² Predominant vegetation is identified, according to PBP.

³ Assessment according to Table A1.12.2 of PBP 2019.

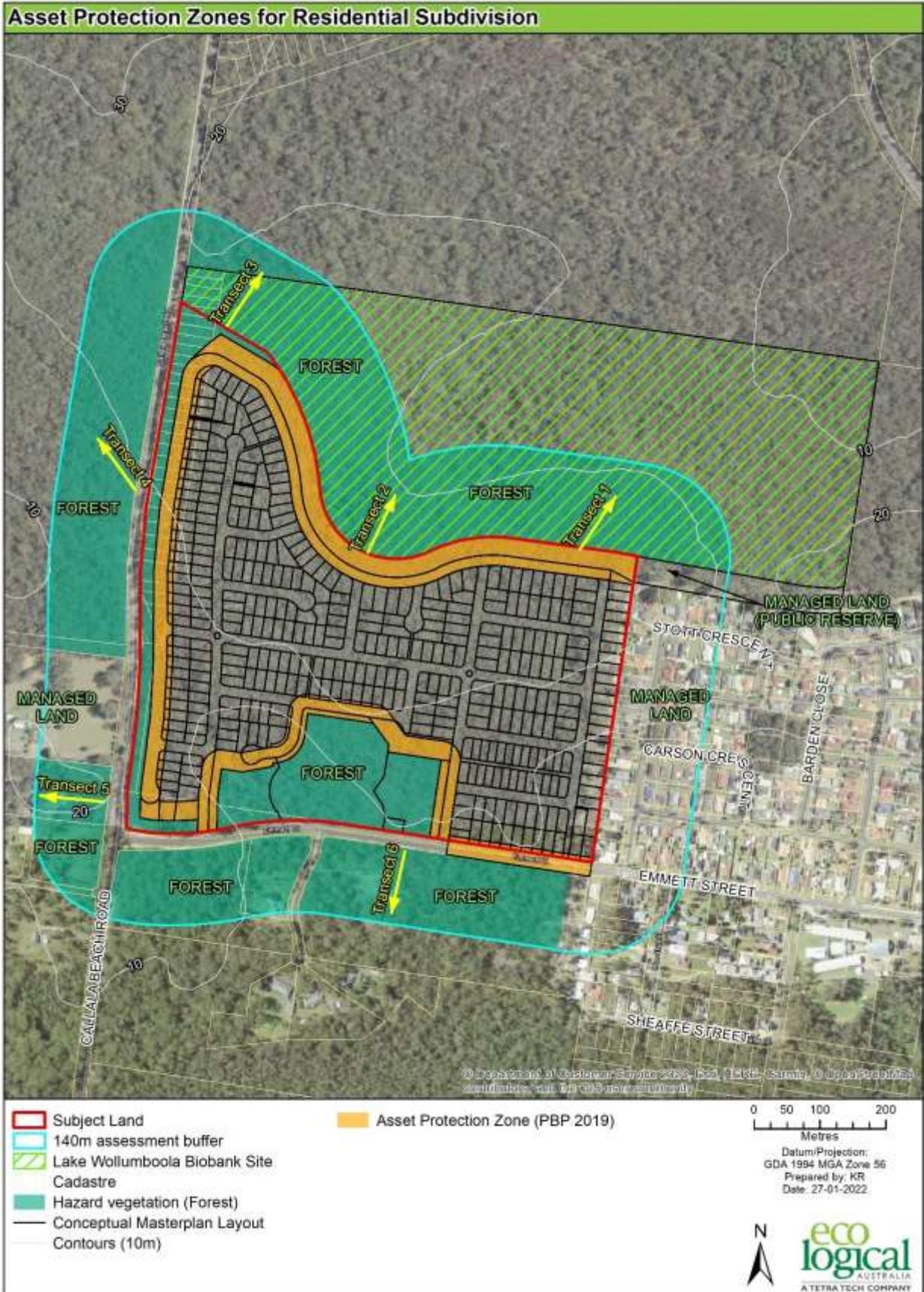


Figure 9: Asset Protection Zones for residential subdivision

5. Access and egress

The Masterplan Layout (**Figure 2**) is capable of meeting the Acceptable Solutions of Table 5.3b of PBP (see **Table 4**) and provides:

- two egress routes to the south onto Emmett Street;
- 16 m wide perimeter road between the bushfire hazard and all future building within the development plus existing perimeter road to south (Emmett Street).

Table 4: Performance Criteria for residential development.

| Performance Criteria | Acceptable Solutions | Compliance notes |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| General access requirements | | |
| The intent may be achieved where: | | |
| Firefighting vehicles are provided with safe, all-weather access to structures. | Property access roads are two-wheel drive, all-weather roads; | Can comply, detail not provided in Masterplan. |
| | Perimeter roads are provided for residential subdivisions of three or more allotments; | Masterplan plan complies – refer Figure 2. |
| | Subdivisions of three or more allotments have more than one access in and out of the development; | Masterplan plan complies, two access points provided to Emmett Street in south |
| | Traffic management devices are constructed to not prohibit access by emergency services vehicles; | Can comply, detail not provided in Masterplan. |
| | 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; | Can comply, detail not provided in Masterplan. |
| | All roads are through roads; | Masterplan plan shows 5 dead end roads proposed however all less than 200 m in length and incorporate compliant turning circle as per below. |
| | 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; | As above. |
| | Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; | Can comply, detail not provided in Masterplan. |
| | 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; | Masterplan plan complies, two access points provided to Emmett Street in south – refer Figure 2. |

| | | |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 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. | Not applicable |
| 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. | Can comply, detail not provided in Masterplan. |
| 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; | Can comply The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and table 5.3b of PBP. |
| | Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2017 – Fire hydrant installations system design, installation and commissioning; and There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available. | Not applicable – development will be serviced by reticulated water supply. |

Perimeter road requirements

| | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface. | Are two-way sealed roads; | Can comply, detail not provided in Masterplan. |
| | Minimum 8m carriageway width kerb to kerb; | Masterplan plan complies – 16 m wide perimeter roads proposed |
| | Parking provided outside of the carriageway width; | Can comply, detail not provided in Masterplan. |
| | Hydrants are located clear of parking areas; | Can comply, detail not provided in Masterplan. |
| | There are through roads, and these are linked to the internal road system at an internal of no greater than 500m; | Masterplan plan complies. |
| | Curves of roads have a minimum inner radius of 6m; | Can comply, detail not provided in Masterplan. |
| | The maximum grade road is 15 degrees and average grade is 10 degrees; | Can comply, detail not provided in Masterplan. |
| | The road crossfall does not exceed 3 degrees; | Can comply, detail not provided in Masterplan. |
| A minimum vertical cleared of 4m to any overhanging obstructions, including tree branches, is provided. | Can comply, detail not provided in Masterplan. | |

Non-perimeter road requirements

| | | |
|-----------------------------------------|----------------------------------|------------------------------------------------|
| Access roads are designed to allow safe | Minimum 5.5m width kerb to kerb; | Masterplan plan complies – all roads 16 m wide |
|-----------------------------------------|----------------------------------|------------------------------------------------|

Perimeter road requirements

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

6. Emergency services

The Planning Proposal increases the number of dwellings and occupants on Bush Fire Prone Land in the locality, however, there are two RFS brigades within 3 minutes travel time of the Site:

- Callala Bay Brigade located on Emmett Street (1 km, 1 minute travel time to east); and
- Callala Beach Brigade (2.5 km, 3 minutes travel time to south).

The development increases the bushland interface but also improves the resilience of the western interface of the township.

There are no unacceptable effects from a bushfire protection and emergency service response perspective; and the linking of the existing north-western perimeter of Callala Bay township westward through to Callala Beach Road is considered useful from a wildfire management perspective.

7. Evacuation

The majority of future residents will be located <200-600 m from egress onto Emmett Street which leads away from the hazard and into the heart of the Callala Bay township. Evacuation of future residents is reasonably foreseeable for evacuation from bushfire threats from the NW - W – S.

As uncontrolled fire over consecutive days is very unlikely from the NE (due to the subsidence pattern of NE winds overnight) the need for evacuation under NE winds is considered low. The primary evacuation risk is likely to be associated with a NW approaching fire and under a fire threat from this direction the egress routes from the proposed development are not likely to be cut as they are on the southern boundary of the Site (**Figure 9**).

Evacuation of the Site is also unlikely to complicate or adversely affect evacuation by existing Callala Bay residents as alternate routes exist and Callala Beach residents if evacuating early are unlikely to be hindered by residents evacuating from the Site as they have two alternate egress routes (east and west). The shielding effects from development of the Site may reduce the need to evacuate much of the existing western interface of the Callala Bay township.

8. Utilities

8.1 Water

The Proposal is to be serviced by a reticulated water supply. **Table 5** identifies the Acceptable Solution requirements of Section 5.3 of PBP.

The PBP Acceptable Solution requirements for water is achievable.

Table 5: Water supply requirements (adapted from Table 5.3c of PBP)

| Performance Criteria | Acceptable Solution | Compliance Notes |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Adequate water supplies is provided for firefighting purposes. | Reticulated water is to be provided to the development where available; A static water supply and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and Static water supplies shall comply with Table 5.3d of PBP. | Complies Proposal serviced by a reticulated water supply |
| 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 (SA 2017); Hydrants are not located within any road carriageway; and Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. | Can comply The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and table 5.3c and table 5.3d of PBP. |
| Flows and pressure are appropriate. | Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1 (SA 2017). | |
| The integrity of the water supply is maintained. | All above-ground water service pipes are metal, including and up to any taps; and | |

| Performance Criteria | Acceptable Solution | Compliance Notes |
|----------------------|-----------------------------------------------------------------|------------------|
| | Above-ground water storage tanks shall be of concrete or metal. | |

8.2 Electricity

Electricity supply for the Proposal will be underground. **Table 6** identifies the Acceptable Solution requirements of Section 5.3 of PBP.

The PBP Acceptable Solution requirements for electricity is achievable.

Table 6: Requirements for the supply of Electricity services (adapted from Table 5.3c of PBP)

| Performance Criteria | Acceptable Solution | Compliance Notes |
|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings. | <p>Where practicable, electrical transmission lines are underground;</p> <p>Where overhead, electrical transmission lines are proposed as follows:</p> <p>Lines are installed with short pole spacing (30 m), unless crossing gullies, gorges or riparian areas; and</p> <p>No part of a tree is closer to a power line than the distance set out in ISSC3 Guide for the Management of Vegetation in the Vicinity of Electricity Assets (ISSC3 2016).</p> | <p>Complies</p> <p>Electricity services to the subject site are located underground.</p> <p>Can comply</p> <p>The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and Table 5.3c of PBP.</p> |

8.3 Gas services

A decision on whether there will be gas supply connected to the development has not yet been made. The compliance for any gas services (reticulated or bottle gas) is to comply with Section 5.3.4 of PBP as detailed in **Table 7** and compliance is achievable if gas is to be connected.

Table 7: Requirements for the supply of gas services (adapted from Table 5.3c of PBP)

| Performance Criteria | Acceptable Solution | Compliance Notes |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings. | <p>Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 – The Storage and handling of LP gas, the requirements of relevant authorities, and metal piping is used;</p> <p>All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 m and shielded on the hazard side;</p> <p>Connections to and from gas cylinders are metal;</p> <p>Polymer-sheathed flexible gas supply lines are not used; and</p> <p>Above-ground gas service pipes are metal, including and up to any outlets.</p> | <p>Can comply</p> <p>The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and Table 5.3c of PBP.</p> |

9. Adjoining land

Future development will not be reliant on any off-site bushfire mitigation measures. All buildings and use will be designed to be resilient to bushfire attack in circumstances where no additional fuel management occurs outside of APZs etc.

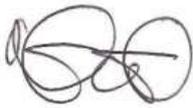
Local Bushfire Management Committees will be updated of the bushfire protection measures in-built and proposed for the development. There is no expectation or need for fuel management to occur on adjoining land for the Proposal to meet PBP standards.

10. Conclusions

The Strategic Bushfire Study has not identified any bushfire risks within the landscape or elsewhere that are beyond that considered by PBP. The Study has also found that all Acceptable Solution Bushfire Protection Measures required for residential subdivision by PBP can be achieved by the Proposal.

The need for bushfire evacuation of a future development is not likely to adversely interfere with the existing evacuation capacity in Callala Bay and the re-zoned development enables the development of a more bushfire resilient urban bushland interface than that which currently exists.

More detailed bushfire protection design is required at the subdivision stage, however the re-zoning application has provisions that allow this more detailed designed to achieve the deemed to satisfy requirements within PBP.



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11. References

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