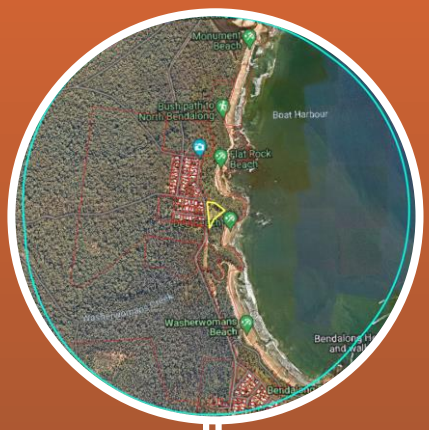
Strategic Bush Fire Study

Planning Proposal



88 North Bendalong Road, Bendalong

Reference Number: 230204B

DRAFT

14 December 2022

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FPA AUSTRALIA SILVER MEMBER Fire Protection Association Australia

Contents

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4.14 applications (under the Environmental Planning and Assessment Act 1979) and all infill development applications *may be* referred by Council to the NSW Rural Fire Service for review and concurrence during the DA process. S100B applications under the Rural Fires Act 1997 (subdivisions and Special Fire Protection Purpose Developments), Flame Zone determinations and Alternate Solutions *must be* referred by Council to the NSW Rural Fire Service for review and receipt of a Bushfire Safety Authority (BSA) or other such recommended conditions from the NSW Rural Fire Service before the consent can be granted.

The onus is on the applicant to cross reference this document with any conditions of consent issued by Council or any requirements supplied by the NSW Rural Fire Service following development approval. Building Code & Bushfire Hazard Solutions can review and cross reference these documents however the onus is on the applicant to provide them to us and request this review – Building Code and Bushfire Hazard Solutions Pty. Ltd. is not in a position to track every DA through Council and we rely upon the applicant to undertake this role as project co-ordinator.

Where any discrepancy between this document and the development approval or the NSW Rural Fire Service requirements is found, the conditions of consent always take precedence until such time as an application to review, amend or vary these conditions is approved.

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Version Control				
Version	Date	Author	Reviewed by	Details
1	14/12/2022	Andrew Muirhead	Stuart McMonnies	Draft Report

List of Abbreviations:

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 'Construction of buildings in bushfire-prone areas' – 2018
BAL	Bushfire Attack Level
BFMC	Bush Fire Management Committee
BPMs	Bushfire Protection Measures
BPLM	Bush Fire Prone Land Map
Council	Shoalhaven City Council
DA	Development Application
EP&A Act	Environmental Planning and Assessment Act - 1979
FRNSW	Fire & Rescue NSW
IPA	Inner Protection Area
NCC	National Construction Code
NP	National Park
NSP	Neighbourhood Safer Places
OPA	Outer Protection Area
PBP	Planning for Bush Fire Protection – 2019
ROW	Right of Way
RF Act	Rural Fires Act - 1997
RFS	NSW Rural Fire Service
SBFS	Strategic Bush Fire Study
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SWS	Static Water Supply

Executive Summary

Building Code and Bushfire Hazard Solutions P/L has been commissioned by Bendalong Essential Services Pty Ltd to prepare an independent Strategic Bush Fire Study for a Planning Proposal which will facilitate a future residential development at 88 North Bendalong Road, Bendalong.

The subject site comprises of one (1) existing allotment, legally identified as Lot 32 DP 1191742 and zoned C3: Environmental Management.

The Planning Proposal (PP) seeks to establish a dwelling entitlement for the land, to facilitate the future construction of a sole occupancy dwelling and detached garage / studio.

The subject site is depicted on Shoalhaven City Council's Bushfire Prone Land Map as containing Category 1 Vegetation and is therefore considered 'bushfire prone land'.

In relation to this PP Shoalhaven City Council is required to apply section 9.1(2) of the *Environmental Planning and Assessment Act* 1979. Direction 4.4 Planning for Bushfire Protection identifies matters for consideration for proposals that affect or are in proximity to land mapped as bushfire prone. Under these directions the following objectives apply:

> *i. to protect life, property and the environment from bush fire, by discouraging the establishment of incompatible land uses in bush fire prone areas; and*
>
> *ii. to encourage sound management of bush fire prone areas.*

A key consideration for PPs in bushfire prone areas is limiting or excluding incompatible development commensurate with the level of risk.

In this regard the subject site was impacted by a significant bushfire event during the 2019-20 fire season (Currowan Fire). The broader township has also been impacted during the 1968-69 fire season (unnamed), 1993-94 fire season (Bendalong Fire), 2001-02 fire season (Hylands Fire) and 2012-13 fire season (Boundary Road Fire).

The township of North Bendalong is accessed via sole access road (North Bendalong Road) and is consequently susceptible to being 'cut-off' or isolated during a bushfire event.

The location of the subject site, on the eastern side of the North Bendalong township, is such that it benefits from existing Asset Protection Zones, managed land, roads and established residential properties to the west and northwest. Prevailing weather conditions associated with the bush fire season in the Shoalhaven Bush Fire Management Committee area are north-westerly winds accompanied by high daytime temperatures and low relative humidity (Shoalhaven BFMC. 2018).

In a bushfire planning context the different types of land use and occupants present different risk profiles which must also be considered when assessing the overall level of risk.

In this instance the subject site has the benefit of an existing development consent (DA14/2397) for the construction and operation of ecotourism accommodation facility comprising of:

Phase 1:

- *Seven (7) 2 storey single bedroom cabins & one accessible accommodation unit for a total of 16 persons accommodated on site.*
- *A single storey multipurpose building (MPB) containing communal dining, terrace, kitchen & sanitary facilities together with pop-up kiosk in high season with hours of operation proposed:*
  - *In association with accommodation 7am to 11pm, seven days;*
  - *Pop-up kiosk 7am to 5pm during peak accommodation season.*
- *A manager's office/fire refuge (24 persons), operating 7am to 5pm, seven days.*
- *Off street parking for 11 cars, together with associated drop off zone.*
- *Ancillary infrastructure including pedestrian access paths, landscaping, sewer pump station, landscaped swales, detention basins and stormwater tanks.*

Phase 2

- *Construction and Operation of two (2) additional 2 storey single bedroom cabins for a total of 20 persons accommodated on site.*
- *Off street parking for 2 additional vehicles.*

Tourist accommodation is considered a Special Fire Protection Purpose (SFPP) development under section 100b(d) of the *Rural Fires Act* 1997. SFPP development is one which is occupied by people who are considered to be at-risk members of the community. In a bushfire event, these occupants are generally more susceptible to the impacts of bushfire.

SFPP development consequently attracts the highest Bushfire Protection Measures commensurate to the risk profile. Most notably SFPP development, attracts larger minimum required Asset Protection Zones to provide emergency services better opportunity to support and / or evacuate occupants.

Conversely, residential development is considered to have a lower risk profile in a bushfire planning context as occupants are generally more familiar with their surroundings (including evacuation routes and refuge locations), bushfire threats, firefighting resources and in instances historic fire paths.

If the PP and subsequent dwelling application is successful it will require the approval for the ecotourism development to be surrendered, which from a bushfire planning context will reduce the number of occupants from 24 persons and reduce the occupant risk profile from Special Fire Protection Purpose to Residential.

While it is acknowledged that the future dwelling on the subject site will likely attract a Flame Zone rating, which is generally not desirable unless there are existing dwelling entitlements and site restrictions, the benefits of the ecotourism approval being surrendered cannot be understated.

We are also confident that a suitable package of Bushfire Protection Measures can be applied to a future dwelling application which will satisfy the aim and objectives of *Planning for Bush Fire Protection* 2019.

It is our opinion that the proposal will result in a better bushfire safety outcome for the subject site and we are therefore in support the Planning Proposal subject to the ecotourism approval being surrendered.

1.0 Introduction

Building Code and Bushfire Hazard Solutions P/L has been commissioned by Bendalong Essential Services Pty Ltd to prepare an independent Bushfire Assessment Report for a Planning Proposal which will facilitate a future residential development at 88 North Bendalong Road, Bendalong.

The subject site comprises of one (1) existing allotment, legally identified as Lot 32 DP 1191742 and zoned C3: Environmental Management.

The Planning Proposal (PP) seeks to establish a dwelling entitlement for the land, to facilitate the future construction of a sole occupancy dwelling and detached garage / studio.

The subject site is depicted on Shoalhaven City Council's Bushfire Prone Land Map as containing Category 1 Vegetation and is therefore considered 'bushfire prone land'.

In relation to this planning proposal Shoalhaven City Council is required to apply section 9.1(2) of the *Environmental Planning and Assessment Act* 1979. Direction 4.4 Planning for Bushfire Protection identifies matters for consideration for proposals that affect or are in proximity to land mapped as bushfire prone. Under these directions the following objectives apply:

> *i. to protect life, property and the environment from bush fire, by discouraging the establishment of incompatible land uses in bush fire prone areas; and*
>
> *ii. to encourage sound management of bush fire prone areas.*

The proposal must demonstrate compliance with the s9.1(2) Directions and the relevant specifications and requirements of *Planning for Bush Fire Protection* 2019 (PBP).

The application of PBP requires satisfactory demonstration of the aim and objectives and the specific objectives and bushfire protection measures relevant to the type of development.

In this instance the proposal relates to a Planning Proposal to facilitate a future residential development and therefore in addition to the aim and objectives detailed in Chapter 1 'Introduction' the proposal must address Chapter 4 'Strategic Planning' of PBP.

The bushfire protection measures detailed in Chapter 7 'Residential Infill Development' of PBP have also been considered for the future dwelling application.

2.0 Purpose of Report

The purpose of this Bushfire Assessment Report is to provide an independent bushfire assessment together with appropriate recommendations for bushfire mitigation measures considered necessary having regard to development within a designated 'bushfire prone' area.

This Bushfire Assessment Report addresses Section 4 'Strategic Planning' of *Planning for Bush Fire Protection* 2019.

3.0 Scope of this Report

The scope of this report is limited to providing a bushfire assessment and recommendations for the subject site (refer to Figure 01). Where reference has been made to the surrounding lands, this report does not purport to directly assess those lands; rather it may discuss bushfire impact and/or progression through those lands and possible bushfire impact to the subject site.

4.0 Aerial Image, BPLM, Zoning & Site Plan

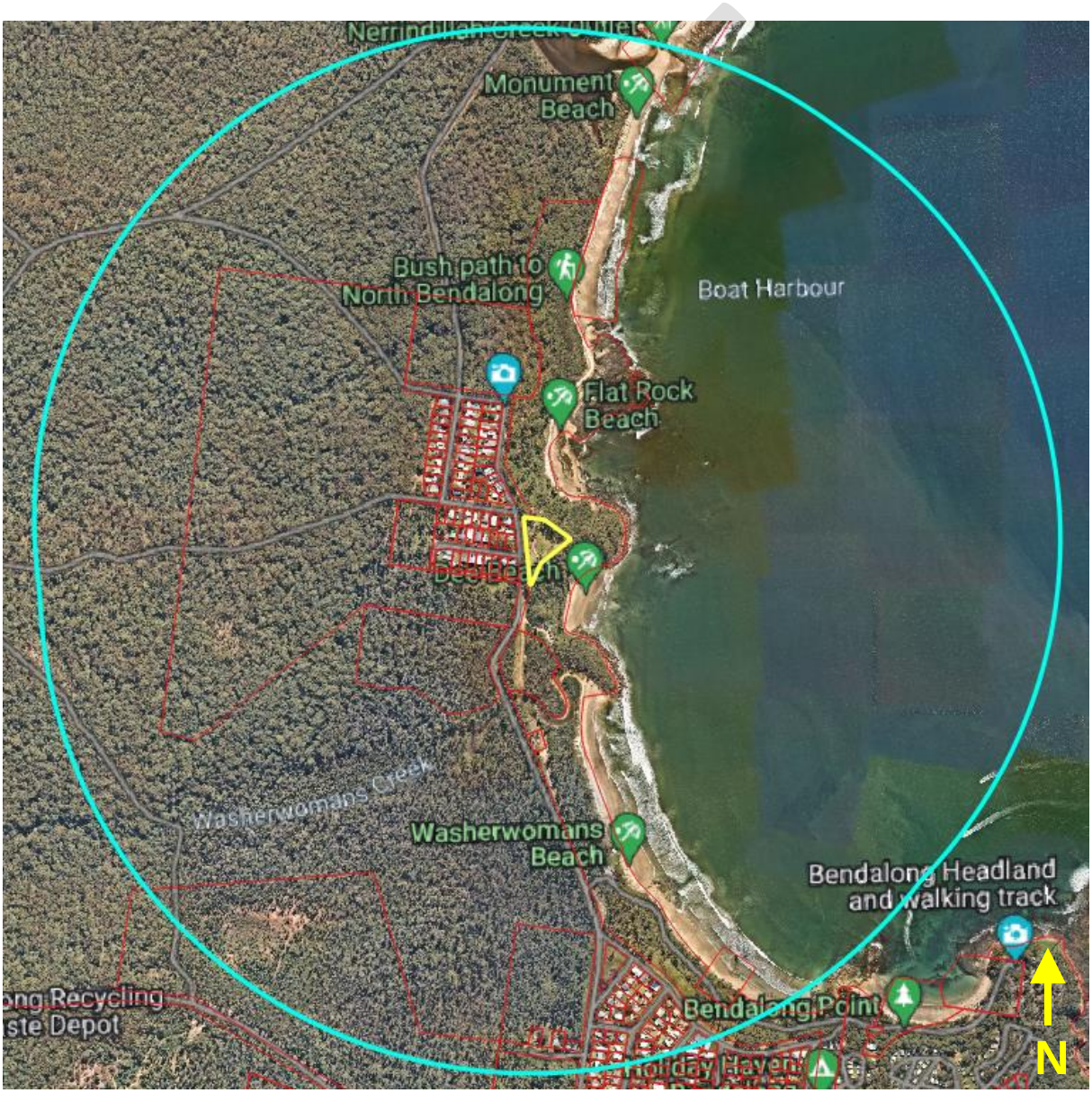

Figure 01: Aerial view of the subject area
Subject site (yellow outline)
1 kilometre buffer (blue outline)

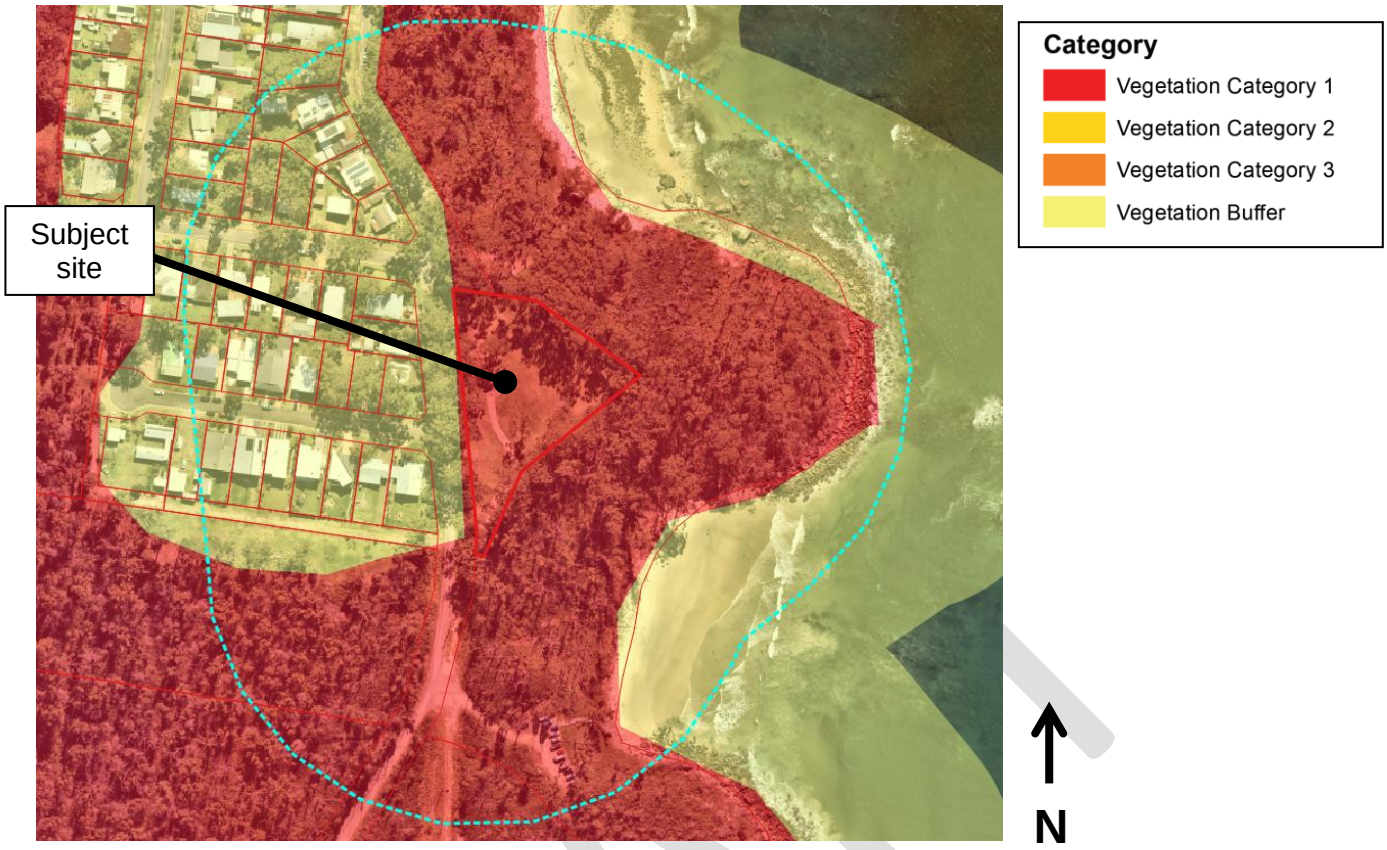

Figure 02: Extract from Shoalhaven City Council's Bushfire Prone Land Map

Figure 03: Land zoning of the subject area
Subject site (outlined in yellow)

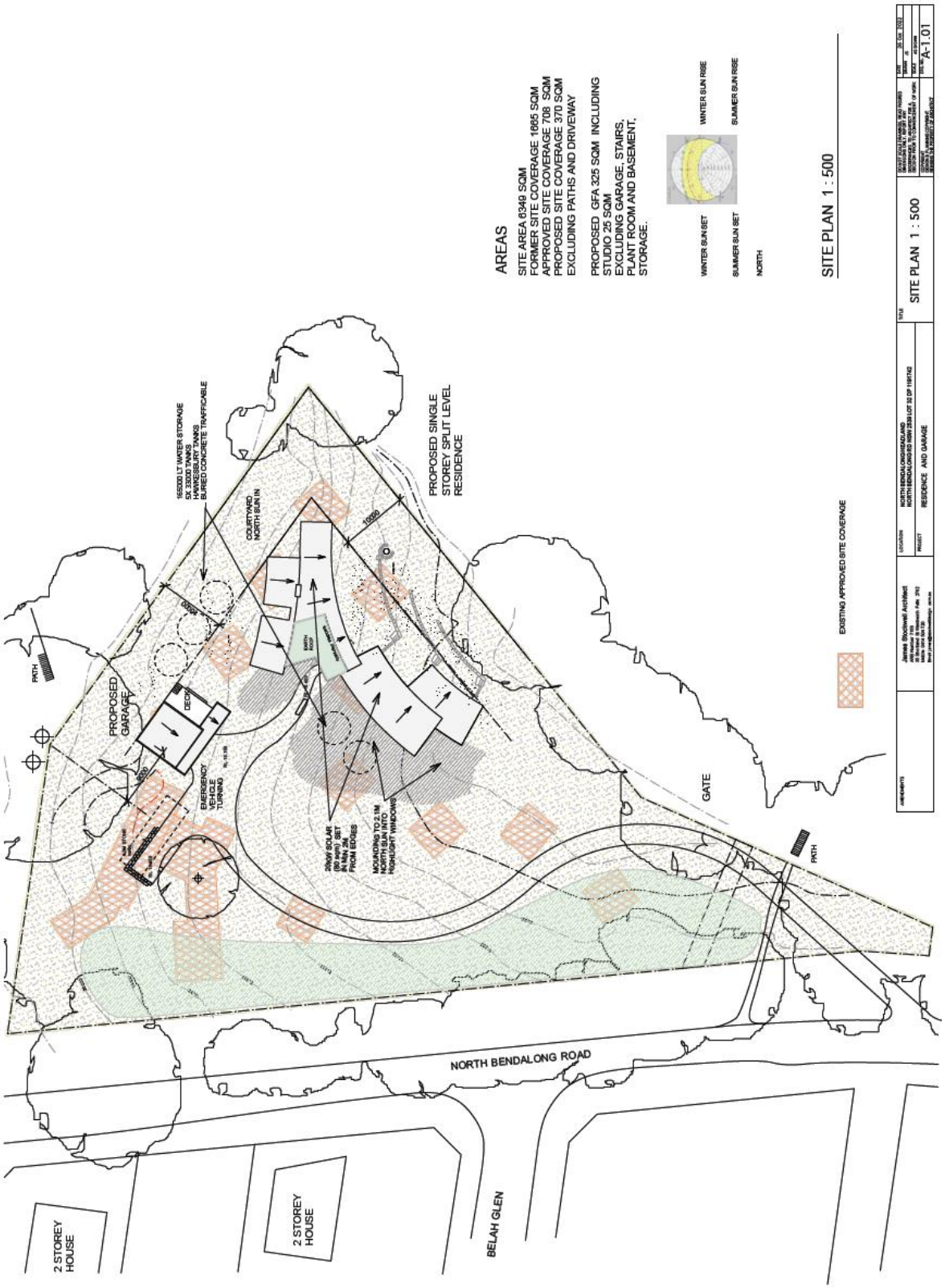

Figure 04: Extract of Site Plan prepared by James Stockwell Architect

5.0 Bushfire Assessment

5.01 Preface

Properties considered to be affected by possible bushfire impact are determined from the local Bushfire Prone Land Map as prepared by Council and/or the Rural Fire Service. All development within affected areas is subject to the application of the relevant specifications and requirements of 'Planning for Bush Fire Protection - 2019' (PBP).

PBP formally adopted on the 1st March 2020 provides for the protection of property and life (including fire-fighters and emergency service personnel) from bushfire impact.

In this instance the subject site is depicted on Shoalhaven City Council's Bushfire Prone Land Map as containing Category 1 Vegetation. The subject site is therefore considered to be 'bushfire prone land'.

When preparing a planning proposal s9.1(2) of the EP&A Act is required to be applied. Direction 4.4 '*Planning for Bushfire Protection*' of the s9.1(2) Direction, applies when a Council prepares a draft LEP that affects, or is in proximity to, land mapped as bushfire prone. Under these directions the following objectives apply:

i. to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas; and

ii. to encourage sound management of bush fire prone areas.

Under direction 4.4 the Commissioner of the NSW RFS must be consulted and any comments taken into account. As part of the consultation process with the NSW RFS, a bush fire assessment is required to be submitted to demonstrate compliance with the s9.1(2) Directions and PBP.

Consideration must be given to limiting or excluding incompatible development in bushfire affected areas commensurate with the level of risk. A key principle to ensure this is that future development is designed and sited capable of complying with PBP.

The NSW Rural Fire Service also encourages the application of zones that limit or exclude inappropriate development in bushfire prone areas where:

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

We provide the following assessment in consideration of the above and *Planning for Bush Fire Protection* 2019 to highlight the suitability of the site for residential development and the relevant Bushfire Protection Measures.

5.02 Strategic Bush Fire Study

Planning proposals which relate to bushfire prone properties require the preparation of a Strategic Bush Fire Study. The Strategic Bush Fire Study (SBFS) provides opportunity to assess the broader landscape and ultimately assesses whether the new zones / entitlements and proceeding development is appropriate in the bushfire hazard context.

The broad principles which apply to the SBFS analysis are:

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

Once the strategic assessment has been addressed in the SBFS, an assessment of whether the future land use / entitlement can comply with the aim and objectives and specific bushfire protection measures of PBP must then be carried out. The assessment against PBP is addressed in section 5.03 of this report.

The following assessment details the components in Table 4.2.1 of PBP which must be addressed in a SBFS.

Bushfire Landscape Assessment

The Bushfire Landscape Assessment component considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.

Location

The subject site comprises of one (1) existing allotment, legally identified as Lot 32 DP 1191742 and zoned C3: Environmental Management.

The subject site is located within Shoalhaven City Council's local government area.

The site is within the Illawarra / Shoalhaven Fire Weather District and is captured by the Shoalhaven Bush Fire Risk Management Plan 2018.

The site has street frontage to North Bendalong Road to the west and abuts the foreshore reserve of Dee Beach and Flat Rock Beach to the north, east and south.

The site is within the immediate fringe of the North Bendalong township, with established residential properties located to the west and northwest.

Vegetation

The vegetation structure, connectivity and attributes are fundamental contributors to bushfire behaviour and its movement through the landscape.

As part of this assessment we have considered the potential bushfire runs (catchments) that currently exist into the site, as well as the potential fire behaviour and impacts following the delivery of the Site Plan.

The subject site was currently found to be managed and subsequently does not contain a bushfire hazard.

The vegetation identified as posing a bushfire hazard was found to be located within the foreshore reserve of Dee Beach and Flat Rock Beach to the north, east and south, large vegetated allotments (zoned C2: Environmental Conservation) to the southwest, west and northwest. Conjola National Park directly links to the large vegetated allotments (zoned C2: Environmental Conservation) to the southwest, west and northwest and provides a significant catchment.

To assess the potential fire runs into the site we have considered all existing vegetation within 1 kilometre and potential fire behaviour and impacts (Figure 05).

Figure 05: Aerial view of the subject area showing subject site (yellow outline), 1km buffer (blue outline) and bushfire hazard (green shade)

The most significant catchments for bushfire were identified to be:

- North of the site, being a vegetated corridor associated with foreshore reserve of Dee Beach and Flat Rock Beach;
- West of the site, beyond North Bendalong township through Conjola National Park and vegetated allotments; and
- Southwest of the site, through Conjola National Park and vegetated allotments.

We have assumed all land within the site will either be developed, maintained to the standard of an Asset Protection Zone or considered Low Threat Vegetation in accordance with A1.10 of PBP.

The existing vegetation to the south and west is mapped (Vegetation NSW) as being Shoalhaven Foothills Turpentine Forest (PCT 3267) and the vegetation to the north is mapped as being Southern Sandplain Heath (PCT 3805).

The following vegetation parameters apply to the mapped vegetation:

Plant Community Type	Formation	Class	Surface and Elevation Fuel Load*	Overall Fuel Load (including bark and canopy)*
Shoalhaven Foothills Turpentine Forest	Wet Sclerophyll Forests	Southern Lowland Wet Sclerophyll Forests	20 t/ha	32.8 t/ha
Southern Sandplain Heath	Heathlands	Wallum Sand Heaths	36.9 t/ha	36.9 t/ha

* Fuel loads from NSW Rural Fire Service publication Comprehensive Vegetation Fuel Loads (2019)

While it is acknowledged that there are large areas within these hazards mapped as Tall Heath as a conservative measures and in acknowledging the presence of higher fuel loads than that attributed to Heath communities a Forest classification was applied.

Photograph 01: View into the vegetation within the foreshore reserve

Slope and Topography

The slope of the land under the classified vegetation has a direct influence on the forward rate of spread, fire intensity and radiant heat exposure. The effective slope is considered to be the slope under the classified vegetation which will most significantly influence bushfire behaviour toward the development site.

The slope that would **most significantly** influence bushfire impact was determined using 1 metre LiDar contour mapping of the subject area.

The subject site slopes gently (0-5 degrees) from north to south and is located on the headland of Dee Beach and Flat Rock Beach. The vegetated foreshore reserve provides a substantial (15-20 degree effective), albeit short (approx.. 50m) down slope to Dee Beach and Flat Rock Beach.

The gradients with the broader catchments to the southwest, west and northwest were found to be generally modest (0-10 degrees).

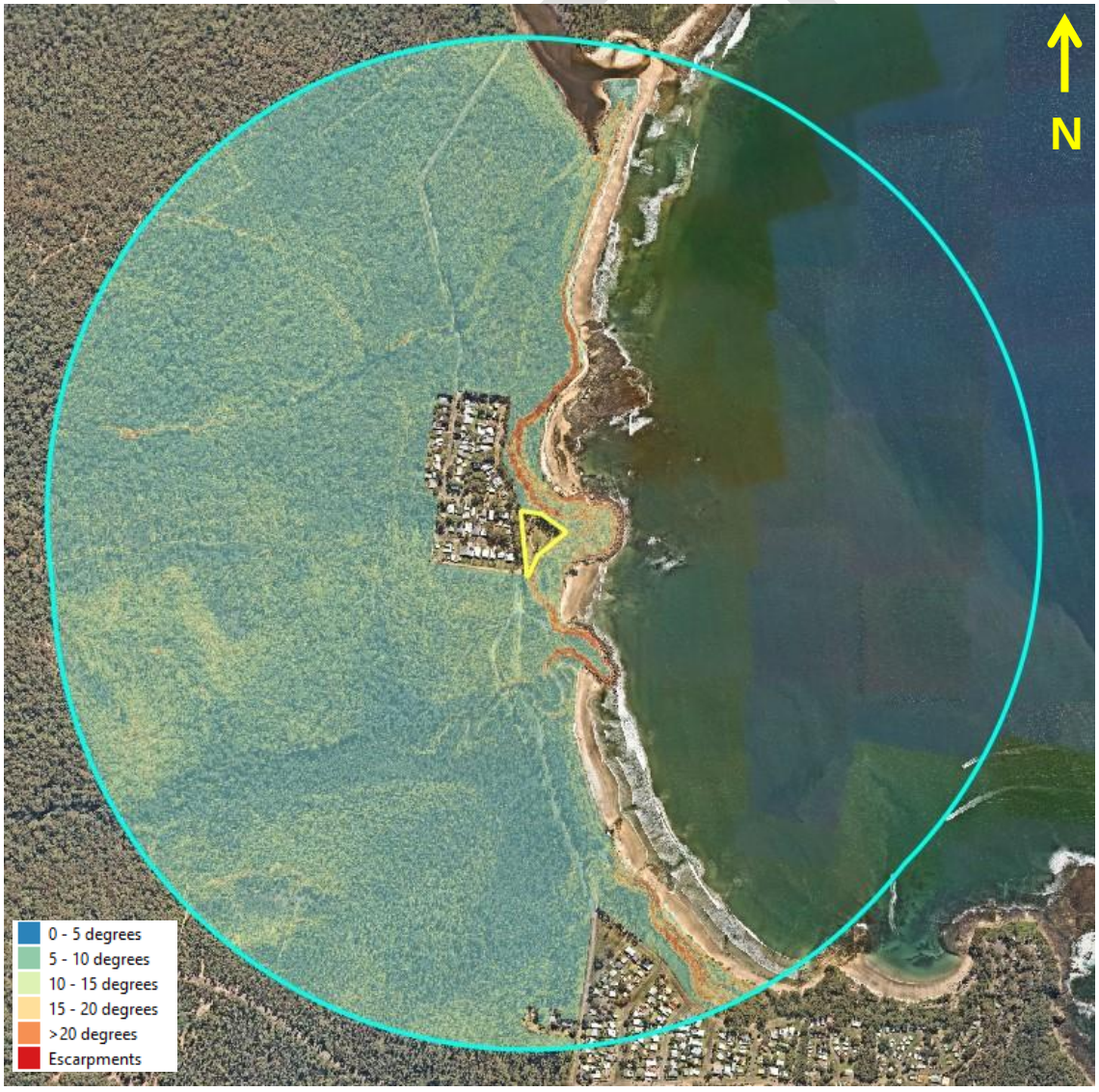

Figure 06: Slope within subject site (yellow outline) and investigation area (blue outline)

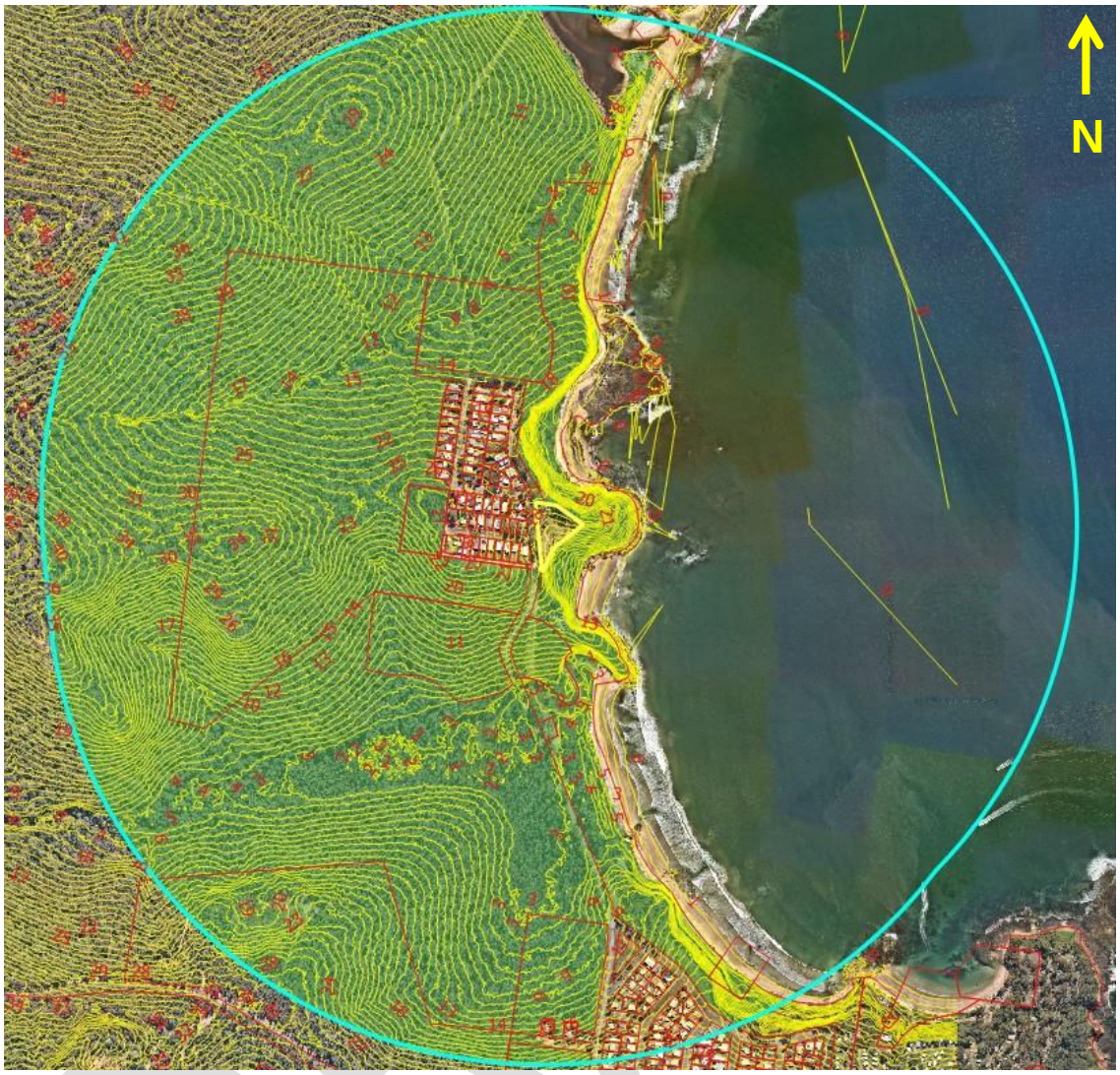

Figure 07: Extract from ELVIS – Geoscience Australia (1 metre contours)

Fire Weather

All development which attracts an Asset Protection Zone under PBP requires the identification of the relevant Fire Danger Index (FDI). The FDI required to be used for development assessment purposes is based on the local government boundaries, being Shoalhaven City Council in this instance.

In accordance with the NSW Rural Fire Service publication 'NSW Local Government Areas FDI' (2017) Shoalhaven City Council is located within the Illawarra / Shoalhaven Fire Weather District which attracts a Fire Danger Index (FDI) of 100 for bushfire planning purposes.

Prevailing weather conditions associated with the bush fire season in the Shoalhaven Bush Fire Management Committee area are north-westerly winds accompanied by high daytime temperatures and low relative humidity (Shoalhaven BFMC. 2018).

Previous Bushfire History

There are areas within NSW that have significant fire history and are recognised as known fire paths. In a planning context it is important to identify these locations and ensure incompatible development is not proposed.

In this instance the subject site was impacted by a significant bushfire event during the 2019-20 fire season (Currowan Fire).

The broader township has also been impacted during the 1968-69 fire season (unnamed), 1993-94 fire season (Bendalong Fire), 2001-02 fire season (Hylands Fire) and 2012-13 fire season (Boundary Road Fire).

Severe fire behaviour in this part of NSW is typically heavily influenced by hot dry northwest / westerly winds bought from inland Australia. These winds are the primary influence for the direction of a fire, generally pushing fires in a south-easterly / easterly direction. Southerly changes which are typically associated with strong winds that push fires in a northerly direction are an exception to this.

The location of the subject site, on the eastern side of the North Bendalong township, is such that it benefits from existing Asset Protection Zones, managed land, roads and established residential properties to the west and northwest.

The site is therefore considered to be within a known fire path.

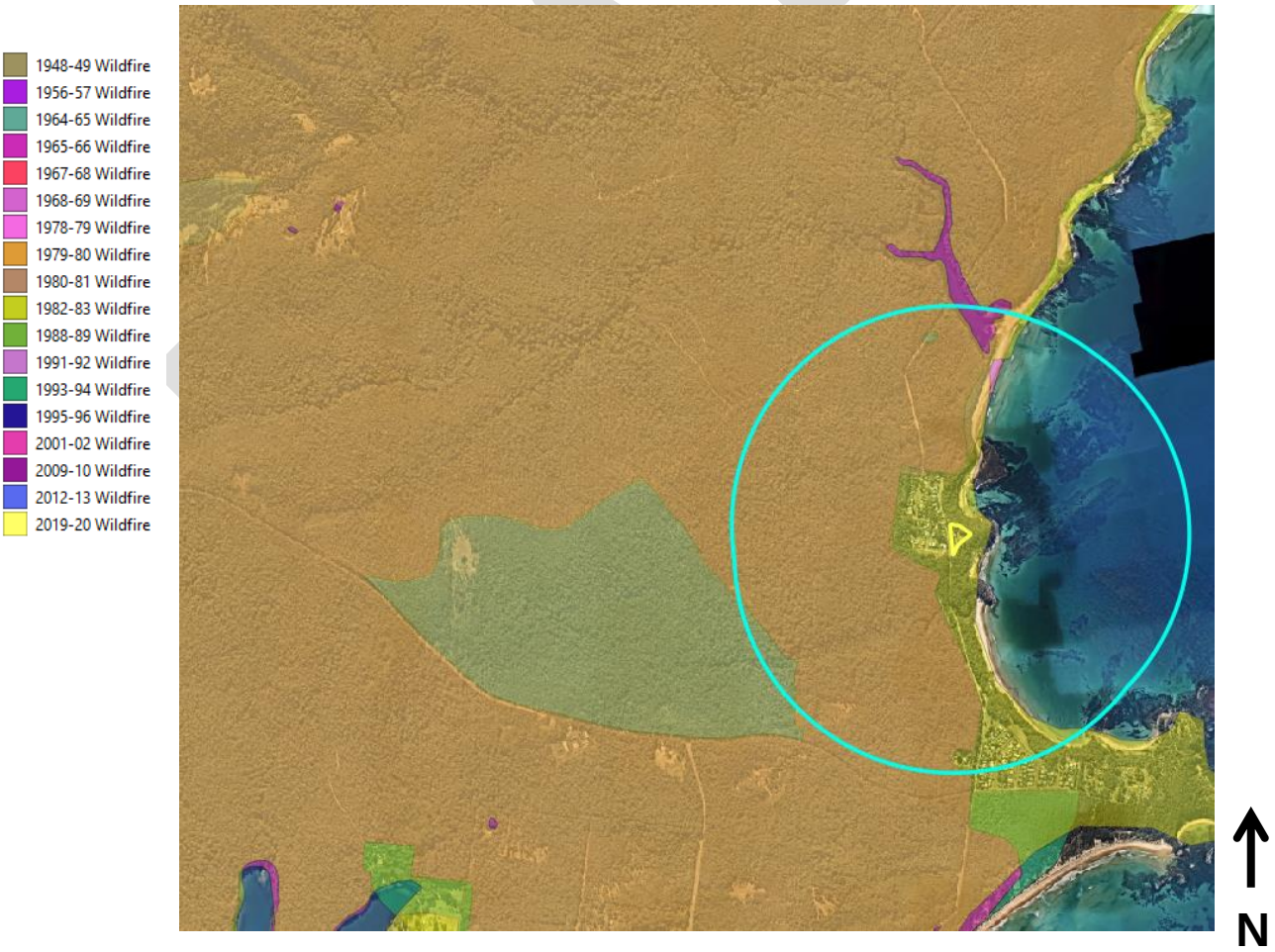

Figure 08: Aerial view of the subject area
Subject site (yellow outline), 1km buffer (blue outline)

Potential Fire Behaviour

In this instance it has been identified that the largest fire catchments to the subject site are the foreshore reserve of Dee Beach and Flat Rock Beach to the north and south and within large vegetated allotments and Conjola NP to the west and southwest.

In applying the parameters described in this section and the accepted assessment methodology described in PBP bushfire design modelling was undertaken to determine the intensity of three potential fires. These being:

1. A bushfire burning from the North of the site, being a vegetated corridor associated with foreshore of Dee Beach and Flat Rock Beach;

2. A bushfire burning from the West of the site, beyond the North Bendalong township within the vegetated allotments and Conjola NP. This catchment is more commonly associated with severe fire behaviour; and

3. A bushfire burning from the Southwest of the site, comprising of bushland within vegetated allotments and Conjola NP. While the coastal influences of a fire burning in this direction are expected to reduce temperatures and humidity, stronger winds can also be experienced causing increased fire activity. As a margin of safety an FDI 100 was adopted.

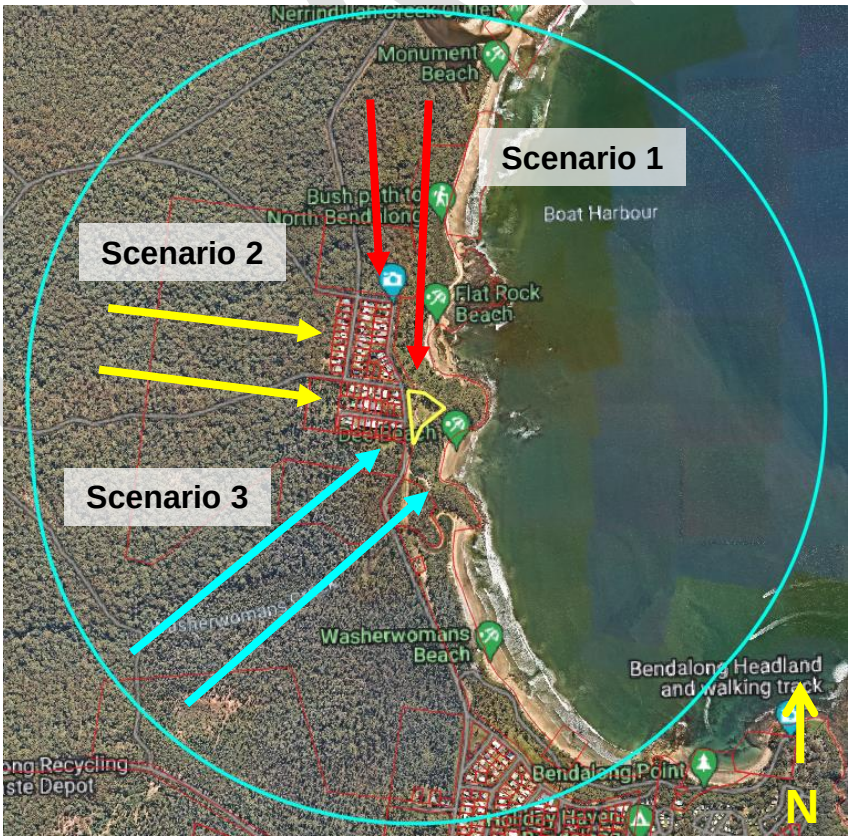

Figure 09: Aerial view of the subject area showing assessed fire runs
Subject site (yellow outline) and 1 kilometer buffer (blue outline)

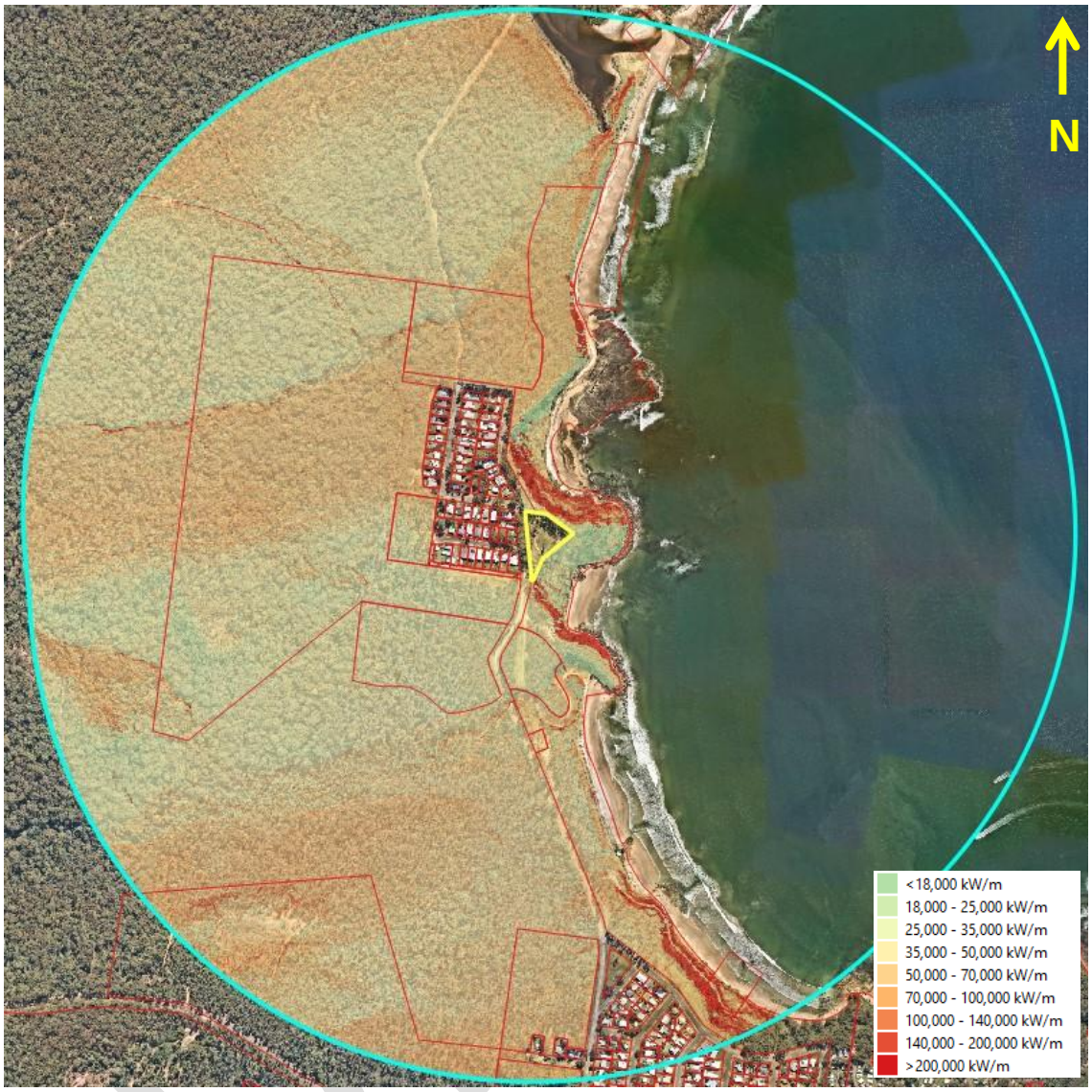

Figure 10: Fire intensity mapping of Scenario 1 (North)
Subject site (yellow outline) and 1 kilometer buffer (blue outline)

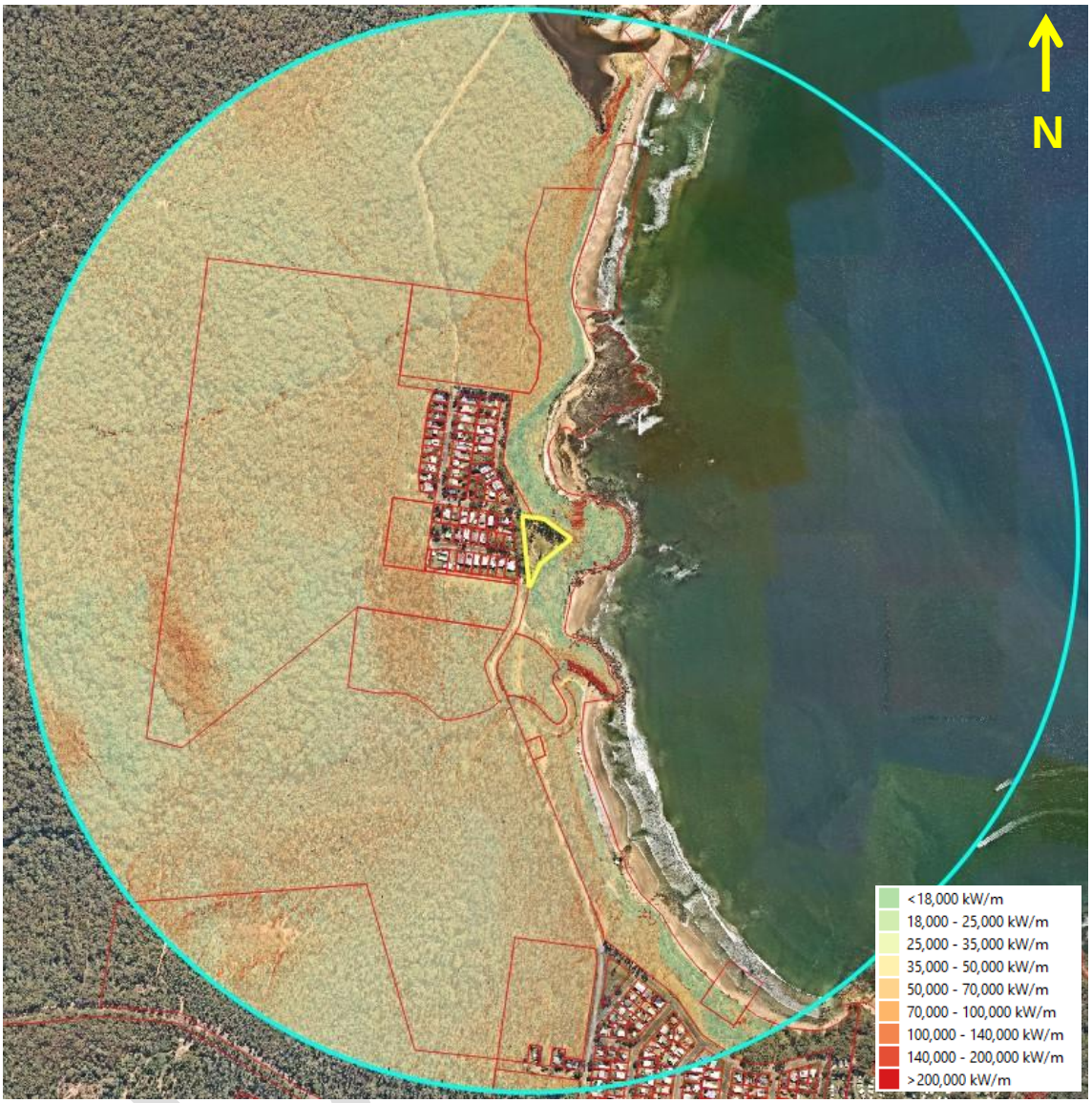

Figure 11: Fire intensity mapping of Scenario 2 (West)
Subject site (yellow outline) and 1 kilometer buffer (blue outline)

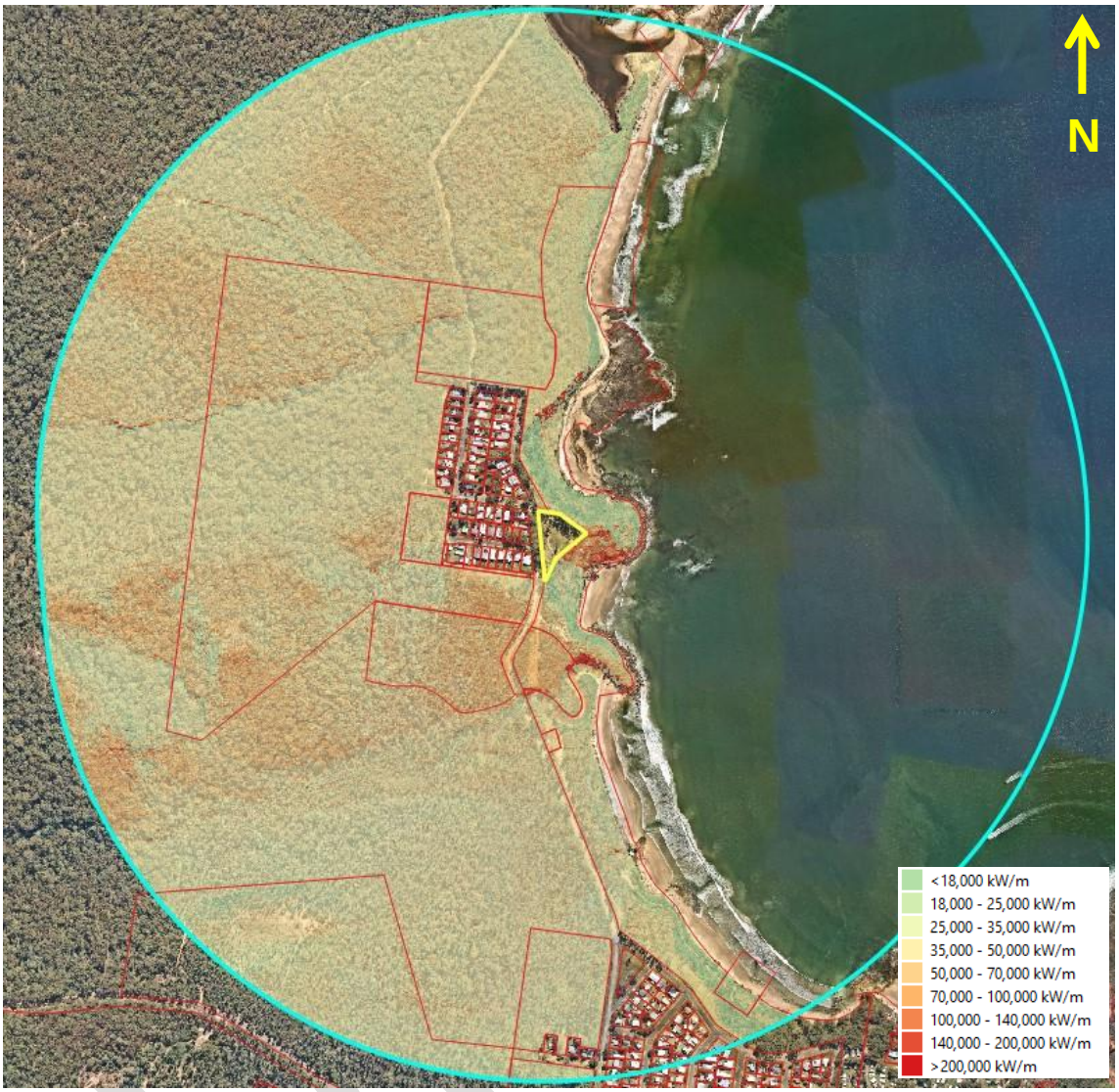

Figure 12: Fire intensity mapping of Scenario 3 (Southwest)
Subject site (yellow outline) and 1 kilometer buffer (blue outline)

Access & Suppression

Access for attending fire services to undertake early suppression is a key factor in whether a fire has the opportunity to develop into a quasi-steady state at which point the opportunity to control / extinguish the fire becomes far more challenging.

Where good access is available it provides opportunity to control / extinguish a fire in its growth phase before developing further and consequently becoming more difficult to conduct direct attacks.

In this particular instance comprehensive access will be available to the bushfire hazards that are within or immediately adjacent the subject site via the internal road network and classified fire trails.

Access to the hazard in the broader landscape is available via existing public roads and classified fire trails. Refer to Figure 13 for the extent of existing roads and classified fire trails in the subject area (source Transport NSW).

Classified fire trails must meet certain standards to be registered as such. This ensures that the NSW RFS and other fire agencies have confidence to deploy resources to a location, with confidence that they will be able to efficiently access and respond to an incident.

In consideration of the comprehensive access and its exposure to the public the identification and subsequent extinguishment of a bushfire within the site is considered reasonable.

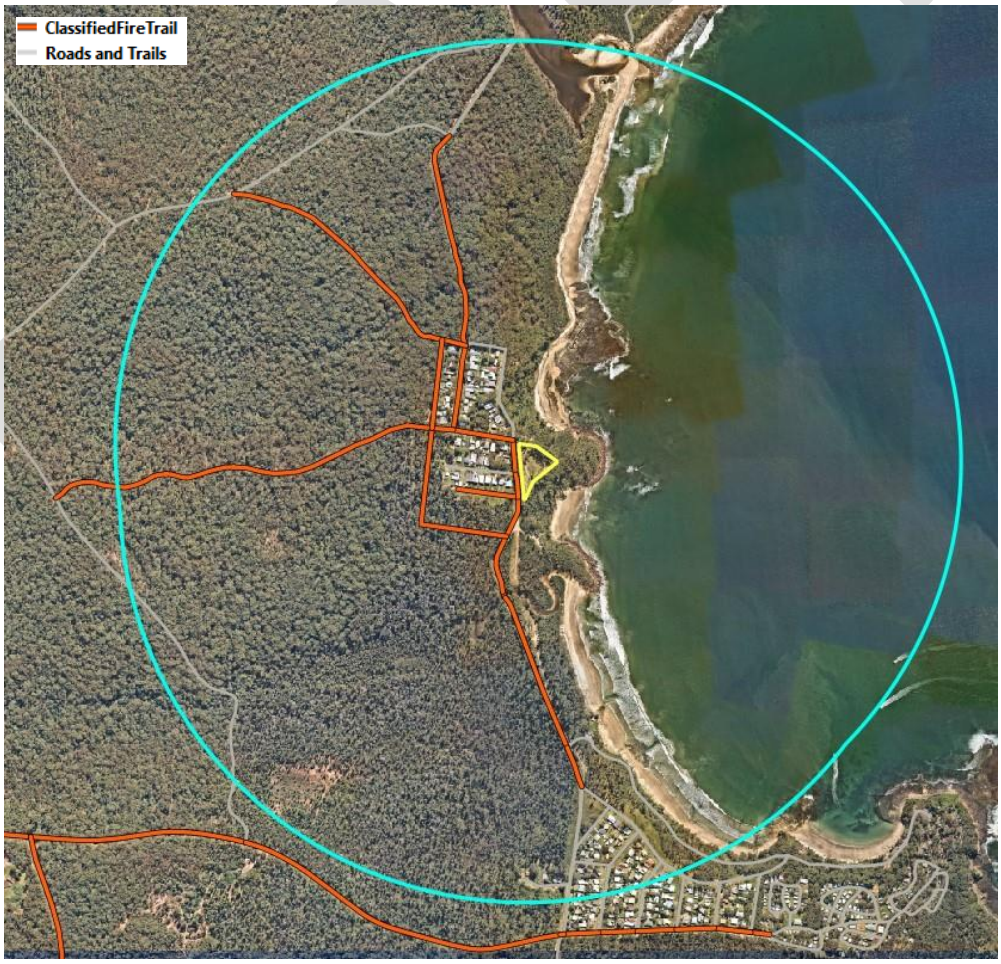

Figure 13: Aerial view of the subject area overlayed with roads, trails and classified fire trails (source Transport NSW)

Land Use Assessment

The Land Use Assessment identifies the most appropriate locations in the Site Plan area for the proposed land uses. In a bushfire planning context the various land uses present different risk profiles and as such are assessed differently under Planning for Bush Fire Protection.

In this instance the subject site has the benefit of an existing development consent (DA14/2397) for the construction and operation of ecotourism accommodation facility comprising of:

Phase 1:

- *Seven (7) 2 storey single bedroom cabins & one accessible accommodation unit for a total of 16 persons accommodated on site.*
- *A single storey multipurpose building (MPB) containing communal dining, terrace, kitchen & sanitary facilities together with pop-up kiosk in high season with hours of operation proposed:*
  - *In association with accommodation 7am to 11pm, seven days;*
  - *Pop-up kiosk 7am to 5pm during peak accommodation season.*
- *A manager's office/fire refuge (24 persons), operating 7am to 5pm, seven days.*
- *Off street parking for 11 cars, together with associated drop off zone.*
- *Ancillary infrastructure including pedestrian access paths, landscaping, sewer pump station, landscaped swales, detention basins and stormwater tanks.*

Phase 2

- *Construction and Operation of two (2) additional 2 storey single bedroom cabins for a total of 20 persons accommodated on site.*
- *Off street parking for 2 additional vehicles.*

Tourist accommodation is considered a Special Fire Protection Purpose (SFPP) development under section 100b(d) of the *Rural Fires Act* 1997. SFPP development is one which is occupied by people who are considered to be at-risk members of the community. In a bushfire event, these occupants are generally more susceptible to the impacts of bushfire.

SFPP development consequently attracts the highest Bushfire Protection Measures commensurate to the risk profile. Most notably SFPP development, attracts larger minimum required Asset Protection Zones to provide emergency services better opportunity to support and / or evacuate occupants.

Conversely, residential development is considered to have a lower risk profile in a bushfire planning context as occupants are generally more familiar with their surroundings (including evacuation routes and refuge locations), bushfire threats, firefighting resources and in instances historic fire paths.

If the PP and subsequent dwelling application is successful it will require the approval for the ecotourism development to be surrendered, which from a bushfire planning context will reduce the number of occupants from 24 persons and reduce the occupant risk profile from Special Fire Protection Purpose to Residential.

While it is acknowledged that the future dwelling on the subject site will likely attract a Flame Zone rating, which is generally not desirable unless there are existing dwelling entitlements and site restrictions, the benefits of the ecotourism approval being surrendered cannot be understated.

We are also confident that a suitable package of Bushfire Protection Measures can be applied to a future dwelling application which will satisfy the aim and objectives of *Planning for Bush Fire Protection* 2019.

It is our opinion that the proposal will result in a better bushfire safety outcome for the subject site and we therefore in support the Planning Proposal subject to the ecotourism approval being surrendered.

Access and Egress

It is important to assess the capacity of both the existing and proposed road networks both within and external to the investigation area to deal with evacuating residents and responding emergency services.

The township of North Bendalong is accessed via sole access road (North Bendalong Road) and is consequently susceptible to being 'cut-off' or isolated during a bushfire event.

From North Bendalong Road residents / occupants can travel southeast toward the township of Bendalong or south toward the township of Manyana which contains a Neighbourhood Safer Place (Manyana Community Hall).

North Bendalong Road has a sealed surface and currently exceeds the minimum carriageway requirements for non-perimeter roads as described in section 5.3.2 of PBP.

If the PP and subsequent dwelling application is successful it will require the approval for the ecotourism development to be surrendered, which will reduce the number of occupants from 24 persons and subsequent demand on the capacity of the road.

Emergency Services

In some circumstances the scale of a planning proposal warrants a need to include provisions for a new fire station.

The site is located within a NSW Rural Fire Service area, with a station (Bendalong Rural Fire Brigade) located along King Street less than 1300 metres to the south of the subject site.

In consideration of the nature of the proposal and reduction in population the existing fire service coverage is considered acceptable.

Infrastructure

An assessment of the issues associated with infrastructure and utilities must be undertaken. This assessment is to include the ability of the reticulated water system to deal with a major bushfire event in terms of pressures, flows and spacing of hydrants.

There are hydrants available along the existing public roads within the area. The capabilities of the broader hydrant network are the responsibility of the water authority.

The sizing, spacing and pressures of any future hydrant system must comply with AS2419.1-2005. Alternatively a Static Water Supply will be provided for the future dwelling.

It is understood that the proposal will not directly impact any existing electrical or gas infrastructure.

5.03 Planning for Bush Fire Protection

As the strategic issues have been satisfactorily addressed in the SBFS, an assessment of compliance with PBP is required. This section addresses the future developments capacity to comply with the relevant specifications and requirements of PBP.

The application of PBP requires satisfactory demonstration of the aim and objectives and the specific objectives and bushfire protection measures relevant to the type of development. The bushfire protection measures detailed in Chapter 5 of PBP have been considered for the future Residential development.

The following table details the aim and objectives of *Planning for Bush Fire Protection 2019* and the proposals ability to comply.

Aim / Objective	Comment
The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.	With the inclusion of the recommendations made herein it is of our opinion that the aim of PBP has been satisfied.
(i) afford buildings and their occupants protection from exposure to a bush fire;	The physical site characteristics preclude the ability to support the minimum required Asset Protection Zones for residential development. The application of the relevant Bushfire Attack Level under Australian Standard 3959 'Construction of buildings in bushfire-prone areas' and other bushfire protection measures to the future dwelling will afford protection from exposure to a bushfire.
(ii) provide for a defendable space to be located around buildings;	The proposed site plan provides a defendable space for fire services and logical fire-fighting platforms.
(iii) provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;	The application of the available defendable spaces in conjunction with the relevant Bushfire Attack Level for the future dwelling will prevent the likely fire spread to the building.

Aim / Objective	Comment
(iv) ensure that appropriate operational access and egress for emergency service personnel and occupants is available;	Comprehensive access is available to the bushfire hazards for attending fire services via the existing road network and fire trails. The access design provides direct access to North Bendalong Road and sufficient emergency turning. The existing road network provides direct access for attending fire services undertaking hazard reduction or fire suppression activities.
(v) provide for ongoing management and maintenance of bush fire protection measures, (BPMs); and	The specific bushfire protection measures of the future development will be addressed within the submission documents of that development application.
(vi) ensure that utility services are adequate to meet the needs of firefighters.	There are hydrants available along the existing public roads within the area. It is likely that a Static Water Supply will be provided for the future dwelling application. These water supplies are considered to be the logical water supply for fire services undertaking hazard reduction and / or fire suppression activities.

It is therefore of our opinion that the proposal can satisfactorily comply with the aim and objectives of *Planning for Bush Fire Protection 2019*.

Asset Protection Zones

Asset Protection Zones (APZs) for residential development are determined from Table A1.12.2 of PBP or bushfire design modelling achieving a radiant heat impact of no more than 29 kW/m^2 at a building footprint.

The minimum required Asset Protection Zones for the future residential development were determined from Table A1.12.2 of PBP to be 56 metres north, south and east and 24 metres to the southwest.

The existing allotment configuration precludes the ability to provide APZs achieving compliance with Table A1.12.2 of PBP and therefore compliance with the Performance Criteria will be necessary for the future dwelling application. The corresponding Performance Criteria being;

- *APZs are provided commensurate with the construction of the building; and*
- *A defendable space is provided.*

The future application has capacity to provide APZs commensurate with the construction of the building (i.e. Flame Zone).

Section 3.2.4 'Defendable space' of PBP provides the following statement:

> *Defendable space is an area within the Inner Protection Area (IPA) of an APZ adjoining a building. This space provides a safe working environment in which efforts can be undertaken to defend the structure, before and after the passage of a bush fire.*
>
> *The physical size of the development will determine whether the defendable space is provided as pedestrian access or will require sufficient space for vehicular movements. Vegetation within the defendable space should be kept to an absolute minimum and the area should be free from combustible items and obstructions.*

The future dwelling application also has capacity to provide an adequate defendable space to defend the structure before and after the passage of a bushfire.

It should also be noted that the proposed dwelling location is located further from the identified bushfire hazards than the existing approved tourist cabins.

The available APZs consist of the land within the subject site and will provide a defendable space around the future dwelling.

Fire Fighting Water Supply

There are hydrants available along North Bendalong Road and existing public roads within the township of North Bendalong.

The sizing, spacing and pressures of any future internal hydrant system must comply with AS2419.1-2021. Alternatively, to achieve compliance with PBP the future dwelling will require the installation of a Static Water Supply.

The subject site has the capacity to comply with the Water Supply requirements as detailed in sections 5.3.3 and 7.4 of PBP.

Access

Planning for Bush Fire Protection addresses design considerations for internal roads and access drives for properties determined to be bushfire prone. In a bush fire prone area, the intent of the access provisions is to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

The subject site has street frontage to North Bendalong Road to the west.

The proposed Site Plan prepared by James Stockwell Architects provides one connection point to North Bendalong Road and includes Emergency Vehicle Turning adjacent to the future garage.

The existing public road network provides direct emergency access to the bushfire hazards.

We are satisfied that the proposed access drive has the capacity to comply with the requirements for Access under section 7.4 of PBP.

6.0 Conclusion

Building Code and Bushfire Hazard Solution P/L has been commissioned to prepare an independent Strategic Bush Fire Study for a Planning Proposal which will facilitate the construction of a future sole occupancy dwelling at 88 North Bendalong Road, Bendalong.

The subject site is currently zoned 'C3: Environmental Management' and is located within Shoalhaven City Council's local government area.

The Planning Proposal (PP) seeks to establish a dwelling entitlement for the land, to facilitate the future construction of a sole occupancy dwelling and detached garage / studio.

In this instance the subject site is depicted on Shoalhaven City Council's Bushfire Prone Land Map as containing Category 1 Vegetation. The subject site is therefore considered 'bushfire prone'.

If the PP and subsequent dwelling application is successful it will require the approval for the ecotourism development to be surrendered, which from a bushfire planning context will reduce the number of occupants from 24 persons and reduce the occupant risk profile from Special Fire Protection Purpose to Residential.

While it is acknowledged that the future dwelling on the subject site will likely attract a Flame Zone rating, which is generally not desirable unless there are existing dwelling entitlements and site restrictions, the benefits of the ecotourism approval being surrendered cannot be understated.

We are also confident that a suitable package of Bushfire Protection Measures can be applied to a future dwelling application which will satisfy the aim and objectives of *Planning for Bush Fire Protection* 2019.

It is our opinion that the proposal will result in a better bushfire safety outcome for the subject site and we are therefore in support the Planning Proposal, subject to the ecotourism approval being surrendered.

Should you have any enquiries regarding this project please contact me at our office.

Prepared by
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7.0 Annexure 01

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Acknowledgements to:

Geoscience Australia
Nearmap
Street-directory.com.au

Attachments

NIL

LODGE
ENVIRONMENTAL

Date: 27 June 2023
Project Code: LE1686

FLORA & FAUNA ASSESSMENT

88 NORTH BENDALONG ROAD
BENDALONG

PREPARED FOR
LAUREN TURNER

LODGE ENVIRONMENTAL • www.lodgeenviro.com.au • ABN 85 631 988 148

Project Name:

88 North Bendalong Road, Bendalong – Flora and Fauna Assessment

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1.0 INTRODUCTION

Lodge Environmental were commissioned by Lauren Turner of MMJ Real Estate Wollongong to prepare this Flora and Fauna Assessment (FFA) to accompany a Planning Proposal in anticipation of the proposed dwelling and associated driveway at 88 North Bendalong Road, Bendalong (herein referred to as the ***Study Area***) (**Figure 1**). This report describes the native vegetation, any threatened species, populations and communities and associated habitat features which were recorded within the Study Area in the context of an impact assessment. This report is based on information obtained through data searches and field survey. The legislative context, methods used, and recommendations are included within this report.

1.1 SITE DESCRIPTION

The Study Area is located at 88 North Bendalong Road, Bendalong (32/-/DP1191742), within the Shoalhaven City Council (SCC) Local Government Area (LGA), with the SCC being the consent authority. The Study Area is approximately 0.6 ha and zoned as 'C3 – Environmental Management' in the Shoalhaven Local Environmental Plan (LEP) 2014. The Study Area is predominately cleared land with scattered native vegetation throughout. There are currently no pre-existing structures within the Study Area. Land to the west of the Study Area consists of residential dwellings with the remaining surrounding land consisting of consolidated bushland. Additionally, Flat Rock Beach and Dee Beach are situated within 100m of the Study Area.

1.2 OBJECTIVES

This report presents an assessment of possible direct and indirect impacts associated with the proposal and is based on a field investigation, a literature review of previous studies undertaken in the region, the consultation of relevant databases and a consideration of the objectives of Section 4 of the EP&A Act, the State BC Act, the Commonwealth EPBC Act and any relevant State Environmental Planning Policies (SEPP).

Where considered necessary, the environmental impacts of the development have been assessed via the Test of Significance pursuant to Section 7.3 BC Act 2016, the Matters of National Environmental Significance (MNES) under the EPBC Act, and the relevant clauses within the Shoalhaven Local Environment Plan 2014 (LEP).

Figure 1: Aerial and Proposal Elements

2.0 LEGISLATIVE CONTEXT

2.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The NSW EP&A Act is the principal planning legislation for the state, providing a framework for the overall environmental planning, and development assessment process. Various legislative instruments, such as the BC Act, NSW *Water Management Act 2000* (WM Act) and NSW *Rural Fires Act 2007* (RF Act) are integrated with the EP&A Act and have been reviewed below where relevant.

2.2 BIODIVERSITY CONSERVATION ACT 2016

The NSW BC Act aims to slow the decline of threatened species, populations and communities listed under the Act. The BC Act is integrated with the EP&A Act and requires consideration of whether a development (Part 4 of the EP&A Act) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

The schedules of the BC Act lists species, populations and communities as endangered or vulnerable. All developments, land use changes or activities need to be assessed to determine if they will have an unacceptable impact on species, populations or communities listed on these schedules.

The potential impact of the development on any threatened species, populations or communities is assessed through application of an Assessment of Significance (AoS) under Section 7.3 of the BC Act at the development application stage. If the impacts on the area are found to be 'significant', a Biodiversity Development Assessment Report (BDAR) would be required as would concurrence from the Chief Executive of the NSW Environment, Energy and Sciences Group (EES) including application of the Biodiversity Assessment Methodology (BAM) and entering into the Biodiversity Offset Scheme (BOS). A BDAR would also be deemed necessary if the proposal were to involve clearance of vegetation mapped on the State Biodiversity Values Map (BVM), or involve native vegetation clearance above the thresholds within the BC Act (**Table 1**).

Table 1: Offset scheme thresholds - area criteria (site relevant threshold in bold)

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme applies
Less than 1 ha	0.25 ha or more
1 ha, and less than 40 ha	0.5 ha or more
40 ha, and less than 1,000 ha	**1 ha or more**
1,000 ha or greater	2 ha or more

2.3 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The Commonwealth EPBC Act aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. Under this Act an action will require approval from the Minister for the Environment if the action has, will have, or is likely to have, a significant impact on a MNES. MNES include listed threatened species and ecological communities, migratory species and wetlands of international importance protected under international agreements. Where applicable, the assessment criteria relevant to this Act must be drawn upon to determine whether there would be a significant impact on these species and hence whether referral to the Federal Environmental Minister is required.

2.4 LOCAL PLANNING INSTRUMENTS

2.4.1 Shoalhaven Local Environment Plan 2014

The Shoalhaven Local Environment Plan 2014 (LEP) is the principal planning instrument for the SCC LGA. The LEP sets out the planning framework and establishes the requirements for the use and development of land in the LGA. The LEP provides broad direction with regard to what types of development are permitted within specific land use zones.

3.0 METHODS

3.1 DATA AND LITERATURE REVIEW

Data records and relevant literature pertaining to the ecology of the Study Area and surrounding areas were reviewed. The material reviewed included:

- NSW BioNet, Atlas of NSW Wildlife database search (10 km) (Accessed April 2023)
- OEH threatened species profile database (OEH 2023)
- DCCEEW Protected Matters Search Tool (10 km) (Accessed April 2023)
- Review of the State Biodiversity Values Map (Accessed April 2023)
- State Vegetation Type Map (DPE 2022)
- Property Report (Accessed April 2023)
- Relevant legislative documents
- Aerial photography (Accessed April 2023)

A review of the databases allowed for the production of a list of threatened species and communities that may occur within the Study Area (**Appendix A**). Likelihood of occurrences for threatened species, endangered populations and communities in the Study Area were then made based on location of database records, the likely presence or absence of suitable habitat on the site, and knowledge of the species' ecology. The likelihood of occurrence was stratified using a rating of "high", "moderate" or "low" likelihood, with those species considered to have a considerable likelihood of occurrence (following site validation) then identified as either potentially "affected" by the proposal and therefore requiring a significance assessment or not.

3.2 FIELD SURVEY

To address the FFA the following survey methods were undertaken on 24 April 2023 and 1, 2 June 2023 by ecologists Olivia Gobran and Lissabelle Giuliano.

- Identification of plant species and vegetation communities present within the site.
- Searching for signs of threatened species, observing and recording significant flora and fauna – threatened and migratory species, other incidental fauna observations.
- Observing and recording current disturbance and threats (e.g. weeds, trampling, litter).
- Identifying potential habitat for threatened fauna species/populations (e.g. hollow-bearing trees (HBTs), creeks, boulders etc).
- Recording presence of environmental weeds.
- Taking reference photographs of the entire site.
- Stag watching HBTs within the site to survey for nocturnal threatened gliders.

3.3 SURVEY WEATHER

The weather during each survey in summarised in **Table 2** below.

Table 2: Weather condition during surveys

Survey	Date	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Wind
Vegetation Assessment, General Habitat Assessment and Habitat Bearing Tree Mapping	24/04/23	15.1	20.8	0	11km/hr SW
Targeted Nocturnal Glider Surveys	1/06/23	15.3	23.1	0.8	20km/hr SSE
Targeted Nocturnal Glider Surveys	2/06/23	14.6	19.1	0.2	4km/hr SW

Observations were drawn from Ulladulla AWS {station ID 069138}, located approximately 15 km from the Study Area.

3.4 SURVEY LIMITATIONS

Survey was conducted during autumn and winter and may be outside of the optimal survey period for some flora and fauna species. It is therefore possible that some species may not have been detected due to their seasonal geographic variation. Cryptic species may not have been obvious. However, habitat assessments were conducted to further predict the likelihood of species occurrence at the site. A conservative approach was applied in the assumption of the presence of species that could potentially occur within the site area. In this regard, the survey is considered adequate for the purposes of this report.

4.0 DESKTOP REVIEW

4.1 BIODIVERSITY VALUES MAP

A review of the State Biodiversity Values Map was conducted on 21 April 2023. There are no areas of mapped Biodiversity Values within the Study Area, with the nearest mapping occurring approximately 200 m from the Study Area (**Figure 2**). Therefore, the BVM entrance trigger into the Biodiversity Offset Scheme is not applicable.

4.2 EXISTING VEGETATION MAPPING

A review of vegetation mapping that covers the Study Area (DPE 2022) identified two vegetation communities within the Study Area (**Figure 3**) – being:

- PCT 3267 – Shoalhaven Foothills Turpentine Forest
- Non-native vegetation

The following vegetation community is mapped in close proximity to the Study Area:

- PCT 3805 – Southern Sandplain Heath

There are currently two Threatened Ecological Communities (TEC) associated with PCT 3805

- Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion, Critically Endangered (BC Act)
- Eastern Suburbs Banksia Scrub of the Sydney Region, Critically Endangered (EPBC Act)

These TECs are however restricted to the Sydney Region and therefore are not applicable to the Study Area.

Figure 2: Biodiversity Values Map

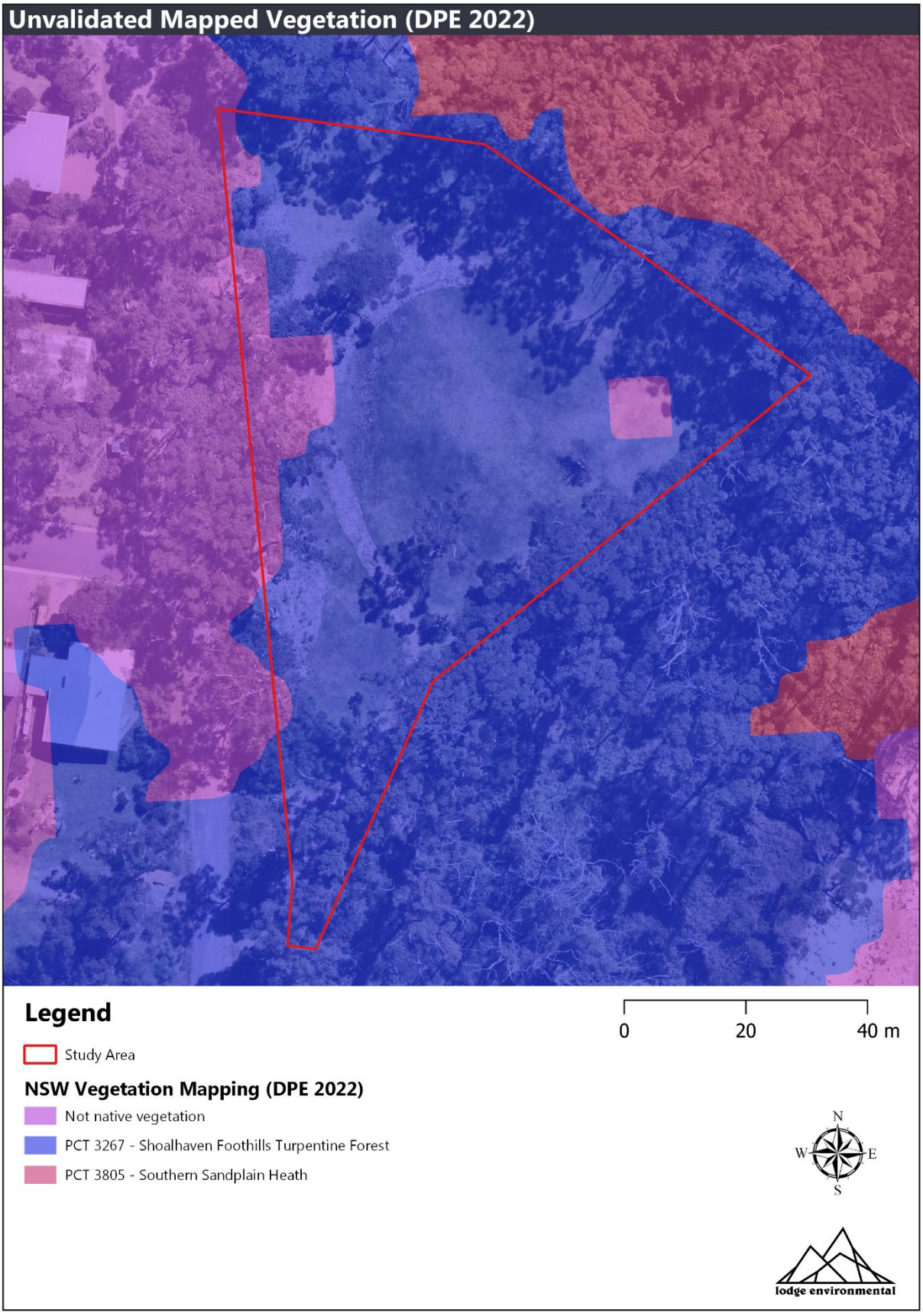

Figure 3: Unvalidated Plant Community Types within the Study Area (DPE 2022)

4.3 THREATENED FLORA SPECIES AND ECOLOGICAL COMMUNITIES

A review of the OEH and DCCEEW databases identified 20 threatened plants and ecological communities listed under the BC Act and/or the EPBC Act that have been previously recorded, or are considered to have habitat, within 10 km of the site (**Figure 4**). This initial compilation of potentially occurring species, general understanding of the site condition and anecdotal evidence provided an indication of which species required consideration within the site. An assessment of the likelihood of occurrence of threatened flora species within the site is available in **Appendix A** and was used to guide the field survey methodology.

The following threatened ecological communities were identified as having a medium to high potential of occurring within the Study Area Prior to field survey:

- Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions

The following threatened flora species were identified as having a medium to high potential of occurring within the Study Area prior to field survey (**Table 3**).

Table 3: Threatened flora species with a potential to use the sites habitat features

Scientific name	Common name(s)	BC Act	EPBC Act
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V
Rhodamnia rubescens	Scrub Turpentine	CE	CE

4.4 THREATENED FAUNA SPECIES

A review of the OEH and DCCEEW databases identified 104 threatened fauna listed under the BC Act and/or the EPBC Act that have been previously recorded, or are considered to have habitat, within 10 km of the site (**Figure 4**). An assessment of the likelihood of occurrence of threatened fauna species within the site is available in **Appendix A** and was used to guide the field survey methodology.

The following threatened fauna species were identified as having a medium to high potential of occurring within the Subject Site prior to field survey (**Table 4**).

Table 4: Threatened fauna species with a potential to use the sites habitat features

Scientific name	Common name	BC Act	EPBC Act
Birds			
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E
Glossopsitta pusilla	Little Lorikeet	V	-
Petroica rodinogaster	Pink Robin	V	-
Mammals			
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-
Petauroides volans	Greater Glider	E	E
Petaurus australis	Yellow-bellied Glider	V	V

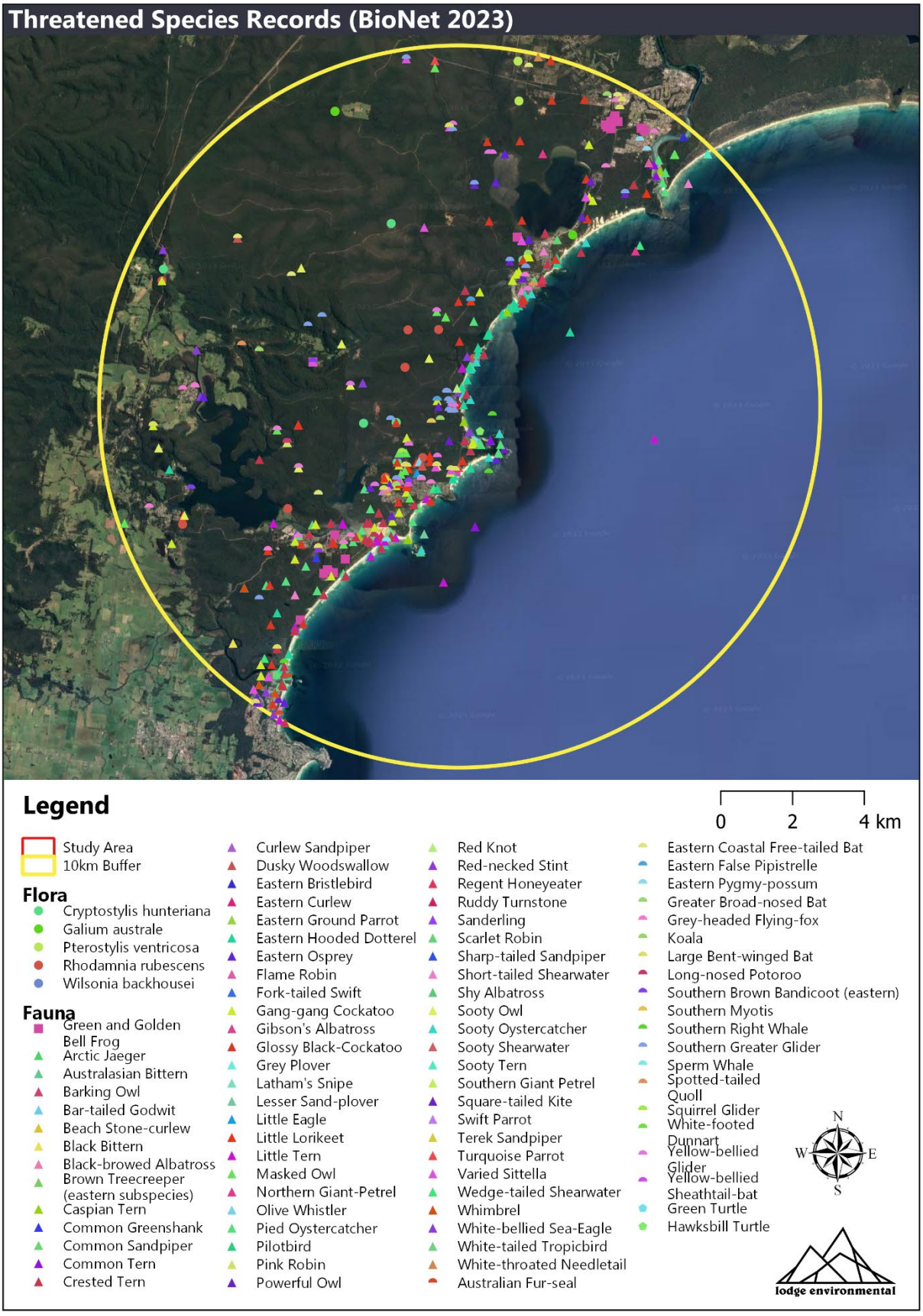

Figure 4: Threatened species records within 10km of the Study Area (BioNet 2023)

4.5 RELEVANT LOCAL CLAUSES

4.5.1 Terrestrial Biodiversity

The Study Area contains a small amount of land mapped as Terrestrial Biodiversity 'Excluded Land' .

This layer is not relevant to the current Planning Proposal or any future Development Application. Therefore, it is not considered any further.

5.0 FIELD SURVEY RESULTS

5.1 EXISTING ENVIRONMENT

The Study Area predominantly consists of cleared land/exotic lawn, with native vegetation scattered throughout. Native vegetation was present in two conditions, scattered/disturbed and good condition along the northern and eastern boundaries. Native vegetation within the Study Area was consistent with surrounding bushland. Areas along the western boundary contained newly planted native species.

Where the canopy was present it was dominated by *Eucalyptus botryoides* (Bangalay) and *Eucalyptus pilularis* (Blackbutt).

In the areas where native vegetation was disturbed/scattered, the mid stratum consisted mainly of *Melaleuca linariifolia* (Flax-leaved Paperbark), *Westringia fruticosa* (Coastal Rosemary) and *Indigofera australis* (Australian Indigo). In areas where native vegetation was in good condition the mid stratum consisted of a high diversity of native species and included species such as *Acmena smithii* (Lilly Pilly), *Pittosporum undulatum* (Native Daphne), *Clerodendrum tomentosum* (Hairy Clerodenedrum) and *Synoum glandulosum* (Scentless Rosewood).

Within cleared/exotic areas the groundcover consisted mainly of mown grass with weed species also recorded. Native ground stratum within scattered vegetation consisted of species such as *Echinopogon ovatus* (Forest hedgehog Grass), *Oplismenus imbecillis* (Creeping Beard Grass) and *Dichondra repens* (Kidney Weed). Ground stratum within good condition native vegetation was dominated by *Pteridium esculentum* (Bracken) and *Oplismenus imbecillis* (Creeping Beard Grass). Climber species such as *Geitonoplesium cymosum* (Scrambling Lily), *Tylophora barbata* (Bearded Tylophora), *Stephania japonica* (Snake Vine) were also dominant in this vegetation.

Four habitat bearing trees were identified within the Study Area. All HBTs will be retained as part of the proposal.

No large boulders, caves, streams, or other notable habitat features were recorded within the Study Area.

Native vegetation and habitat features within the Study Area are considered to provide moderate fauna habitat due to disturbed nature.

Table 5: Habitat Bearing Trees within the Study Area

Habitat Bearing Tree number (Figure 5)	Description of the features
1	1 Small Hollow, Fissured Trunk
2	1 Medium Hollow
3	2 Medium Hollows
4	2 Large Hollows, 2 Medium Hollows

5.2 PLANT COMMUNITY TYPES

The following vegetation zones were validated within the Subject Site:

- No PCT – Cleared/ exotics
- PCT 3638 – South Coast Sands Bangalay Forest

The vegetation zones and mapped Habitat Bearing Trees (HBTs) are displayed in **Figure 5**.

PCT 3638 is currently associated with following Threatened Ecological Communities (TECs):

- Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions
- Kurnell Dune Forest in the Sutherland Shire and City of Rockdale

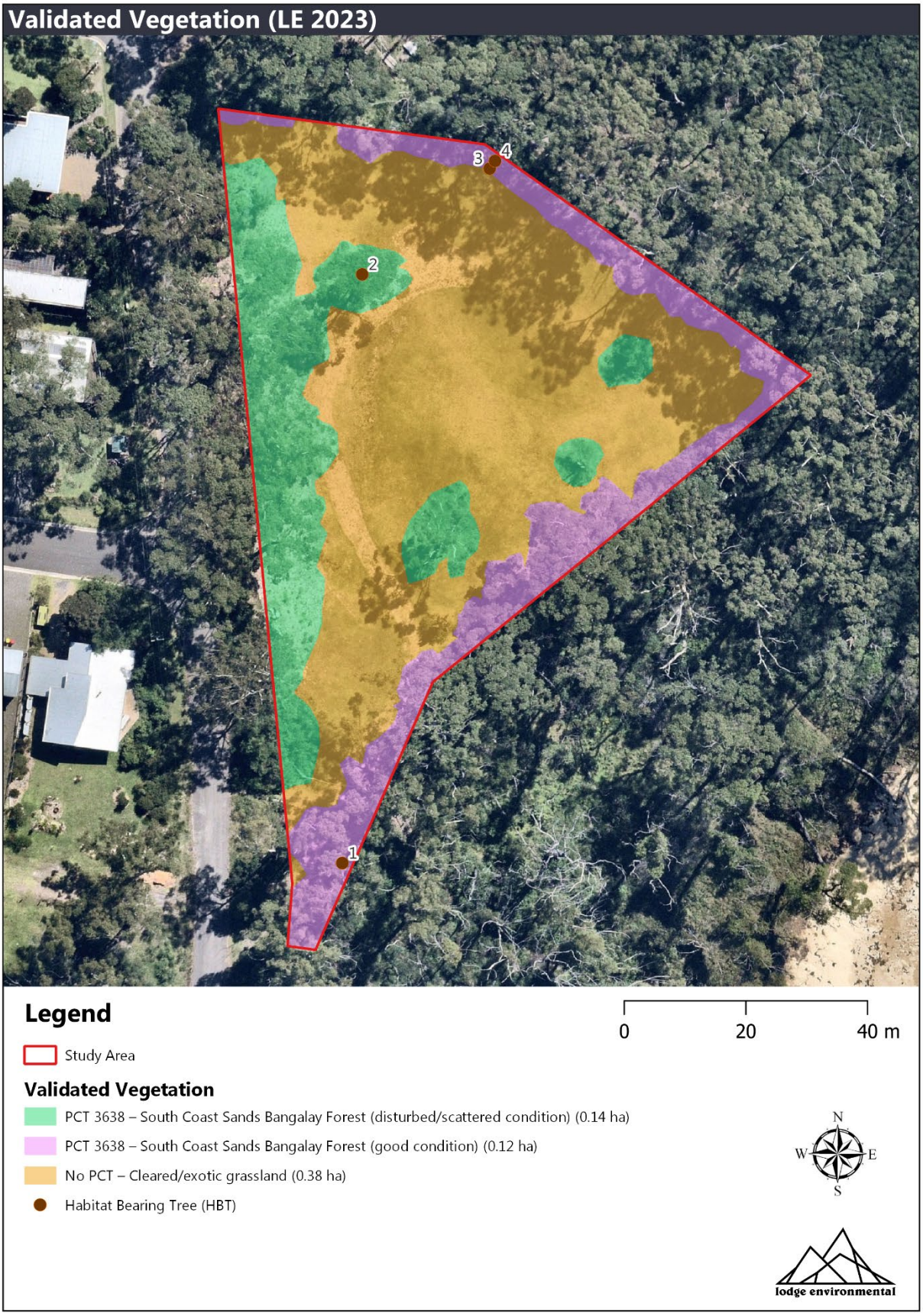

Figure 5: Validated Vegetation (LE 2023)

5.2.1 PCT 3638 – South Coast Sands Bangalay Forest

The native vegetation within the Study Area has been assigned to PCT 3638 based on the following.

5.2.1.1 Species assemblage

The field survey data was input into the Flora Survey module of the BioNet Vegetation Classification. Several PCT outputs were provided and assessed against the field data. Upon review of the species assemblage within and immediately surrounding the Study Area, PCT 3638 appeared to align with the IBRA Subregion and 32 of the 50 native species recorded. Furthermore, the vegetation formation of PCT 3638 better aligned with the Study Area opposed to other PCTs that had high species match.

The topographical and geological factors were then assessed to further justify the PCT selection. Following on from this the landscape context (topography and geological characteristics) and dominant flora species of this PCT were then assessed to further justify the PCT selection. All PCT information used in this justification has been outlined in **Table 6**.

5.2.1.2 Topography and Geological Factors

- *A mid-high to tall, rarely very tall, dry shrubby sclerophyll open forest found on low-lying marine sand deposits and occasionally on wind-formed headland dunes of the southern NSW coastal zone.*

  The Study Area is situated in along the coast approximately 100m from the ocean.

- *This PCT extends south from Botany Bay in Sydney to Eden on the far south coast, mainly at elevations of below 40 metres asl. It grades into littoral forest PCT 3639 on dunes within the littoral zone.*

  The Study Area is 20 metres asl at its highest point. 3639 is considered to only occur on sand spits, lagoon margins and hind dunes and typically occupies smaller discontinuous patches on dunes. PCT 3638 occurs on drier or more exposed coastal sand along the south coast which better aligns with the Study Area

5.2.1.3 Dominant Species

- *The tree canopy is very frequently dominated by Eucalyptus botryoides and is commonly the only tree however, occasionally there are local stands of Eucalyptus pilularis or rarely Corymbia gummifera, Angophora costata or Angophora floribunda. The mid-stratum is very frequently layered, with taller small trees of Banksia serrata and Banksia integrifolia with lower dry shrubs.*

  The dominant upper canopy species within the Study Area consisted of *Eucalyptus botryoides* (Bangalay) and *Eucalyptus pilularis* (Blackbutt).

- *The lower layer is variable in cover however mainly a sparse to mid-dense combination of Monotoca elliptica, Acacia longifolia and Breynia oblongifolia with Pittosporum undulatum present in long unburnt sites. The ground layer is characterised by a mid-dense cover of Pteridium esculentum, Lomandra longifolia and Imperata cylindrica which are almost always present, the former with highest foliage cover.*

  Mid stratum within the Study Area consisted of *Pittosporum undulatum* and *Acacia longifolia*. In good condition areas the ground stratum consisted of a high cover of *Pteridium esculentum* (Bracken).

Table 6: PCT 3638 – South Coast Sands Bangalay Forest

PCT 3638 – South Coast Sands Bangalay Forest	
PCT ID	3638
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	South Coast Sands Dry Sclerophyll Forests
Description (Bionet Vegetation Classification)	A mid-high to tall, rarely very tall, dry shrubby sclerophyll open forest found on low-lying marine sand deposits and occasionally on wind-formed headland dunes of the southern NSW coastal zone. The tree canopy is very frequently dominated by *Eucalyptus botryoides* and is commonly the only tree however, occasionally there are local stands of *Eucalyptus pilularis* or rarely *Corymbia gummifera*, *Angophora costata* or *Angophora floribunda*. The mid-stratum is very frequently layered, with taller small trees of *Banksia serrata* and *Banksia integrifolia* with lower dry shrubs. The lower layer is variable in cover however mainly a sparse to mid-dense combination of *Monotoca elliptica*, *Acacia longifolia* and *Breynia oblongifolia* with *Pittosporum undulatum* present in long unburnt sites. The ground layer is characterised by a mid-dense cover of *Pteridium esculentum*, *Lomandra longifolia* and *Imperata cylindrica* which are almost always present, the former with highest foliage cover. This PCT extends south from Botany Bay in Sydney to Eden on the far south coast, mainly at elevations of below 40 metres asl. It grades into littoral forest PCT 3639 on dunes within the littoral zone.
Condition with Study Area	Moderate to poor (scattered/disturbed).
Survey Effort	Random meander

Extent within Study Area	Approximately 0.26 ha of PCT 3638 in a poor-moderate condition was recorded within the Study Area.		
PCT Justification: Characteristic species recorded within and surrounding the Study Area	Upper Stratum Species: *Eucalyptus botryoides* *Eucalyptus pilularis* *Acacia maidenii* *Clerodendrum tomentosum* *Acmena smithii*	Mid Stratum Species: *Acacia longifolia* *Homalanthus populifolius* *Indigofera australis* *Melaleuca linariifolia* *Notelaea venosa* *Pittosporum undulatum* *Pultenaea retusa* *Rubus parvifolius* *Synoum glandulosum* *Geitonoplesium cymosum* *Kennedia rubicunda* *Smilax glyciphylla* *Stephania japonica* *Tylophora barbata*	Ground Stratum Species: *Commelina cyanea* *Dianella caerulea* *Dichondra repens* *Echinopogon ovatus* *Eustrephus latifolius* *Gahnia clarkei* *Geitonoplesium cymosum* *Geranium solanderi* *Hypolepis muelleri* *Lobelia purpurascens* *Oplismenus imbecillis* *Pteridium esculentum* *Viola hederacea*
TEC Status	PCT 3638 is associated with the following two TECs: • Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions • Kurnell Dune Forest in the Sutherland Shire and City of Rockdale		
Estimate of percent cleared value of PCT in the major catchment area	45.40%		
Photos of PCT within Study Area	 **Figure 6: Scattered/disturbed PCT 3638**		

Figure 7: Good condition PCT 3638

5.2.2 No PCT – Cleared/exotic grassland

Cleared/exotic grassland within the site consisted of gravel areas, mown grass, weed species and exotic garden species. The Study Area was dominated by this vegetation type, with native vegetation mainly present around the boundary. Common species found in this area of vegetation included *Cenchrus clandestinum* (Kikuyu), *Conyza bonariensis* (Flax Leaf Fleabane), *Hypochaeris radicata* (Catsear), *Richardia humistrata* and *Trifolium repens* (White Clover). Exotic garden species such as Banana Palms (*Musa* spp.) and Protea (*Protea* spp.) were also recorded.

Figure 8: Exotic maintained grass within the Study Area

Figure 9: Gravel and weeds within the Study Area

5.2.3 Threatened Ecological Communities (TECs)

PCT 3638 is associated with the below Threatened Ecological Communities (TEC):

- Bangalay Sand Forest of the Sydney Basin and South Easter Corner bioregions (Endangered – BC Act)
- Kurnell Dune Forest in the Sutherland Shire and City of Rockdale (Endangered – BC Act)

Kurnell Dune Forest in the Sutherland Shire and City of Rockdale does not occur in the LGA of the Study Area, therefore it is not considered further.

The representation of PCT 3638 within the Study Area does match the description of Bangalay Sand Forest. The relevant diagnostic attributes are outlined in **Table 7**. Accordingly, the native vegetation mapped as PCT 3638, including both condition classes, within the Study Area is considered to align with the Endangered TEC – Bangalay Sand Forest.

Table 7: Relevant Final Determination Diagnostic Attributes

Relevant Final Determination Diagnostic Attributes	Relevance to Site Vegetation
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with coastal sand plains of marine or aeolian origin. It occurs on deep, freely draining to damp sandy soils on flat to moderate slopes within a few km of the sea and at altitudes below 100 m. Bangalay Sand	The Study Area is situated 100m from the coastline with sandy, free draining soils. The Study Area is 20m asl at its highest point.

Forest is characterised by the assemblage of species listed in paragraph 2 and typically comprises a relatively dense or open tree canopy, an understorey of mesophyllous or sclerophyllous small trees and shrubs, and a variable groundcover dominated by sedges, grasses or ferns.		
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions is characterised by the following assemblage of species:		
Acacia longifolia *Acacia sophorae* *Acmena smithii* *Allocasuarina littoralis* *Astroloma pinifolium* *Banksia integrifolia subsp. integrifolia* *Banksia serrata* *Billardiera scandens* *Breynia oblongifolia* *Cassytha pubescens* *Carex longebrachiata* *Casuarina glauca* *Commelina cyanea* *Desmodium gunnii* *Dianella caerulea var. caerulea* *Dianella crinoides* *Dichondra repens* *Echinopogon ovatus* *Entolasia marginata* *Eucalyptus botryoides* *Eucalyptus pilularis* *Geranium potentilloides* *Glycine clandestina* *Gonocarpus teucrioides* *Hardenbergia violacea*	*Hibbertia scandens* *Imperata cylindrica var. major* *Isolepis nodosa* *Kennedia rubicunda* *Lagenifera stipitata* *Lepidosperma concavum* *Leptospermum laevigatum* *Lomandra longifolia* *Marsdenia rostrata* *Microlaena stipoides var. stipoides* *Monotoca elliptica* *Notelaea longifolia* *Oplismenus imbecillus* *Parsonsia straminea* *Pittosporum revolutum* *Pittosporum undulatum* *Pratia purpurascens* *Pteridium esculentum* *Ricinocarpus pinifolius* *Rubus parvifolius* *Solanum pungentium* *Stephania japonica var. discolor* *Stellaria flaccida* *Themeda australis* *Viola hederacea*	The Study Area contained the following characteristic species: *Acacia longifolia* *Acmena smithii* *Commelina cyanea* *Dianella caerulea var. caerulea* *Dichondra repens* *Echinopogon ovatus* *Eucalyptus botryoides* *Eucalyptus pilularis* *Kennedia rubicunda* *Oplismenus imbecillus* *Pittosporum undulatum* *Pratia purpurascens* *Pteridium esculentum* *Rubus parvifolius* *Stephania japonica var. discolor* *Viola hederacea*
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions typically has a dense to open tree canopy, approximately 5 - 20 m tall, depending on exposure and disturbance history. The most common tree species include *Eucalyptus botryoides* (Bangalay) and *Banksia integrifolia subsp. integrifolia* (Coast Banksia), while *Eucalyptus pilularis* (Blackbutt) and *Acmena smithii* (Lilly Pilly) may occur in more sheltered situations, and *Casuarina glauca* (Swamp Oak) may occur on dunes exposed to salt-bearing sea breezes or where Bangalay Sand Forest adjoins Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions, as listed under the Threatened Species Conservation Act 1995. The open shrub stratum may be dominated by sclerophyllous		Good condition vegetation within the Study Area had dense canopy cover of around 70%. The Study Area was dominated by *Eucalyptus botryoides* (Bangalay), with *Eucalyptus pilularis* (Blackbutt) and *Acmena smithii* (Lilly Pilly) also present. Shrub species within the Study Area included *Pittosporum undulatum* (Native Daphne). Ground cover was dense in areas and included species such as Pteridium

species, such as *Banksia serrata* (Old Man Banksia), *Leptospermum laevigatum (*Coast Teatree) and *Monotoca elliptica*, or mesophyllous, species, such as *Breynia oblongifolia* (Coffee Bush) and *Pittosporum undulatum* (Sweet Pittosporum), or a combination of both. Shrubs may vary in height from one to ten m tall. The groundcover varies from open to dense and may be sparse where the tree canopy is dense or where there is a thick litter of leaves and branches. Dominant species include *Dianella* spp. (Blue Flax Lilies), *Lepidosperma concavum*, *Lomandra longifolia* (Spiny-headed Matrush), *Pteridium esculentum* (Bracken), and the grasses *Imperata cylindrica var. major* (Blady Grass), *Microlaena stipoides var. stipoides* (Weeping Grass) and *Themeda australis* (Kangaroo Grass), while herbs, such as *Desmodium gunnii*, *Dichondra repens* (Kidney Weed), *Pratia purpurascens* (Whiteroot) and *Viola hederacea* (Ivy-leaved Violet), are scattered amongst the larger plants. Vines of *Glycine clandestina*, *Hardenbergia violacea* (False Sarsparilla), *Kennedia rubicunda* (Running Postman), *Marsdenia rostrata* (Common Milk Vine) and *Stephania japonica var. discolor* (Snake Vine) scramble through the groundcover and occasionally over shrubs or tree trunks.	esculentum (Bracken), *Dianella caerulea* (Blue Flax Lily), *Dichondra repens* (Kidney Weed), *Pratia purpurascens* (Whiteroot) and *Viola hederacea* (Native Violet). Common climbers included *Kennedia rubicunda* (Running Postman) and *Stephania japonica var. discolor* (Snake Vine).
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions is currently known from parts of the Local Government Areas of Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. Bioregions are defined in Thackway and Creswell (1995).	The Study Area is within the Sydney Basin within the Shoalhaven Local Government Area.

5.3 FLORA

A total of 70 species were recorded during site inspection (50 natives and 20 exotic). A species list is provided in **Appendix B**. This species

5.3.1 Threatened Flora Species

No threatened flora species were identified within the Subject Site.

5.4 FAUNA

A total of 13 fauna species were identified within the Study Area. A species list is included in **Appendix C**. Targeted surveys were conducted as part of this assessment and are detailed below.

5.4.1 Threatened Fauna Species

There were no threatened fauna species identified within the Study Area.

There is potential for threatened fauna to utilise the site for roosting and foraging purposes within the sites native canopy and habitat bearing trees. A total of four habitat bearing trees were found within the native canopy and provide potential habitat for locally occurring threatened fauna as listed in **Table 8.**

Table 8: Threatened fauna species with a potential to use the sites habitat features

Scientific name	Common name	BC Act	EPBC Act
Birds			
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E
Glossopsitta pusilla	Little Lorikeet	V	-
Petroica rodinogaster	Pink Robin	V	-
Mammals			
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-
Petauroides volans	Greater Glider	E	E
Petaurus australis	Yellow-bellied Glider	V	V

5.4.1.1 Targeted Fauna Surveys

Due to the number of Greater Glider and Yellow-bellied Glider records close to the Study Area, targeted surveys were conducted to confirm if HBTs were being used as roosting habitat.

Surveys were conducted as per the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – working draft (DPE 2004).

Stag-watching was completed over two nights (1st & 2nd June 2023) for 30 minutes before sunset and 60 minutes following sunset. All four habitat bearing trees were watched for fauna (**Figure 5**).

On the first survey evening, one Brushtail Possum was seen emerging from a large hollow in Tree 3.

One the second survey evening, one Brushtail Possum was seen emerging from the same large hollow in Tree 3 and one Brushtail Possum was seen emerging from a medium sized hollow in Tree 1.

No threatened species, including Great Gliders or Yellow-bellied Gliders were identified during these surveys.

Figure 10: Habitat Bearing Trees number 3 & 4

5.4.2 Biodiversity and Conservation SEPP 2021

Chapter 4 (Koala Habitat Protection 2021) of SEPP (Biodiversity and Conservation) 2021 aims to encourage the conservation and management of natural vegetation that provides habitat for Koalas, to ensure a permanent, free-living population over their present range and reverse the current trend of Koala population decline.

Based on lot size, land zoning and Local Government Area, a Koala Assessment Report would be required if the Study Area is deemed to be Core Koala Habitat.

Under Chapter 4 of SEPP (Biodiversity and Conservation) 2021, Core Koala Habitat is defined as:

a. an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or

b. an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

The Study Area does not contain vegetation considered to be highly suitable habitat. As such, the Study Area does not contain Core Koala Habitat and the preparation of a Koala Assessment Report is not required to accompany a future Development Application.

6.0 IMPACT ASSESSMENT

6.1 SUMMARY OF IMPACTS

Table 9 depicts the Study Area and the associated impacts assessed within this report. The proposal requires clearing of exotic grassland and native vegetation validated to be PCT 3638 and TEC Bangalay Sand Forest for the building envelope and associated driveway (**Figure 11**). The building envelope and driveway are sighted to avoid most impacts to native vegetation. Native vegetation that is to be impacted by the proposed driveway will not require total clearance, only pruning and maintenance, as there is a pre-existing access in this area (see **Section 6.1.1** for detail). No habitat bearing trees will be impacted.

Direct impacts

The direct impact imposed by the proposal will occur to exotic vegetation and native vegetation (**Table 9**).

Table 9: Direct impacts

Vegetation type	Impact (ha)
PCT 3638 – South Coast Sands Bangalay Forest (scattered/disturbed condition)	0.009
PCT 3638 – South Coast Sands Bangalay Forest (good condition)	0.01
No PCT – Cleared/exotic grassland	0.08
Total native vegetation impact	**0.019 ha**

The direct impact will occur from clearance required for the proposed dwelling and associated driveway. Vegetation to be impacted by the driveway will only require trimming and maintenance. No HBTs are required to be removed under the current design.

The total area of impacted native vegetation is 0.019 ha. This is below the BOS entrance threshold of 1 ha.

The vegetation to be impacted by the proposal is listed as Bangalay Sand Forest TEC. The impacts to this TEC will be minor with 0.009 ha of impact occurring to poor condition vegetation and a maximum of 0.08 ha of impact occurring to good condition vegetation (see **Section 6.1.1** for detail). No threatened flora is to be impacted by the proposal.

The native vegetation to be impacted is considered to provide potential foraging habitat for threatened fauna listed in **Table 8**. A total of 0.019 ha of potential threatened species habitat will be impacted through building envelopes and associated driveway.

Indirect impacts

The proposal is not considered to introduce any considerable additional indirect impacts on important vegetation such as TEC Bangalay Sand Forest or fauna habitat as the majority of the proposal is sighted within the exotic grassland areas within the Study Area. It is recommended

that only native species be planted within the Study Area to reduce any chance of exotic species encroaching on good condition Bangalay Sand Forest TEC in the future.

The proposal is not considered to have any indirect impacts outside of the Study Area.

Figure 11: Impacts Map

6.1.1 Driveway location

Shoalhaven City Council' s Scoping Proposal Feedback (May 2023) highlighted that impacts to native vegetation known to be TEC Bangalay Sand Forest could be reduced by changing the location of the proposed driveway.

The current proposed driveway is shown to access the property from the south, on aerial imagery (Nearmap 2023) this appears to be partially vegetated. It is understood that this driveway location was chosen as it is the current access road to the property and would therefore require the least amount of additional vegetation clearance. Survey of this area confirmed this, showing that the current access road is already cleared to accommodate the proposed driveway and would therefore require very little clearance, likely only trimming and maintenance (**Figure 12** & **Figure 13**). Other possible driveway locations within the Study Area would likely require removal of trees or native vegetation associated with TEC Bangalay Sand Forest as the northern and western boundaries of the Study Area are lined with vegetation.

Therefore, the current proposed driveway is seen to have the least amount of impact to native vegetation validated to be TEC Bangalay Sand Forest.

Figure 12: Current access road looking north

Figure 13: Current access road looking south

6.1.2 Asset Protect Zone

It is understood that the Study Area would require an Asset Protect Zone (APZ) as a part of future bushfire protection, as indicated from correspondence with NSW Rural Fire Service (February 2023).

The letter states that a future dwelling would likely require the entirety of the site to be managed as an asset protect zone.

It is assumed that the site would be required to be maintained to APZ – Inner Protection Areas (IPA). The following is required to meet IPA minimum requirements:

- 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.
- 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.

The Study Area and current proposed dwelling location is likely to already meet the above minimum requirements, therefore it is unlikely that any clearance or impacts to native vegetation will be needed for a future APZ.

6.2 BOS ENTRANCE ASSESSMENT

6.2.1 Native Vegetation Impact Threshold

The impact imposed by the proposed development on the native vegetation is below the Biodiversity Offset Scheme entrance impact threshold of 1 ha for a minimum lot size of 40 ha.

6.2.2 Biodiversity Values Map

The proposal will not directly impact on any areas mapped on the Biodiversity Values Map.

6.2.3 Assessments of Significance.

Assessments of Significance (AoS) were applied where necessary. The AoS are discussed below.

6.3 SIGNIFICANCE ASSESSMENTS

6.3.1 Assessment of Significance Under the EP&A Act and BC Act

Assessments using the criteria provided under the EP&A Act (i.e. Assessment of Significance (AoS)) must be taken into account by consent or determining authorities when considering a development proposal or development application. This enables a decision to be made as to whether there is likely to be a significant impact on the species and hence if entry into the Biodiversity Offset Scheme (BOS) is required.

The results of the field survey have been used to inform whether significance assessments are required, and for which listed species and communities. Significance assessments have been undertaken (**Appendix D**) for the following threatened ecological communities and fauna species:

- Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions
- Gang-gang Cockatoo (*Callocephalon fimbriatum*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Pink Robin (*Petroica rodinogaster*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Greater Glider (*Petauroides volans*)
- Yellow-bellied Glider (*Petaurus australis*)

The proposal, under its current layout, is not considered to have any significant impact on threatened species, ecological communities or populations such that a viable local population will be placed at risk of extinction.

6.3.2 EPBC Act Significant Impact Criteria

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. The process includes the application of SIC for listed threatened species and ecological communities that represent a MNES that will be impacted as a result of the proposed action. Significant impact guidelines that outline a number of criteria have been developed by the Commonwealth, to provide assistance in conducting the assessment and help decide whether or not a referral to the Commonwealth is required.

The results of the field survey have been used to inform whether significance assessments are required and for any listed species and communities. SICs were conducted for the below listed community and/or species and are included in **Appendix E**:

- Gang-gang Cockatoo (*Callocephalon fimbriatum*)
- Greater Glider (*Petauroides volans*)
- Yellow-bellied Glider (*Petaurus australis*)

It is determined that the proposed development is unlikely to result in a significant impact to MNES (threatened and migratory species).

7.0 RECOMMENDATIONS

7.1 GENERAL RECOMMENDATIONS

This report assesses the impacts from the proposed dwelling and associated driveway at 88 North Bendalong Road, Bendalong. This will require impact to 0.019 ha native vegetation that was validated to be PCT 3638 – South Coast Sands Bangalay Forest. This vegetation aligns with TEC Bangalay Sand Forest. No threatened flora was recorded within the Study Area, nor considered likely to occur. Native vegetation within the site may provide habitat for local threatened fauna species, however targeted surveys confirmed the Study Area is not current roosting habitat for threatened gliders in the area. The following recommendations are provided to minimise potential impacts to non-threatened vegetation communities, and flora and fauna from the proposal:

- Landscaping must use native species that align with PCT 3638 and TEC Bangalay Sand Forest
- All Habitat Bearing Trees are to be retained as part of the proposal
- Native vegetation within the proposed driveway should only be trimmed to maintain the current access path
- Care must be taken when moving equipment near any vegetation to be retained. If works appear to encroach on retained vegetation, advice from a qualified Arborist should be gained to infer appropriate tree protection measures. Generally, the Tree Protection Zone (TPZ) is a hypothetical estimation of the area required to protect a tree from adverse construction and development activities. It is calculated for each tree by multiplying diameter at breast height (DBH) by 12 and is a radius measured in metres from the centre of trunk. It is understood that encroachments into the TPZ can occur for 10% of the zone in accordance with AS4970-2009 Protection of trees on development sites.
- Due to the presence of Bangalay Sand Forest TEC within and surrounding the Study Area, it is important that any weeds and exotics within the cleared areas be appropriately controlled during and after development.
- Adequate erosion and sediment control measures should be in place at all times during construction in accordance with best practice guidelines (Landcom 2004), including:
    - vehicle and machinery movement confined to designated work areas
    - consideration given to weather, with works stopped if the onset of heavy rain is deemed likely to cause soil erosion or soil structure damage.

8.0 CONCLUSION

Through the completion of the desktop study and field survey conducted as part of this assessment, no threatened flora, fauna or ecological communities were recorded within the Study Area that would be significantly impacted by the development.

The impact of the proposed development is considered minor, and to occur primarily to exotic vegetation. The native vegetation to be impacted was validated to be PCT 3638 – South Coast Sands Bangalay Forest; this PCT is associated with TEC Bangalay Sand Forest. Furthermore, the native vegetation to be impacted is situated on the edge of exotic grassland and more consolidated bushland therefore will not fragment any existing biodiversity corridors. The Study Area presents some opportunity for nesting and opportunistic foraging. Local threatened and non-threatened fauna species may utilise the Study Area, however, they are unlikely to be dependent on the vegetation proposed for removal.

A range of suitable recommendations have been made to improve the environmental outcome of the proposal. This includes retention of all Habitat Bearing Trees, landscaping with species that align with PCT 3638 and appropriate management of any weeds and exotics within the Study Area to reduce any potential indirect impacts to adjacent Bangalay Sand Forest.

This FFA has adequately considered threatened species and communities in the context of the proposed dwelling and driveway at the Study Area by:

- Conducting field survey including targeted threatened Glider Surveys
- Adopting the precautionary principle in the assessment of threatened species
- Designating appropriate recommendations to minimise potential impacts to threatened species that may transiently occur on the site as well as any other fauna

The assessments contained within this report have determined that the proposed development is unlikely to have a significant effect on the listed communities or species or their habitat in accordance with the EP&A Act, BC Act and EPBC Act provided the recommendations contained in this report are adhered to.

There will not be an impact on any mapped areas of Biodiversity Value, nor will there be an impact on native vegetation above the relevant impact threshold.

Therefore, the preparation and submission of a BDAR or referral to the Commonwealth is not required.

9.0 REFERENCES

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10.0 LIMITATIONS

This report and the associated services performed by Lodge Environmental are in accordance with the scope of services set out in the contract between Lodge Environmental and the Client. The scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to Site.

Lodge Environmental derived the data in this report primarily from visual inspections, and, limited survey and analysis made on the dates indicated. In preparing this report, Lodge Environmental has relied upon, and presumed accurate, certain information provided by government authorities, the Client and others identified herein. The report has been prepared on the basis that while Lodge Environmental believes all the information in it is deemed reliable and accurate at the time of preparing the report, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by the Client arising from or in connection with the supply or use of the whole or any part of the information in the report through any cause whatsoever.

The data, findings, observations, conclusions and recommendations in the report are based solely upon the state of the Site at the time of the investigation. The passage of time, manifestation of latent conditions or impacts of future events (e.g. changes in legislation, scientific knowledge, land uses, etc) may render the report inaccurate. In those circumstances, Lodge Environmental shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of the report.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Lodge Environmental and the Client. Lodge Environmental accepts no liability or responsibility whatsoever and expressly disclaims any responsibility for or in respect of any use of or reliance upon this report by any third party or parties.

It is the responsibility of the Client to accept if the Client so chooses any recommendations contained within and implement them in an appropriate, suitable and timely manner.

Appendices

Appendix A: Threatened flora and fauna likelihood table

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Ecological Communities						
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions		**E**	**-**	**Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions typically has a dense to open tree canopy, approximately 5 - 20 m tall, depending on exposure and disturbance history. The most common tree species include Bangalay (Eucalyptus botryoides) and Coast Banksia (Banksia integrifolia subsp. integrifolia), while Blackbutt (Eucalyptus pilularis) and Lilly Pilly (Acmena smithii) may occur in more sheltered situations, and Swamp Oak (Casuarina glauca) may occur on dunes exposed to salt-bearing sea breezes or where Bangalay Sand Forest adjoins Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions**	**High**	**Yes**
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and Southeast Queensland ecological community.		E	E	Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees.	Low	No
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland		-	E	The Coastal Sclerophyll Swamp Forest often has a layered canopy, dominated by melaleucas and/or Eucalyptus robusta. The ecological community occurs between the Great Dividing Range and the coastline from near Gladstone in	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				Queensland, through to the south coast of New South Wales.		
Illawarra and south coast lowland forest and woodland ecological community		-	CE	It comprises eucalypt forest or woodlands, which can have a grassy ground layer and/or a shrub layer as well as a small tree layer. The distribution is patchy, with the remaining occurrences mostly on lowland sandy loam, loam or clay loam soils around Wollongong to Shellharbour, Milton, Bawley Point and Moruya. The ecological community can occur below approximately 350 m above sea level (ASL), but most occurrences are at a much lower altitude; between 10 and 150 m ASL. The ecological community occurs as a forest or woodland, with foliage cover of the main canopy greater than 10%. The canopy is typically dominated by Eucalyptus or Angophora trees.	Low	No
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia		-	CE	Typically, the ecological community occurs within two kilometres of the coast or adjacent to a large salt water body, such as an estuary and, thus, is influenced by the sea.	Low	No
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria		E	CE	As the name suggests, this EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. The composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include Eucalyptus tereticornis (forest red gum), E. amplifolia (cabbage gum), Angophora floribunda (rough-barked apple) and A. subvelutina (broad-leaved apple). Eucalyptus baueriana (blue box), E. botryoides (bangalay) and E. elata (river	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				peppermint) may be common south from Sydney, E. ovata (swamp gum) occurs on the far south coast, E. saligna (Sydney blue gum) and E. grandis (flooded gum) may occur north of Sydney, while E. benthamii is restricted to the Hawkesbury floodplain.		
Subtropical and Temperate Coastal Saltmarsh		-	V	The Subtropical and Temperate Coastal Saltmarsh (hereafter Coastal Saltmarsh) ecological community occurs within a relatively narrow margin of the Australian coastline, within thesubtropical and temperate climatic zones south of the South-east Queensland IBRA bioregion boundary at 23° 37' latitude along the east coast and south of (and including) Shark Bay at 26°on the west coast. The ecological community spans six State jurisdictions: Queensland (southern), New South Wales, Victoria, Tasmania, South Australia and Western Australia (south-western).	Low	No
Flora						
Thick-lipped Spider-orchid	*Caladenia tessellata*	-	V	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border.	Low	No
Pretty Beard-orchid	*Calochilus pulchellus*	E	E	Calochilus pulchellus is endemic to NSW and is known from the Sydney Basin Bioregion, where a total of less than 30 adult plants have been recorded in three sites over a range of 40km on the South Coast of NSW, at altitudes from 20-560 m above sea level. All currently known sites are within the Shoalhaven Local Government Area.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
East Lynne Midge-orchid	*Corunastylis vernalis*	-	V	The East Lynne midge-orchid is known from only a narrow belt (approximately 12km wide) of predominantly dry sclerophyll forest on the south coast of New South Wales.	Low	No
Leafless Tongue-orchid	*Cryptostylis hunteriana*	V	V	The Leafless Tongue-orchid has been observed in recent years at many sites between Batemans Bay and Nowra. It occurs in a range of communities, including swamp-heath and woodland. Larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black She-Oak (*Allocasuarina littoralis*). Flowers November to February.	Moderate	No, Study Area not considered suitable habitat
White-flowered Wax Plant	*Cynanchum elegans*	E	E	Restricted to eastern NSW, from Brunswick Heads on the north coast to Gerroa in the Illawarra region, and as far west as Merriwa in the upper Hunter River valley. Dry rainforest; littoral rainforest; Leptospermum laevigatum-Banksia integrifolia subsp. integrifolia (Coastal Tea-tree– Coastal Banksia) coastal scrub; Eucalyptus tereticornis (Forest Red Gum) or Corymbia maculata (Spotted Gum) open forest and woodland; and Melaleuca armillaris (Bracelet Honeymyrtle) scrub.	Low	No
Tangled Bedstraw	*Galium australe*	E	-	Tangled Bedstraw has been recorded historically in the Nowra (Colymea) and Narooma areas and is extant in Nadgee Nature Reserve, south of Eden. Most flowering collections have been made in late spring to early autumn. In NSW (and ACT Territory in Jervis Bay), Tangled Bedstraw has been recorded in Turpentine Forest and coastal Acacia shrubland.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Bauer's Midge Orchid	*Genoplesium baueri*	E	E	The species has been recorded from locations between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O' Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.	Low	No
Biconvex Paperbark	*Melaleuca biconvexa*	-	V	Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Low	No
Knotweed	*Persicaria elatior*	V	V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low	No
Jervis Bay Leek Orchid	*Prasophyllum affine*	E	E	Jervis Bay Leek Orchid is currently known from three areas south-east of Nowra on South Coast. These are Kinghorne Point, Wowly Gully near the town of Callala Bay, and near the township of Vincentia. This species grows on poorly drained grey clay soils that support low heathland and sedgeland communities.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Illawarra Greenhood	*Pterostylis gibbosa*	E	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. Near Nowra, the species grows in an open forest of Spotted Gum *Corymbia maculata*, Forest Red Gum *E.tereticornis* and Grey Ironbark *E. paniculata.* The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter.	Low	No
-	*Pterostylis ventricosa*	CE	-	Pterostylis ventricosa is known from populations at St Georges Basin, Sussex Inlet and west of Nowra in the Shoalhaven and also near Tallong and Mittagong in the Southern Highlands. Predominantly in more open areas of tall coastal eucalypt forest often dominated by one or more of the following tree species: - Turpentine, Spotted Gum, Grey Ironbark, Blackbutt, White Stringybark, Scribbly Gum and Sydney Peppermint. Often favours more open areas such as along powerline easements and on road verges where the tree overstorey has been removed or thinned. Grows in a range of groundcover types, including moderately dense low heath, open sedges and grasses, leaf litter, and mosses on outcropping rock. Small moss gardens are a commonly associated micro-habitat feature in most habitats. Soil type ranges from moisture-retentive grey silty loams to grey sandy loams.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				Sometimes found in skeletal soils on sandstone rock shelves.		
Eastern Underground Orchid	*Rhizanthella slateri*	V	E	Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. The habitat requirements are poorly understood, and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore, usually located only when the soil is disturbed.	Low	No
Scrub Turpentine	*Rhodamnia rubescens*	CE	CE	Occurs in coastal districts north from Batemans Bay, NSW to inland of Bundaberg, QLD. Whilst populations of *R. rubescens* typically occur in coastal regions, this species can occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Moderate	No, not recorded within the Study Area
Magenta Lilly Pilly	*Syzygium paniculatum*	CE	V	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.	Low	No
Austral Toadflax	*Thesium australe*	V	V	Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (Themeda australis). One small population is located in Budderoo National Park. The species is found in swamps in sedgelands over grey silty grey loam soils and is thought to be a short-lived perennial, flowering in late October and early November.		
Nowra Heath Myrtle	*Triplarina nowraensis*	E	E	There are five known populations of Nowra Heath Myrtle. Three of these form a cluster to the immediate west of Nowra. A fourth, much smaller population is found 18km south-west of Nowra in the Boolijong Creek Valley. The fifth population is located north of the Shoalhaven River on the plateau above Bundanon. Nowra Heath Myrtle occurs on poorly drained, gently sloping sandstone shelves or along creek lines underlain by Nowra Sandstone. The sites are often either treeless or have a very open tree canopy due to the impeded drainage.	Low	No
Narrow-leafed Wilsonia	*Wilsonia backhousei*	V	-	In NSW Narrow-leaf Wilsonia is found on the coast between Mimosa Rocks National Park and Wamberal north of Sydney (Nelson's Lake, Potato Point, Sussex Inlet, Wowly Gully, Parramatta River at Ermington, Clovelly, Voyager Point, Wollongong and Royal National Park). It grows in all southern states.	Low	No
Swamp Everlasting	*Xerochrysum palustre*	-	V	Found in Kosciuszko National Park and the eastern escarpment south of Badja. Grows in swamps and bogs which are often dominated by heaths. Also grows at the edges of bog margins on peaty soils with a cover of	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				shrubs or grasses. Re-sprouts after fires and sometimes grows in bogs with Sphagnum.		
Aves						
Common Sandpiper	*Actitus hypoleucos*	-	M	In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline or fresh. This species is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers. Migratory Wetlands Species.	Low	No
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes	Low	No
Southern Whiteface	*Aphelocephala leucopsis*	-	V	Habitat information not available from DCCEEW	Low	No
Fork-tailed Swift	*Apus pacificus*	-	M	The Fork-tailed Swift is almost exclusively aerial (forage aerially). In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. Migratory Marine Birds.	Low	No
Sooty Shearwater	*Ardenna grisea*	-	M	The Sooty Shearwater forages in pelagic (open ocean) sub-tropical, sub-Antarctic and Antarctic waters. In Australian waters, the Sooty Shearwater has been recorded in areas with sea surface-temperatures of 8.7-22.0. Migratory Marine Birds.	Low	No
Short-tailed Shearwater	*Ardenna tenuirostris*	-	M	Usually shearwaters only visit land to breed. They establish colonies on remote islands, capes or coastal mountains in places where take-offs are helped by winds and there are few land predators.	Low	No
Ruddy Turnstone	*Arenaria interpres*	-	M	In Australia, Ruddy Turnstones are widespread around the coast of the mainland and off-shore islands. This species is found in estuaries, rocky	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				coasts, mudflats and mixed pebble and sand beaches.		
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water.	Low	No
Australasian Bittern	*Botaurus poiciloptilus*	E	E	Australasian Bitterns are widespread but uncommon over south-eastern Australia. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.).	Low	No
Sharp-tailed Sandpiper	*Calidris acuminata*	-	M	The Sharp-tailed Sandpiper prefers the grassy edges of shallow inland freshwater wetlands. Migratory Wetlands Species.	Low	No
Sanderling	*Calidris alba*	V	M	Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands.	Low	No
Knot	*Calidris canutus*	-	E,M	Migratory Wetlands Species	Low	No
Curlew Sandpiper	*Calidris ferruginea*	E	CE,M	It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. Migratory Wetlands Species.		
Red-necked Stint	*Calidris ruficollis*	-	M	In Australia, Red-necked Stints are found on the coast, in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores.	Low	No
Gang-gang Cockatoo	*Callocephalon fimbriatum*	**V**	**E**	**In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. The Gang-gang Cockatoo prefers tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests during summer, these being at higher altitudes. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas.**	**Moderate**	**Yes**
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V	V	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. This species inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak.	Low	No
Greater Sand Plover	*Charadrius leschenaultii*		V,M	Migratory Wetlands Species	Low	No
Lesser Sand-plover	*Charadrius mongolus*	V	E, M	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms.		
Brown Treecreeper	*Climacteris picumnus victoriae*	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	Low	No
Varied Sitella	*Daphoenositta chrysoptera*	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	Low	No
Eastern Bristlebird	*Dasyornis brachypterus*	E	E	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia. There are three main populations: Northern (southern Queensland/ northern NSW), Central (1600 birds) - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula) and Southern (Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border).	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey.		
Antipodean Albatross	*Diomedea antipodensis*	-	V,M	The Antipodean Albatross is marine, pelagic and aerial.	Low	No
Gibson's Albatross	*Diomedea antipodensis gibsoni*	-	V	Gibson's Albatross is marine, pelagic and aerial.	Low	No
Southern Royal Albatross	*Diomedea epomophora*	-	V,M	Habitat information not available from DCCEEW. Migratory Marine Birds.	Low	No
Wandering Albatross	*Diomedea exulans*	-	V,M	The Wandering Albatross is marine, pelagic and aerial. It occurs where water surface temperatures range from -2° to 24°C.	Low	No
Northern Royal Albatross	*Diomedea sanfordi*	-	E,M	The Northern Royal Albatross is marine, pelagic and aerial. Its habitat includes subantarctic, subtropical, and occasionally Antarctic waters.	Low	No
Beach Stone-curlew	*Esacus magnirostris*	CE	-	Beach Stone-curlews are found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.	Low	No
Grey Falcon	*Falco hypoleucos*	V	V	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				occurs near wetlands where surface water attracts prey.		
White-bellied Storm-Petrel	*Fregetta grallaria grallaria*	V	V	Marine Birds. In Australia this species only breeds on offshore islands in the Lord Howe Island group.	Low	No
Latham's Snipe	*Gallinago hardwickii*	-	M	Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level.Migratory Wetlands Species.	Low	No
Little Lorikeet	***Glossopsitta pusilla***	**V**	**-**	**The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat with lorikeets found westward as far as Dubbo and Albury. Forages primarily in the canopy of open Eucalyptus Forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Additionally, isolated flowering trees in open country, (paddocks, roadside remnants and urban trees) also help sustain viable populations of the species.**	**Moderate**	**Yes**
Painted Honeyeater	*Grantiella picta*	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. A	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.		
Sooty Oystercatcher	*Haematopus fuliginosus*	V	-	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels.	Low	No
Pied Oystercatcher	*Haematopus longirostris*	E	-	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish.	Low	No
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	The White-bellied Sea-Eagle is widespread along the east coast of NSW. This species occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. The habitat of this species is characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Additionally, their terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).	Low	No
Little Eagle	*Hieraaetus morphnoides*	V	-	The Little Eagle is found throughout the Australian mainland apart from the most densely forested areas of the Dividing Range escarpment. It occurs as a single population throughout NSW. The species occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
White-throated Needletail	*Hirundapus caudacutus*	-	V,M	Almost exclusively aerial. Takes insects on wing over a range of habitat types. Recorded most often above wooded areas, including open forest and rainforest. Migratory Terrestrial Species.	Low	No
Black Bittern	*Ixobrychus flavicollis*	V	-	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	Low	No
Swift Parrot	*Lathamus discolor*	E	CE	The Swift Parrot migrates to the Australian south-east mainland between February and October. In NSW the species is generally found on the coast and southwest slopes. Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *Corymbia maculata* (Spotted Gum), *C. gummifera* (Red Bloodwood), *E. tereticornis* (Forest Red Gum), *E. sideroxylon* Mugga Ironbark) and *E. albens* (White Box).	Low	No
Bar-tailed Godwit	*Limosa lapponica*	-	V,M	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh.	Low	No
Square-tailed Kite	*Lophoictinia isura*	V	-	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. This species is found in a variety of timbered habitats including dry woodlands and open	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				forests. Shows a particular preference for timbered watercourses.		
Southern-Giant Petrel	*Macronectes giganteus*		E.M	Migratory Marine Birds	Low	No
Northern-Giant Petrel	*Macronectes halli*		V,M	Migratory Marine Birds	Low	No
South-eastern Hooded Robin	*Melanodryas cucullata cucullata*	V	E	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas (northern and eastern coastal QLD and TAS), rarely found on the coast. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Low	No
Orange-bellied Parrot	*Neophema chrysogaster*	CE	CE	The orange-bellied parrot is a small ground-feeding bird that migrates between distinct breeding and non-breeding ranges. Breeding occurs in south-west Tasmania in summer, and the birds overwinter on the coast of south-east mainland Australia.. Non-breeding birds are usually found along the coast of South Australia and Victoria. The non-breeding range also includes NSW however sightings in that state are now very with the most recent sightings being two reports of single birds in 2003.	Low	No
Blue-winged Parrot	*Neophema chrysostoma*	-	V	A partial migrant, variable numbers of birds migrate across Bass Strait in winter, apparently making the flight non-stop based on the scarcity of records from the Bass Strait islands. During the non-breeding period, from autumn to early spring, birds are recorded from northern Victoria, eastern South Australia, south-western Queensland and western New South Wales,	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				with some birds reaching south-eastern New South Wales and eastern Victoria, particularly on the southern migration (Higgins 1999). Marine Species.		
Turquoise Parrot	*Neophema pulchella*	V	-	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Low	No
Barking Owl	*Ninox connivens*	V	-	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas.	Low	No
Powerful Owl	*Ninox strenua*	V	-	Large tracts of open or closed sclerophyll forest or woodlands but can occur in fragmented landscapes as well. Gullies consisting of wet to dry sclerophyll forest with a dense understorey.	Low	No
Eastern Curlew	*Numenius madagascariensis*	-	CE,M	The eastern curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats. It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Migratory Wetlands Species	Low	No
Sooty Tern	*Onychoprion fuscata*	V	-	Known to breed at Lord Howe Island, but occasionally seen along coastal NSW, especially after cyclones. Marine Species.	Low	No
Fairy Prion (southern)	*Pachyptila turtur subantarctica*	V	V	Habitat information not available from DCCEEW.	Low	No
Eastern Osprey	*Pandion cristatus*	V	-	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Low	No
Osprey	*Pandion haliaetus*		M	Migratory Wetlands Species	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Olive Whistler	*Pachycephala olivacea*	V	-	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes.	Low	No
Sooty Albatross	*Phoebetria fusca*		V,M	Migratory Marine Birds	Low	No
Scarlet Robin	*Petroica boodang*	V	-	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. Its habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	Low	No
Flame Robin	*Petroica phoenicea*	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The ground layer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.	Low	No
Pink Robin	***Petroica rodinogaster***	**V**	**-**	**Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.**	**Moderate**	**Yes**
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V	-	The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgelands, generally below one metre in height and very dense (up to 90% projected foliage cover). The eastern subspecies (wallicus) inhabits south-eastern Australia from southern Queensland through NSW to western Victoria.There are also large populations on the NSW south coast, particularly Barren Grounds NR, Budderoo NP, the Jervis Bay area and Nadgee NR.	Low	No
Gould's Petrel	*Pterodroma neglecta neglecta*	V	E	Marine Species. Breeds on both Cabbage Tree Island, 1.4 km offshore from Port Stephens and	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				on nearby Boondelbah island. The range and feeding areas of non-breeding petrels are unknown. Principal nesting habitat is located within two gullies which are characterised by steeply, sloping rock scree with a canopy of Cabbage Tree Palms.		
Pilotbird	*Pycnoptilus floccosus*	-	V	Habitat information not available from DCCEEW.	Low	No
Australian Painted-snipe	*Rostratula australis*	E	E	Generally, inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans.	Low	No
Diamond Firetail	*Stagonopleura guttata*	V	V	It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	Low	No
Little Tern	*Sternula albifrons*		M	Migratory Marine Birds	Low	No
Common Tern	*Sterna hirundo*	-	M	Migratory Marine Birds	Low	No
Australian Fairy Tern	*Sternula nereis nereis*	-	V	The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation.	Low	No
Pacific Albatross	*Thalassarche bulleri*	-	V	The Pacific Albatross is a marine, pelagic species. It occurs in subtropical and subantarctic waters of the South Pacific Ocean. Habitat preferences are poorly known.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Northern Buller's Albatross	*Thalassarche bulleri platei*	-	V,M	Habitat preferences are poorly known. Migratory Marine Birds	Low	No
Indian Yellow-nosed Albatross	*Thalassarche carteri*	-	V,M	Migratory Marine Birds	Low	No
Shy Albatross	*Thalassarche cauta*	V	V,M	Migratory Marine Birds	Low	No
Chatham Albatross	*Thalassarche eremita*	-	E,M	Migratory Marine species	Low	No
Campbell Albatross	*Thalassarche impavida*	-	V,M	Migratory Marine species	Low	No
Black-browed Albatross	*Thalassarche melanophris*	V	V,M	Migratory Marine species	Low	No
Salvin's Albatross	*Thalassarche salvini*	-	V,M	Migratory Marine species	Low	No
White-capped Albatross	*Thalassarche steadi*	-	V,M	Migratory Marine species	Low	No
Eastern Hooded Dotterel	*Thinornis cucullatus cucullatus*	CE	V	Migratory Marine species	Low	No
Greenshank	*Tringa nebularia*	-	M	Migratory Marine Birds	Low	No
Masked Owl	*Tyto novaehollandiae*	V	-	The masked owl records fall within approximately 90% of NSW, excluding the most arid north-western corner. This species lives in dry eucalypt forests and woodlands (with a sparse mid-storey layer, but with patches of dense low ground cover) from sea level to 1100 m.	Low	No
Sooty Owl	*Tyto tenebricosa*	V	-	Occurs in woodland, including dry woodland, subtropical and warm temperate woodland, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum *(Pseudocheirus peregrinus)* or Sugar Glider (*Petaurus breviceps).* Nests in very large tree-hollows.	Low	No
Terek Sandpiper	*Xenus cinereus*		V	In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				pools and reefs, and occasionally up to 10km inland around brackish pools.		
Mammals						
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	Broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation.	Low	No
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	Cave-roosting bat that forages in timbered woodland and dry sclerophyll forest.	Low	No
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Low	No
Eastern False Pipistrelle	***Falsistrellus tasmaniensis***	**V**	**-**	**Prefers moist habitats with trees larger than 20m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.**	**Moderate**	**Yes**
Southern Brown Bandicoot (eastern)	*Isoodon obesulus obesulus*	E	E	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils.	Low	No
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V	-	Occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes.	Low	No
Southern Myotis	*Myotis macropus*	V	-	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	Low	No
Greater Glider	***Petauroides volans***	**E**	**E**	**It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.**	**Moderate**	**Yes**
Yellow-bellied Glider	***Petaurus australis***	**V**	**V**	**The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range. This species occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.**	**Moderate**	**Yes**
Squirrel Glider	*Petaurus norfolcensis*	V	-	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	Low	No
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Koala	*Phascolarctos cinereus*	V	E	Open eucalypt forest and woodland, containing a variety of 'preferred' feed trees	Low	No
Long-nosed Potoroo	*Potorous tridactylus tridactylus*	V	V	Inhabits coastal heath and dry and wet sclerophyll forests with dense cover which provides diurnal sheltering sites and protection from predators, whilst foraging in adjacent, open areas.	Low	No
New Holland Mouse	*Pseudomys novaehollandiae*	V	V	Open heathland, open woodland with a heathland understorey and vegetated sand dunes.	Low	No
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests.	Low	No
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Low	No
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest. Roosts in tree hollows and buildings.	Low	No
White-footed Dunnart	*Sminthopsis leucopus*	V	-	The White-footed Dunnart occurs in Tasmania and along the Victorian and southern NSW coast. The Shoalhaven area is the species' northern-most limit. In NSW, the species seems to favour vegetation communities with an open understorey structure. It is patchily distributed across these habitats and, where present, typically occurs at low densities.	Low	No
Amphibia						
Giant Burrowing Frog	*Heleioporus australiacus*	V	V	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types (excluding clay-based soils).		
Green and Golden Bell Frog	*Litoria aurea*	E	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available.	Low	No
Watson's Tree Frog	*Litoria watsoni*	-	E	Littlejohn's Tree Frog is known to inhabit forest, coastal woodland and heath from 100 to 950 m above sea level but the species is not associated with any specific vegetation type.	Low	No
Stuttering Frog	*Mixophyes balbus*	-	V	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	Low	No

Key. V=Vulnerable, E=Endangered, Ep=Endangered Population, Vp=Vulnerable Population, CE=Critically Endangered, M=Migratory, CD= Conservation Dependent
Species habitat associations have been informed predominantly from EES (2023) and DotEE (2023) species profiles.

Appendix B: Flora Species List

Scientific name	Common name	Native	Exotic
Acacia longifolia		x	
Acacia maidenii	Maiden's Wattle	x	
Acmena smithii	Lilly Pilly	x	
Adiantum aethiopicum	Common Maidenhair		x
Androcalva fraseri	Brown Kurrajong	x	
Bidens pilosa	Farmer's Friend		x
Cenchrus clandestinum	Kikuyu		x
Chrysocephalum apiculatum	Common Everlasting	x	
Cissus hypoglauca	Water Vine	x	
Clerodendrum tomentosum	Hairy Clerodendrum	x	
Commelina cyanea	Scurvy Weed	x	
Conyza bonariensis	Flax Leaf Fleabane		x
Cyclospermum leptophyllum	Slender Celery		x
Cyperus brevifolius	Mullumbimby Couch		x
Cyperus polystachyos		x	
Dianella caerulea	Blue Flax-lily	x	
Dichondra repens	Kidney Weed	x	
Digitaria didactyla	Blue Couch	x	
Echinopogon ovatus	Forest Hedgehog Grass	x	
Eragrostis brownii	Brown's Lovegrass	x	
Eragrostis leptostachya	Paddock Lovegrass	x	
Erigeron bonariensis	Flaxleaf Fleabane		x
Eucalyptus botryoides	Banaglay	x	
Eucalyptus pilularis	Blackbutt	x	
Euphorbia peplus	Milkweed		x
Eustrephus latifolius	Wombat Berry	x	
Ficus coronata	Sandpaper Fig	x	
Gahnia clarkei	Tall Saw-sedge	x	
Geitonoplesium cymosum	Scrambling Lily	x	
Geranium solanderi	Native Geranium	x	
Goodenia ovata	Hop Goodenia	x	

Homalanthus populifolius	Bleeding Heart	x	
Hypochaeris radicata	Catsear		x
Hypolepis muelleri	Harsh Ground Fern	x	
Indigofera australis	Australian Indigo	x	
Isolepis nodosa	Knobby Club Rush	x	
Juncus usitatus		x	
Kennedia rubicunda	Dusky Coral Pea	x	
Lobelia purpurascens	Whiteroot	x	
Lysimachia arvensis	Scarlet Pimpernal		x
Melaleuca hypericifolia	Hillock Bush	x	
Melaleuca linariifolia	Flax-leaved Paperbark	x	
Musa spp.	Banana Palm		x
Notelaea venosa	Veined Mock-Olive	x	
Onopordum acanthium	Scotch thistle		x
Oplismenus imbecillis	Australian Basket-Grass	x	
Oxalis perennans		x	
Pittosporum undulatum	Native Daphne	x	
Plantago gaudichaudii	Narrow plantain	x	
Poa sieberiana	Snow Grass	x	
Protea spp.	Protea		x
Pteridium esculentum	Bracken	x	
Pultenaea retusa	Blunt Bush-pea	x	
Richardia humistrata			x
Rubus parvifolius	Native Raspberry	x	
Senecio madagascariensis	Fireweed		x
Senna pendula	Cassia		x
Sida rhombifolia	Paddy's Lucerne		x
Sigesbeckia orientalis	Indian Weed	x	
Smilax glyciphylla	Sweet Sarsaparilla	x	
Solanum americanum	Glossy Nightshade	x	
Sporobolus creber	Slender Rat's Tail Grass	x	
Stephania japonica	Snake Vine	x	
Synoum glandulosum	Scentless Rosewood	x	

Taraxacum officinale	Dandelion		x
Trifolium repens	White Clover		x
Tylophora barbata	Bearded Tylophora	x	
Viola hederacea	Native Violet	x	
Westringia fruticosa	Coastal Rosemary	x	
Zantedeschia aethiopica	Arum Lily		x

Appendix C: Fauna Species List

Class Name	Scientific Name	Common Name
Aves	*Anthochaera chrysoptera*	Little Wattlebird
	Cracticus torquatus	Grey Butcherbird
	Dacelo novaeguineae	Laughing Kookaburra
	Eolophus roseicapilla	Galah
	Gymnorhina tibicen	Australian Magpie
	Malurus cyaneus	Superb Fairywren
	Meliphaga lewinii	Lewin's Honeyeater
	Neochmia temporalis	Red-browed Finch
	Nesoptilotis leucotis	White-eared Honeyeater
	Rhipidura albiscapa	Grey Fantail
	Trichoglossus moluccanus	Rainbow Lorikeet
Mammals	*Macropus giganteus*	Eastern Grey Kangaroo
	Trichosurus vulpecula	Common Brushtail Possum

Appendix D: Assessments of Significance

Assessments of Significance were applied to the following species and ecological communities:

- Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions
- Gang-gang Cockatoo (*Callocephalon fimbriatum*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Pink Robin (*Petroica rodinogaster*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Greater Glider (*Petauroides volans*)
- Yellow-bellied Glider (*Petaurus australis*)

Threatened Birds

Gang-gang cockatoo (*Callocephalon fimbriatum*) – Vulnerable (BC Act)

This species occurs across an altitudinal gradient, generally occurring in tall mountain forests and woodlands in spring and summer, descending to lower altitudes and coastal zones during winter. Favours old growth forest, with tall, mature trees. Forages in a variety of habitats and has been recorded breeding in urban areas in NSW and the ACT.

Key threats to the species include loss of breeding and foraging habitat from intensive wildfires, rural/urban development and forestry management practices, as well as Psittacine cirovirus disease (PCD).

Little Lorikeet (*Glossopsitta pusilla*) – Vulnerable (BC Act)

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. The species forages primarily in the canopy of open Eucalyptus forest and woodland, with riparian habitats particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country and urban trees also help sustain viable populations of the species. It feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe. The species roosts in treetops and nests in proximity to feeding areas if possible, most typically selecting hollows (approximately 3cm) in the limb or trunk of smooth-barked Eucalypts.

Pink Robin (*Petroica rodinogaster*) – Vulnerable (BC Act)

This species inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. It catches prey by the perch-and-pounce method, foraging mostly on the ground for insects and spiders. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen, and is lined with fur and plant down. It is situated in an upright or oblique fork, from 30cm to 6m above the ground, in deep undergrowth.

> **A. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

The vegetation to be removed is considered less favourable compared to woodland surrounding the Study Area. The 0.019 ha of impacted vegetation mostly already disturbed and all habitat-bearing trees which may be used for roosting within the Study Area are to be retained.

The removal of a maximum 0.019 ha of habitat is unlikely to impact these species' life cycle such that they are placed at risk of extinction. The development is not likely to have an adverse effect on the life cycle of these species such that a viable population of the species is likely to be placed at risk of extinction.

B. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable – not an endangered population.

C. In relation to the habitat of a threatened species or ecological community:

i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The total area of native vegetation being removed is 0.019 ha, most of which is in disturbed condition. Native vegetation within the Study Area is considered to provide potential, marginal foraging habitat and all habitat-bearing trees within the Study Area which may be used for roosting or breeding are to be retained. As such, the proposed development is not considered to adversely affect habitat critical to the survival of the species.

ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The impact from the proposal would not fragment or isolate any potential habitat from other areas of habitat as the vegetation to be removed is minimal and the Study Area borders contiguous bushland.

iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The maximum of 0.019 ha of potential habitat to be removed, in a mostly disturbed state, is not considered important to the long-term survival of the species.

D. Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding value (either directly or indirectly)

There are no areas of outstanding biodiversity value in the Study Area.

E. Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatened process.

There is one key threatening process, as listed in Schedule 4 of the BC Act, of relevance to the proposed vegetation clearance:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

The removal of a maximum 0.019 ha of native vegetation is considered a small disturbance, particularly in relation to the surrounding habitat and mobility of these species. Additionally, habitat bearing trees within the Study Area are to be retained. Therefore, it is considered unlikely that the proposed vegetation removal would exacerbate any key threatening processes to such an extent that they would place any local populations of the species at risk of extinction.

Conclusion

The proposal will directly affect a maximum area of 0.019 ha of native vegetation to be cleared. The vegetation exists in an area which is already partly cleared and vegetation to be removed is mostly in disturbed condition. Even if the species did use the trees for intermittent use, the localised nature of the vegetation removal and the presence of abundant suitable foraging and sheltering resources in the surrounding area, indicate that the proposed action is *unlikely* to have a significant impact on Gliders such that it would put a local population of any of the species at risk of extinction or substantially isolate any areas of potential habitat. Targeted surveys were conducted to confirm if HBTs were being used as roosting habitat. No Gliders were identified during targeted survey.

In summary:

- the proposal would remove 0.019 ha of potential foraging habitat;
- the birds are highly mobile and would not be heavily reliant on foraging resources within the Study Area; and
- the habitat to be removed would not isolate or fragment other foraging resources at a local scale.

As such, a Species Impact Statement or BDAR is not recommended with respect to the potentially affected species.

Arboreal mammals

Southern Greater Glider (*Petauroides volans*) – Endangered (BC Act)

This species occurs in eastern Australia, in eucalypt forests and woodlands. It feeds exclusively on eucalypt leaves, buds, flowers and mistletoe, sheltering during the day in tree hollows. They occupy a relatively small home range, averaging 1 to 3 ha, but will use up to 18 hollows in their home range.

Yellow-bellied Glider (*Petaurus australis*) – Vulnerable (BC Act)

This species is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria, occurring in tall mature eucalypt forest in areas with high rainfall and nutrient rich soils. They feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna, often extracting sap by incising the trunks and branches of favoured food trees, leaving a distinctive 'V' -shaped scar. They roost, often in family groups, in hollows of large trees.

A. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The vegetation to be removed is considered less favourable compared to woodland surrounding the Study Area. The 0.019 ha of impacted vegetation is largely experiencing disturbance in it' s existing state and all habitat-bearing trees which may be used for roosting within the Study Area are to be retained.

The removal of a maximum 0.019 ha of habitat is unlikely to impact these species' life cycle such that they are placed at risk of extinction. The development is not likely to have an adverse effect on the life cycle of these species such that a viable population of the species is likely to be placed at risk of extinction. Due to the number of Southern Greater Glider and Yellow-bellied Glider records close to the Study Area, targeted surveys were conducted to confirm if HBTs were being used as roosting habitat. No Gliders were identified during targeted survey.

B. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable – not an endangered population.

C. In relation to the habitat of a threatened species or ecological community:

i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The total area of native vegetation being removed is 0.019 ha, most of which is in disturbed condition. Native vegetation within the Study Area is considered to provide potential, marginal foraging habitat and all habitat-bearing trees within the Study Area which may be used for roosting are to be retained. As such, the proposed development is not considered to adversely affect habitat critical to the survival of the species.

ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The impact from the proposal would not fragment or isolate any potential habitat from other areas of habitat as the vegetation to be removed is minimal and the Study Area borders contiguous bushland.

iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The maximum of 0.019 ha of potential habitat to be removed, in a mostly disturbed state, is not considered important to the long-term survival of the species.

D. Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding value (either directly or indirectly)

There are no areas of outstanding biodiversity value in the Study Area.

E. Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatened process.

There is one key threatening process, as listed in Schedule 4 of the BC Act, of relevance to the proposed vegetation clearance:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

The removal of a maximum 0.019 ha of native vegetation is considered a small disturbance, particularly in relation to the surrounding habitat and mobility of these species. Additionally, habitat bearing trees within the Study Area are to be retained. Therefore, it is considered unlikely that the proposed vegetation removal would exacerbate any key threatening processes to such an extent that they would place any local populations of the species at risk of extinction.

Conclusion

The proposal will directly affect a maximum area of 0.019 ha of native vegetation to be cleared. The vegetation exists in an area which is already partly cleared and vegetation to be removed is mostly in disturbed condition. Even if the species did use the trees for intermittent use, the localised nature of the vegetation removal and the presence of abundant suitable foraging and sheltering resources in the surrounding area, indicate that the proposed action is *unlikely* to have a significant impact on Gliders such that it would put a local population of any of the species at risk of extinction or substantially isolate any areas of potential habitat. Targeted surveys were conducted to confirm if HBTs were being used as roosting habitat. No Gliders were identified during targeted survey.

In summary:

- proposed habitat clearance is small (0.019 ha)
- potential foraging and roosting habitat for these species will remain throughout the Study Area
- no Gliders were observed to be utilising the Study Area during targeted surveys over 2 nights

A Species Impact Statement or BDAR is not recommended with respect to the potentially affected species.

Threatened Microbats

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) – Vulnerable (BC Act)

Eastern False Pipistrelle is listed as a vulnerable species under the BC Act. It is generally found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. It prefers moist habitats, with trees taller than 20 metres. It generally roosts in eucalypt hollows, although has also been found underneath loose bark and in buildings. It hunts flying insects above or just below the tree canopy. Key threats to the species are loss of roosting and breeding sites,

particularly eucalypt hollows, and fragmentation of foraging sites, mainly extensive areas of continuous forest and areas of high productivity.

The proposed clearance will require a maximum clearance of 0.019 ha of vegetation associated with PCT 3638, most of which is in disturbed condition. This area of native vegetation is considered to provide potential foraging and roosting habitat for this species in the form of hollows in eucalypt trunks.

A. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The removal of 0.019 ha of native vegetation is unlikely to have an impact on the above-listed species, such that a local population will be put at risk of extinction. Native vegetation to be removed is mostly in a disturbed state and all habitat-bearing trees suitable for roosting are to be retained. The Study Area largely represents disturbed native bushland which is not the preferred roosting habitat for the species. No impacts to Eastern False Pipistrelle are anticipated, such that a local population is placed at risk of extinction. Large native trees, that will continue to provide seasonal foraging resources, will be retained within the Study Area.

B. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

C. In relation to the habitat of a threatened species or ecological community:

i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposal would remove of 0.019 ha of potential foraging habitat.

ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The proposal would not result in the fragmentation or isolation of any areas of foraging habitat for this species. The areas of potential foraging habitat to be affected is small (0.019 ha) and will not fragment or isolate foraging habitat at a broad scale as the area is already disturbed. Trees to be removed will not inhibit this species' ability to forage.

iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The 0.019 ha of potential foraging habitat to be removed is not considered important to the long-term survival of the species. The areas to be affected would not act as a foraging link between two areas of foraging habitat. Trees present within the Study Area would likely be utilised by a small number of animals, on a seasonal basis. Trees within the Study Area are unlikely to provide optimal foraging habitat as the site is already partly cleared and the species prefers to forage above consolidated canopy.

D. Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding value (either directly or indirectly)

There are no Areas of Outstanding Biodiversity Value within the Study Area with reference to the Areas of Outstanding Biodiversity Value register – accessed 23/6/23.

E. Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatened process.

There is one key threatening process, as listed in Schedule 4 of the BC Act, of relevance to the proposed vegetation clearance:

- Clearing of native vegetation

The proposal would involve the clearing of 0.019 ha of native vegetation which is considered to provide limited foraging habitat for Eastern False Pipistrelle. This species is known to prefer foraging in continuous forest with high productivity and the Study Area contains cleared areas with mostly disturbed native vegetation. Therefore, the proposal is unlikely to exacerbate the impacts of this key threatening process.

Conclusion

The proposal is unlikely to constitute a significant impact on the Eastern False Pipistrelle given the following:

- the proposal would remove 0.019 ha of potential foraging habitat;
- this vegetation is considered to provide limited roosting habitat given the disturbed nature of the vegetation and cleared areas within the Study Area. Hollow-bearing trees present are to be retained.
- the habitat to be removed would not isolate or fragment other foraging resources at a local scale.

As such, a Species Impact Statement or BDAR is not recommended with respect to the potentially affected species.

Threatened Ecological Communities

Bangalay Sand Forest of the Sydney Basin and Southeast Corner bioregions - (Endangered – BC Act)

Bangalay Sand Forest (BSF) of the Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with coastal sand plains of marine or aeolian origin. It occurs on deep, freely draining to damp sandy soils on flat to moderate slopes within a few kilometres of the sea and at altitudes below 100 m. Bangalay Sand Forest typically comprises a relatively dense or open tree canopy, an understorey of mesophyllous or sclerophyllous small trees and shrubs, and a variable groundcover dominated by sedges, grasses or ferns.

The proposed development will require a maximum clearance of 0.019 ha of vegetation of PCT 3638 in good to disturbed condition.

A. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable.

B. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

The total area of native vegetation being removed is 0.019 ha, most of which is in disturbed condition. This loss is such a small relative area that it is not considered to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

C. In relation to the habitat of a threatened species or ecological community:

i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The development is removing 0.019 ha of BSF, a loss of habitat which is considered very minimal and would not result in the fragmentation or isolation of any areas of contiguous BSF. The area to be removed is so small that it is not considered important to the long-term survival of the community.

D. Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding value (either directly or indirectly)

There are no Areas of Outstanding Biodiversity Value within the Study Area with reference to the Areas of Outstanding Biodiversity Value register – accessed 23/6/23.

E. Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatened process.

There is one key threatening process, as listed in Schedule 4 of the BC Act, of relevance to the proposed vegetation clearance:

- Clearing of native vegetation

The proposal would involve the clearing of 0.019 ha of BSF, with 2 representative canopy species to be retained. As this removal is very minimal, the proposal is unlikely to exacerbate the impacts of this key threatening process.

Conclusion

The proposal is unlikely to constitute a significant impact on Bangalay Sand Forest of the Sydney Basin and Southeast Corner bioregions given the following:

- the proposal would remove 0.019 ha of BSF, most of which is in disturbed condition;
- most of the BSF area within the Study Area is to be retained

- the vegetation to be removed would not isolate or fragment BSF at a local scale

As such, a Species Impact Statement or BDAR is not recommended with respect to the potentially affected community.

Appendix E: Significant Impact Criteria

The Significant Impact Criteria was applied to the following fauna species:

- Gang-gang Cockatoo (Callocephalum fimbriatum)
- Greater Glider (*Petauroides volans*)
- Yellow-bellied Glider (*Petaurus australis*)

Gang-gang Cockatoo (*Callocephalum fimbriatum*) – Endangered (EPBC Act)

This species occurs across an altitudinal gradient, generally occurring in tall mountain forests and woodlands in spring and summer, descending to lower altitudes and coastal zones during winter. Favours old growth forest, with tall, mature trees. Forages in a variety of habitats and has been recorded breeding in urban areas in NSW and the ACT.

The Study Area contains marginal foraging habitat on the periphery of the Study Area, as well as several habitat-bearing trees. Native vegetation to be removed is mostly in a disturbed state and all habitat-bearing trees are to be retained. Therefore, the removal of 0.019 ha of marginal foraging habitat is unlikely to have a significant impact on the life cycle of this species such that a viable local population of the species would be placed at risk of extinction.

Criterion a: lead to a long-term decrease in the size of an important population of a species

No important populations have been recorded within the Study Area.

Criterion b: reduce the area of occupancy of an important population

No important populations have been recorded within the Study Area.

Criterion c: fragment an existing important population into two or more populations

Impacts to native vegetation associated with the proposed development will not fragment any habitat. As such, above-listed species that may utilise the Study Area for foraging will not be isolated from surrounding populations.

Criterion d: adversely affect habitat critical to the survival of a species

Native vegetation within the Study Area is considered to provide potential, marginal foraging habitat for Gang-gang Cockatoo. All habitat-bearing trees within the Study Area which may be used for breeding are to be retained. As such, the proposed development is not considered to adversely affect habitat critical to the survival of the species.

Criterion e: disrupt the breeding cycle of an important population

No important populations have been recorded within the Study Area. All habitat-bearing trees within the Study Area which may be used for breeding are to be retained. As such, the development will not disrupt breeding cycle of an important population.

Criterion f: Adversely affect habitat critical to the survival of a species; modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Vegetation within the Study Area is considered to provide a small number of potential breeding sites and marginal foraging habitat. The habitat to be removed is mostly already in a disturbed

state. Such habitat is not critical to the survival of this species. As such, the proposed development will not adversely affect habitat that is critical to this species' survival.

Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The proposed development will not result in the establishment of an invasive species that is harmful to Gang-gang Cockatoo.

Criterion h: Introduce disease that may cause the species to decline

The project will not result in the introduction of a disease that is harmful to Gang-gang Cockatoo.

Criterion i: Interfere substantially with the recovery of the species

The proposed development will not interfere with any recovery or conservation efforts for Gang-gang Cockatoo.

Conclusion

The proposed action is not considered to constitute a significant impact on Gang-gang Cockatoo. As such, referral to the Commonwealth is not required.

Southern Greater Glider (*Petauroides volans*) – Endangered (EPBC Act)

This species occurs in eastern Australia, in eucalypt forests and woodlands. It feeds exclusively on eucalypt leaves, buds, flowers and mistletoe, sheltering during the day in tree hollows. They occupy a relatively small home range, averaging 1 to 3 ha, but will use up to 18 hollows in their home range.

The Study Area contains marginal foraging habitat on the periphery of the Study Area, as well as several habitat-bearing trees. Native vegetation to be removed is mostly in a disturbed state and all habitat-bearing trees are to be retained. Due to the number of Southern Greater Glider records close to the Study Area, targeted surveys were conducted to confirm if HBTs were being used as roosting habitat. No Greater Gliders were identified during targeted survey.

Therefore, the removal of 0.019 ha of marginal foraging habitat is unlikely to have a significant impact on the life cycle of this species such that a viable local population of the species would be placed at risk of extinction.

Criterion a: lead to a long-term decrease in the size of an important population of a species

No important populations have been recorded within the Study Area.

Criterion b: reduce the area of occupancy of an important population

No important populations have been recorded within the Study Area.

Criterion c: fragment an existing important population into two or more populations

Impacts to native vegetation associated with the proposed development will not fragment any habitat. As such, above-listed species that may utilise the Study Area for foraging will not be isolated from surrounding populations.

Criterion d: adversely affect habitat critical to the survival of a species

Native vegetation within the Study Area is considered to provide potential, marginal foraging habitat for the Southern Greater Glider. All habitat-bearing trees within the Study Area which

may be used for roosting are to be retained. As such, the proposed development is not considered to adversely affect habitat critical to the survival of the species.

Criterion e: disrupt the breeding cycle of an important population

No important populations have been recorded within the Study Area.

Criterion f: Adversely affect habitat critical to the survival of a species; modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Native vegetation within the Study Area is considered to provide potential, marginal foraging habitat for the Southern Greater Glider, which is not considered critical habitat for the species. All habitat-bearing trees within the Study Area which may be used for roosting are to be retained. As such, the proposed development will not adversely affect habitat that is critical to this species' survival.

Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The proposed development will not result in the establishment of an invasive species that is harmful to the Southern Greater Glider.

Criterion h: Introduce disease that may cause the species to decline

The project will not result in the introduction of a disease that is harmful to the Southern Greater Glider.

Criterion i: Interfere substantially with the recovery of the species

The proposed development will not interfere with any recovery or conservation efforts for the Southern Greater Glider.

Conclusion

The proposed action is not considered to constitute a significant impact on the Southern Greater Glider. As such, referral to the Commonwealth is not required.

Yellow-bellied Glider (*Petaurus australis*) – Vulnerable (EPBC Act)

This species is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria, occurring in tall mature eucalypt forest in areas with high rainfall and nutrient rich soils. They feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna, often extracting sap by incising the trunks and branches of favoured food trees, leaving a distinctive 'V' -shaped scar. They roost, often in family groups, in hollows of large trees.

The Study Area contains marginal foraging habitat on the periphery of the Study Area, as well as several habitat-bearing trees. Native vegetation to be removed is mostly in a disturbed state and all habitat-bearing trees are to be retained. Due to the number of Yellow-bellied Glider records close to the Study Area, targeted surveys were conducted to confirm if HBTs were being used as roosting habitat. No Yellow-bellied Gliders were identified during targeted survey.

Therefore, the removal of 0.019 ha of marginal foraging habitat is unlikely to have a significant impact on the life cycle of this species such that a viable local population of the species would be placed at risk of extinction.

Criterion a: lead to a long-term decrease in the size of an important population of a species

No important populations have been recorded within the Study Area.

Criterion b: reduce the area of occupancy of an important population

No important populations have been recorded within the Study Area.

Criterion c: fragment an existing important population into two or more populations

Impacts to native vegetation associated with the proposed development will not fragment any habitat. As such, above-listed species that may utilise the Study Area for foraging will not be isolated from surrounding populations.

Criterion d: adversely affect habitat critical to the survival of a species

Native vegetation within the Study Area is considered to provide potential, marginal foraging habitat for the Yellow-Bellied Glider. All habitat-bearing trees within the Study Area which may be used for roosting are to be retained. As such, the proposed development is not considered to adversely affect habitat critical to the survival of the species.

Criterion e: disrupt the breeding cycle of an important population

No important populations have been recorded within the Study Area.

Criterion f: Adversely affect habitat critical to the survival of a species; modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Native vegetation within the Study Area is considered to provide potential, marginal foraging habitat for the Yellow-Bellied Glider, which is not considered critical habitat for the species. All habitat-bearing trees within the Study Area which may be used for roosting are to be retained. As such, the proposed development will not adversely affect habitat that is critical to this species' survival.

Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The proposed development will not result in the establishment of an invasive species that is harmful to the Yellow-Bellied Glider.

Criterion h: Introduce disease that may cause the species to decline

The project will not result in the introduction of a disease that is harmful to the Yellow-Bellied Glider.

Criterion i: Interfere substantially with the recovery of the species

The proposed development will not interfere with any recovery or conservation efforts for the Yellow-Bellied Glider.

Conclusion

The proposed action is not considered to constitute a significant impact on the Yellow-Bellied Glider. As such, referral to the Commonwealth is not required.

NEW HOUSE, AND GARAGE
NORTH BENDALONG HEADLAND

PROPOSED RESIDENTIAL PROJECT
DEVELOPMENT APPLICATION

CONCEPT PLANS ONLY
18 June 2023

FORMER DEVELOPMENT ON LOT 32

AMENDMENTS

James Stockwell Architect
ARB Number 7156
35 Shortland St Wentworth Falls 2782
Mobile 0414 504 720
Email james@stockwelldesign .com.au

LOCATION: NORTH BENDALONG HEADLAND
NORTH BENDALONG RD NSW 2539 LOT 32 DP 1191742

PROJECT: RESIDENCE AND GARAGE

TITLE: TITLE PAGE

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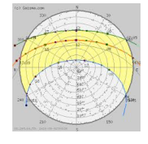
DATE 18 June 2023
DRAWN JS
SCALE AS SHOWN
DRG. NO. A-1.00

CONCEPT PLANS ONLY
18 June 2023

AREAS

SITE AREA 6349 SQM
FORMER SITE COVERAGE 1665 SQM
APPROVED SITE COVERAGE 708 SQM
PROPOSED SITE COVERAGE 370 SQM
EXCLUDING PATHS AND DRIVEWAY

PROPOSED GFA 325 SQM INCLUDING
STUDIO 25 SQM
EXCLUDING GARAGE, STAIRS,
PLANT ROOM AND BASEMENT,
STORAGE.



WINTER SUN SET
WINTER SUN RISE
SUMMER SUN SET
SUMMER SUN RISE
NORTH

SITE PLAN 1 : 500

AMENDMENTS	James Stockwell Architect ARB Number 7156 35 Shortland St Wentworth Falls 2782 Mobile 0414 504 720 Email james@stockwelldesign .com.au	LOCATION: NORTH BENDALONG HEADLAND NORTH BENDALONG RD NSW 2539 LOT 32 DP 1191742 PROJECT: RESIDENCE AND GARAGE	TITLE: SITE PLAN 1 : 500	DO NOT SCALE DRAWINGS, READ FIGURED DIMENSIONS ONLY, REPORT ANY DISCREPANCIES TO ARCHITECT FOR A DECISION PRIOR TO COMMENCEMENT OF WORK COPYRIGHT DESIGN & PLANNING COPYRIGHT REMAINS THE PROPERTY OF ARCHITECT	DATE 18 June 2023 DRAWN JS SCALE AS SHOWN DRG. NO. A-1.01

CONCEPT PLANS ONLY
18 June 2023

2 STOREY HOUSE

2 STOREY HOUSE

BELAH GLEN

NORTH BENDALONG ROAD

PATH

26080

PROPOSED GARAGE

0.5M STONE WALL

RL 18.450

9000

STUDIO
FFL 20.750

DECK

EXISTING TREE RETAINED

EMERGENCY VEHICLE TURNING

RL 18.150

10000

165000 LT WATER STORAGE
5X 33000 TANKS
HAWKESBURY TANKS
BURIED CONCRETE TRAFFICABLE

COURTYARD
NORTH SUN IN

CONCRETE AND EARTH ROOF OVER ENTRY REFER ELEVATIONS

RL 18.400

BEDROOM
FFL 20.500

UPPER LIVING

KITCHEN
FFL 18.900

DINING

FFL 18.500

TV ROOM

ENTRY

FFL 17.000

NE LIGHT IN

FIRE PIT

10000

MOUNDING TO RETAINING WALLS TO 2.1M AGL

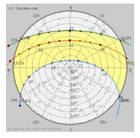
GARDEN
OPEN TO SKY
ROCKS AND FERNS

DRY CREEK BED AND SEASONAL POND (NON PERMANENT)

PROPOSED SINGLE STOREY SPLIT LEVEL RESIDENCE

WINTER SUN SET

WINTER SUN RISE



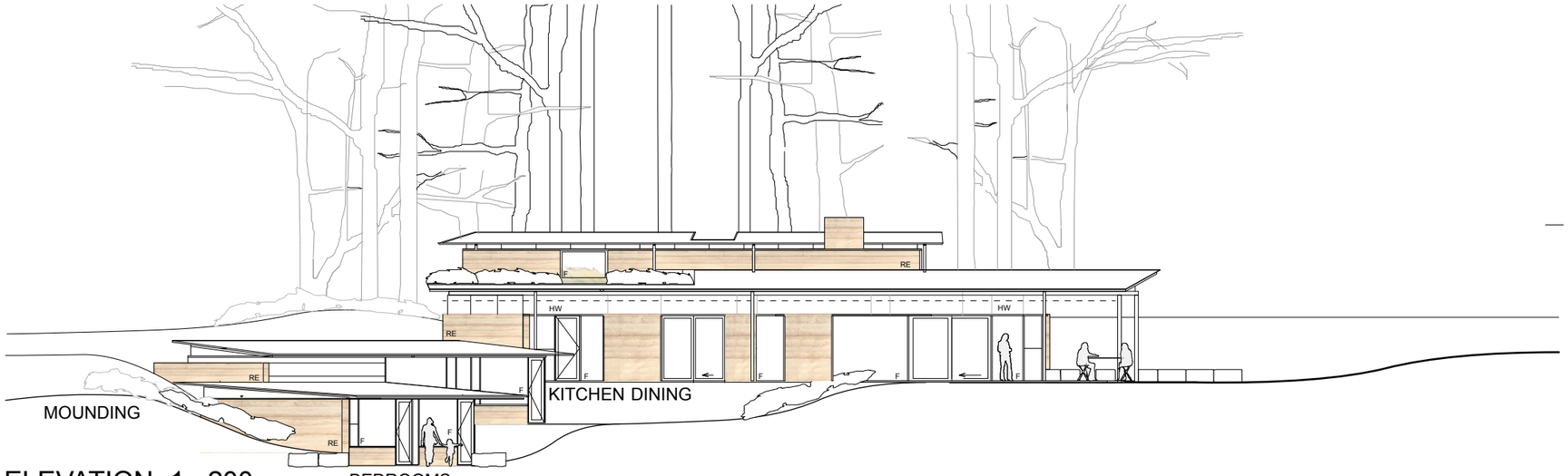
SUMMER SUN SET

SUMMER SUN RISE

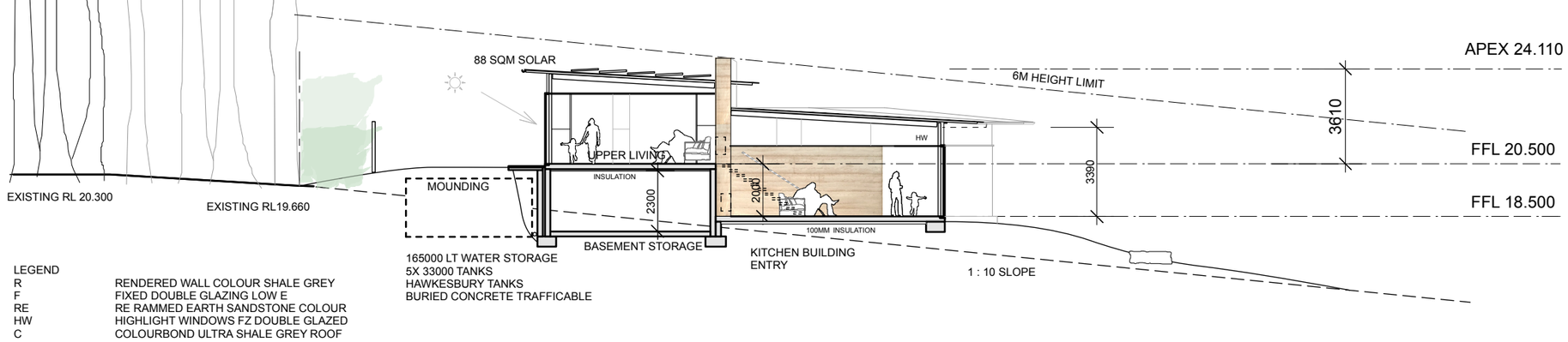
NORTH

FLOOR AND SITE PLAN 1 : 500

AMENDMENTS	James Stockwell Architect ARB Number 7156 35 Shortland St Wentworth Falls 2782 Mobile 0414 504 720 Email james@stockwelldesign .com.au	LOCATION: NORTH BENDALONG HEADLAND NORTH BENDALONG RD NSW 2539 LOT 32 DP 1191742 PROJECT: RESIDENCE AND GARAGE	TITLE: FLOOR AND SITE PLAN 1 : 500	DO NOT SCALE DRAWINGS. READ FIGURED DIMENSIONS ONLY. REPORT ANY DISCREPANCIES TO ARCHITECT FOR A DECISION PRIOR TO COMMENCEMENT OF WORK COPYRIGHT DESIGN & PLANNING COPYRIGHT REMAINS THE PROPERTY OF ARCHITECT	DATE 18 June 2023 DRAWN JS SCALE AS SHOWN DRG. NO A-1.02



SOUTH ELEVATION 1 : 200



165000 LT WATER STORAGE
5X 33000 TANKS
HAWKESBURY TANKS
BURIED CONCRETE TRAFFICABLE

LEGEND

R	RENDERED WALL COLOUR SHALE GREY
F	FIXED DOUBLE GLAZING LOW E
RE	RE RAMMED EARTH SANDSTONE COLOUR
HW	HIGHLIGHT WINDOWS FZ DOUBLE GLAZED
C	COLOURBOND ULTRA SHALE GREY ROOF

SECTION AA 1 : 200

CONCEPT PLANS ONLY
18 June 2023

AMENDMENTS

James Stockwell Architect
ARB Number 7156
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Mobile 0414 504 720
Email james@stockwelldesign .com.au

LOCATION NORTH BENDALONG HEADLAND
NORTH BENDALONG RD NSW 2539 LOT 32 DP 1191742

PROJECT RESIDENCE AND GARAGE

TITLE SECTION AA 1 : 200

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DATE 18 June 2023
DRAWN JS
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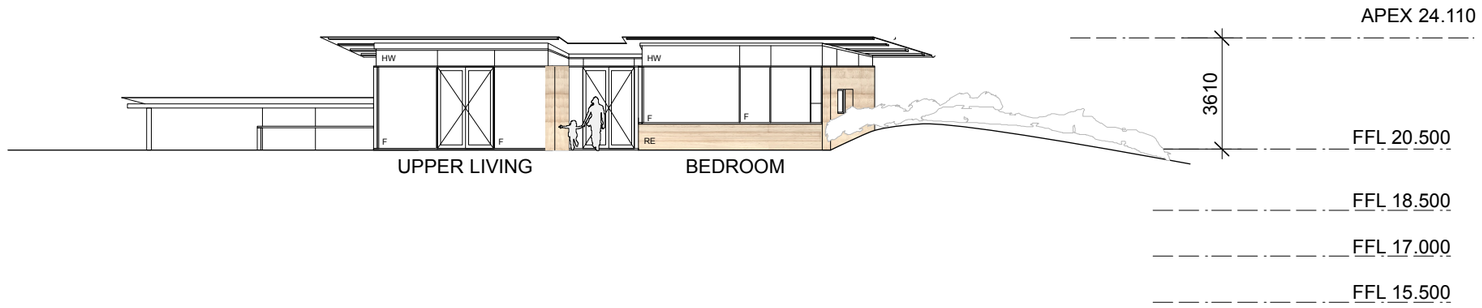
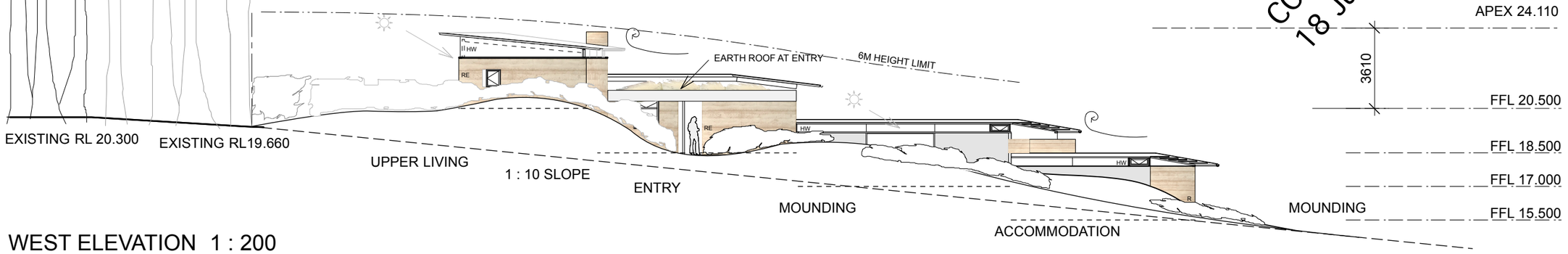
DRG. NO. A-1.03



NORTH ELEVATION 1 : 200

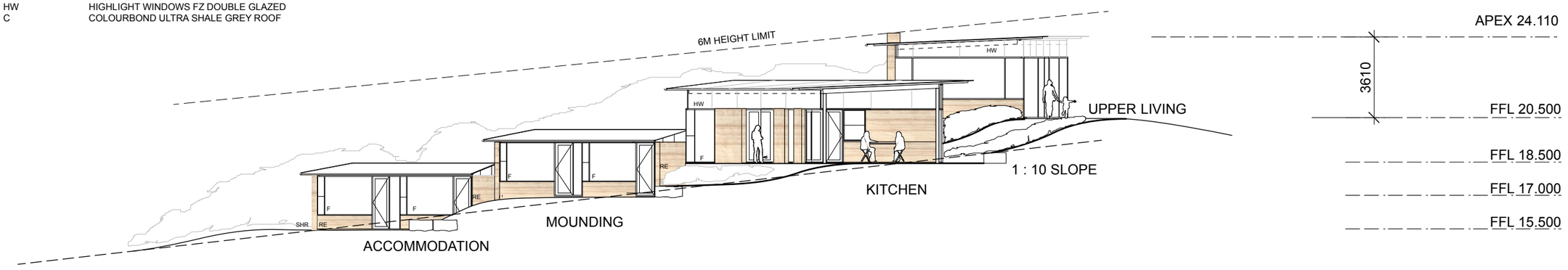
CONCEPT PLANS ONLY
18 June 2023



WEST ELEVATION 1 : 200

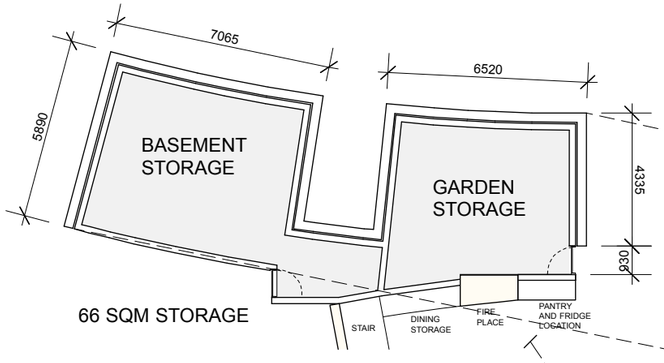
LEGEND

R	RENDERED WALL COLOUR SHALE GREY
F	FIXED DOUBLE GLAZING LOW E
RE	RE RAMMED EARTH SANDSTONE COLOUR
HW	HIGHLIGHT WINDOWS FZ DOUBLE GLAZED
C	COLOURBOND ULTRA SHALE GREY ROOF



EAST ELEVATION 1 : 200

AMENDMENTS		James Stockwell Architect ARB Number 7156 35 Shortland St Wentworth Falls 2782 Mobile 0414 504 720 Email james@stockwelldesign .com.au	LOCATION NORTH BENDALONG HEADLAND NORTH BENDALONG RD NSW 2539 LOT 32 DP 1191742 PROJECT RESIDENCE AND GARAGE	TITLE ELEVATIONS 1 : 200	DO NOT SCALE DRAWINGS. READ FIGURED DIMENSIONS ONLY. REPORT ANY DISCREPANCIES TO ARCHITECT FOR A DECISION PRIOR TO COMMENCEMENT OF WORK COPYRIGHT DESIGN & PLANNING COPYRIGHT REMAINS THE PROPERTY OF ARCHITECT	DATE 18 June 2023 DRAWN JS SCALE AS SHOWN DRG. NO. A-1.04



66 SQM STORAGE

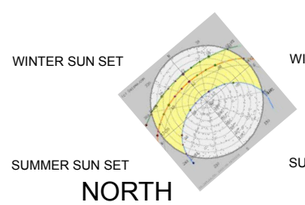
BASEMENT STORAGE PLAN 1 : 200

EARTH ROOF

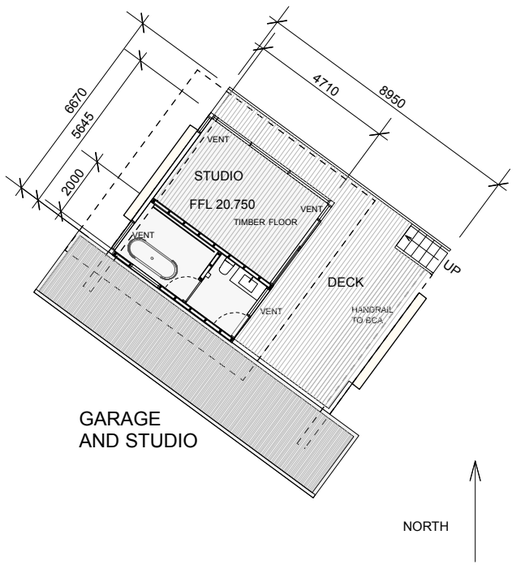
50 SQM EARTH ROOF OVER
ENTRY AND LAUNDRY AREA
CONCRETE WITH ARDEX WPM

FLOOR PLAN 1 : 200

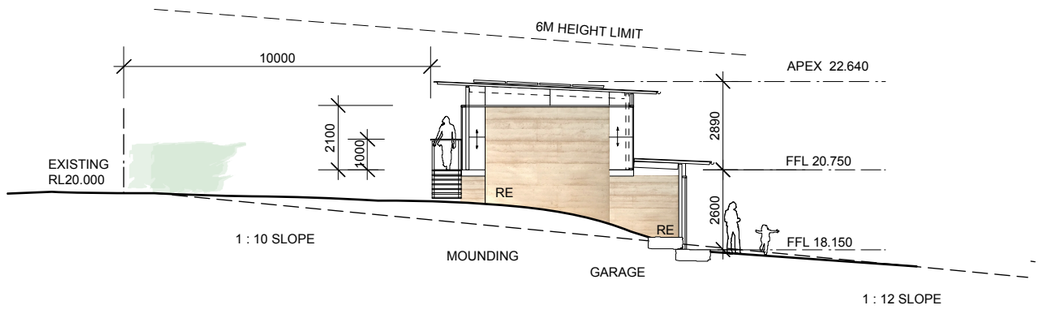
CONCEPT PLANS ONLY
18 June 2023



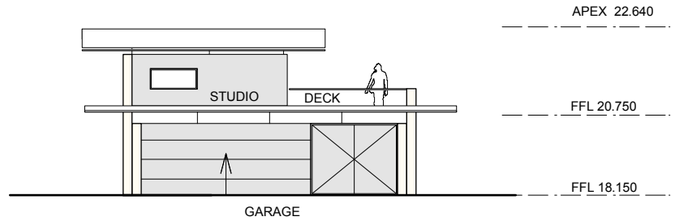
AMENDMENTS		James Stockwell Architect ARB Number 7156 35 Shortland St Wentworth Falls 2782 Mobile 0414 504 720 Email james@stockwelldesign .com.au	LOCATION NORTH BENDALONG HEADLAND NORTH BENDALONG RD NSW 2539 LOT 32 DP 1191742 PROJECT RESIDENCE AND GARAGE	TITLE DEVELOPMENT COMPARISON NTS	DO NOT SCALE DRAWINGS. READ FIGURED DIMENSIONS ONLY. REPORT ANY DISCREPANCIES TO ARCHITECT FOR A DECISION PRIOR TO COMMENCEMENT OF WORK. COPYRIGHT DESIGN & PLANNING COPYRIGHT REMAINS THE PROPERTY OF ARCHITECT.	DATE 18 June 2023 DRAWN JS SCALE AS SHOWN DRG. NO. A-1.05



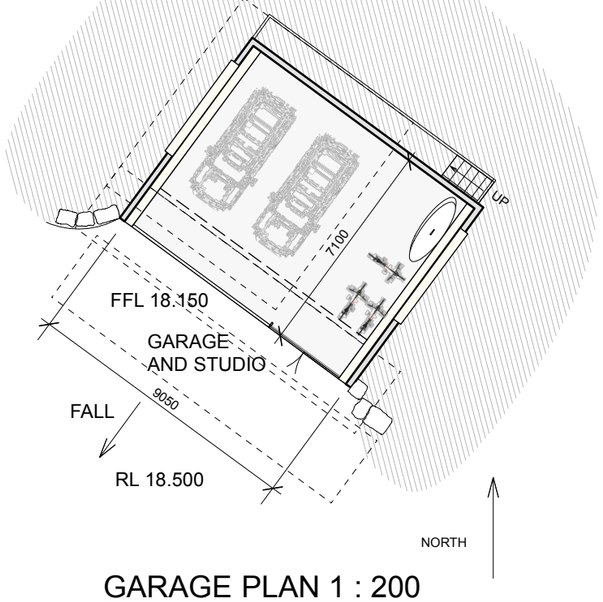
STUDIO PLAN 1 : 200



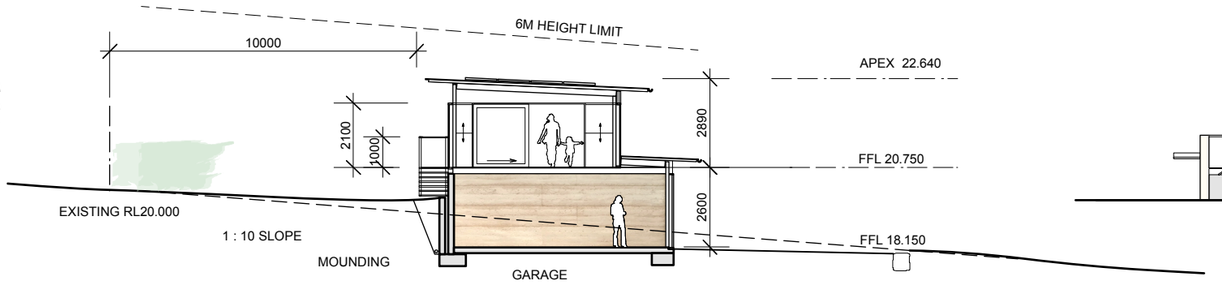
WEST ELEVATION 1 : 200



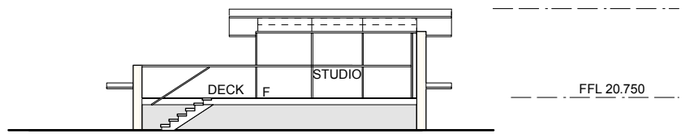
SOUTH ELEVATION 1 : 200



GARAGE PLAN 1 : 200



SECTION 1 : 200



NORTH ELEVATION 1 : 200

CONCEPT PLANS ONLY
18 June 2023

AMENDMENTS		James Stockwell Architect ARB Number 7156 35 Shortland St Wentworth Falls 2782 Mobile 0414 504 720 Email james@stockwelldesign .com.au	LOCATION: NORTH BENDALONG HEADLAND NORTH BENDALONG RD NSW 2539 LOT 32 DP 1191742 PROJECT: RESIDENCE AND GARAGE	TITLE: GARAGE STUDIO ELEVATIONS 1 : 200	DO NOT SCALE DRAWINGS, READ FIGURED DIMENSIONS ONLY. REPORT ANY DISCREPANCIES TO ARCHITECT FOR A DECISION PRIOR TO COMMENCEMENT OF WORK COPYRIGHT DESIGN & PLANNING COPYRIGHT REMAINS THE PROPERTY OF ARCHITECT	DATE 18 June 2023 DRAWN JS SCALE AS SHOWN DRG. NO. A-1.06

PROPOSED NEW HOUSE AND GARAGE
LANDSCAPE CONCEPT - DA PACKAGE

North Bendalong Headland

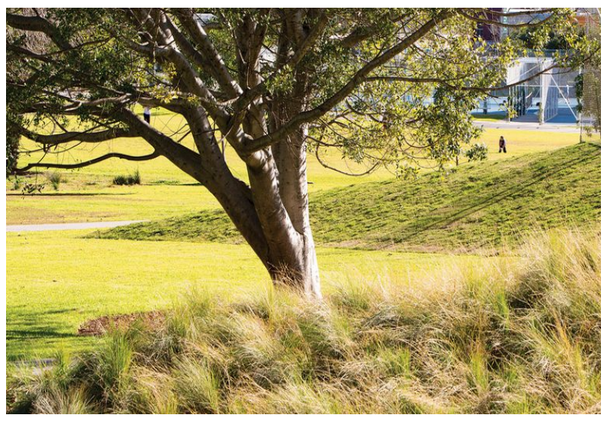
Site location

Nearmap 7 May 2022

LANDSCAPE Drawing Register

Drawing No.	Drawing Title	Scale	Issue
L01	Location		B
L02	Landscape Concept Plan	1:500	B
L03	Indicative plant photos and species list		A

ISSUE : A 26 October 2022
B 2 November 2022 Amended for APZ requirements
C 29 May 2023 Amended to remove Dee beach access



Indicative mounding against house planted with grasses

Surrounding landscape

Temporary fence

Indicative Images

Lindy Lean
LANDSCAPE ARCHITECT
AAILA Registered Landscape Architect #0423
HLS Pty Ltd PO Box 313 Ashfield NSW
phone 0412 568 410
lindy@lllandscapearchitect.com.au

North Bendalong Headland
Lot 32 DP 1191742
For Robert Aldis and Penny Bingham-Hall
29 May 2023

Landscape Concept Plan L02

FLAT ROCK BEACH

DEE BEACH

LEGEND

- Mass planting of natives plants, with the majority being local native species density to meet Appendix 4 APZ requirements
- Mass planting of mowable native grass with no shrubs or trees, to meet Appendix 4 APZ requirements
- Mound to 2.1m high against house, planted with native herbs, grasses and groundcovers, able to be mown to meet Appendix 4 APZ requirements.
- Existing road reserve and surrounding vegetation
- Potential community spaces
- Hollow bearing trees to be retained and protected

Edge of sand (7May 22)

Existing planted mound

Herb Garden

Roof Garden

Buried water storage tanks

Existing edge of clearing

Remove banana palm

Stone faced gateposts with timber gate

Top of bank

Existing trees

raingarden

Temporary 1200 high mesh fence for plant establishment

mown turf grass

drainage swale

bridge

mowable native grass to meet APZ requirements

Existing Dee Beach steps

Remove introduced species from this area including Palm, Agapanthus and Michelia figo

mowable native grass to meet APZ requirements with scattered canopy trees less than 15% and shrub planting less than 10%.

Potential Community Space

existing track

fence

Melaleuca

mass planting in old driveway of native grasses and herbs

existing gravel

Pittosporum

mass planting in old driveway of native grasses and herbs

drainage swale

Existing Dee Beach track

HOLLY STREET

NORTH BENDALONG ROAD

VIEW TO WATER THROUGH TREES

fire trail

CYPRESS STREET

Deco granite path with pedestrian gate for bins to kerb

Low plants with scattered trees to 15% to maintain views to ocean from Belah Glen

BELAH GLEN

0 5 10 15 20 M

N

Lindy Lean
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North Bendalong Headland House

For Robert Aldis and Penny Bingham-Hall

Scale 1:500@ A3 29 May 2023


Anigozanthus sp
Kangaroo Paw


Banksia serrata
Old man Banksia


Boronia ledifola
Sydney Boronia


Breynia oblongifolia
Coffee Bush


Callistemon citrinus
Crimson Bottlebrush


Callistemon salignus
Willow Bottlebrush


Clematis aristata
Old Mans Beard


Dianella congesta
Blue Flax Lily


Ficina nodosa
Knobby Club Rush

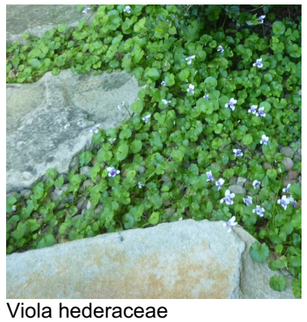

Hibbertia aspera
Rough Guinea Flower


Indigofera australis
Austral indigo


Imperata cylindrica
Blady Grass


Pandorea pandoreana
Wong Wonga Vine


Persoonia linearis
Narrow leaved Geebung


Viola hederaceae
Native violet


Telopea speciossima
Waratah

SPECIES TO BE SELECTED FROM THE FOLLOWING PLANT LIST

Trees and Tall Shrubs

Acmena smithii	Lilypilly
Alphitonia excelsa	Red Ash
Banksia integrifolia	Coast banksia
Banksia serrata	Old Man Banksia
Callistemon salignus	Willow Bottlebrush
Claxylon australe	Brittlewood
Clerodendrom tomentosum	Hairy Clary
Elaeocarpus reticulatus	Blueberry Ash
Eucalyptus botryoides	Bangalay
Ficus coronata	Sand paper Fig
Glochidion ferdinandi	Cheese Tree
Pittosporum revolutum	Rough Fruited Pittosporum
Synoum glandulosum	Scentless Rosewood

Shrubs

Breynia oblongifolia	Coffee Bush
Boronia ledifolia	Sydney Boronia
Callistemon citrinus	Crimson Bottlebrush
Correa alba var alba	White Correa
Indigofera australis	Austral indigo
Persoonia linearis	Narrow leaved Geebung
Pimelea linifolia	Slender Rice Flower
Telopea speciossima	Waratah

Ground Covers and Raingarden plants

Actinotus helianthi	Flannel Flower
Anigozanthus sp	Kangaroo Paw
Dianella congesta	Blue Flax Lily
Doodia aspera	Prickly Rasp fern
Ficina nodosa	Knobby Club Rush
Gahnia clarkei	Saw Sedge
Imperata cylindrica	Blady Grass
Lomandra longifolia	Mat rush
Oplismenus imbecillis	Basket Grass
Viola hederacea	Native Violet

Vines

Clematis aristata	Old Mans Beard
Hibbbertia aspera	Rough Guinea Flower
Pandora Pandoreana	Wonga Wonga Vine

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North Bendalong Headland House

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29 May 2023