4 Beinda St, 53 – 57 Bolong Rd, Bomaderry

Flora and Fauna Assessment

Landcom

19 April 2024

Final

cumberland ecology

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The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Table of Contents

Table of Tables

Table of Photographs

Table of Appendices

Table of Figures

Glossary

Term/Abbreviation	Definition
AOBV	Area of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method 2020
BC Act	NSW *Biodiversity Conservation Act 2016*
BOS	Biodiversity Offsets Scheme
Council	Shoalhaven City Council
DA	Development Application
DBH	Diameter at Breast Height
DCCEEW (Cwlth)	Commonwealth Department of Climate Change, Energy, the Environment and Water
DCCEEW (NSW)	NSW Department of Climate Change, Energy, the Environment and Water
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FFA	Flora and Fauna Assessment
LGA	Local Government Area
Locality	5 km buffer surrounding the subject land
MNES	Matters of National Environmental Significance
NSW	New South Wales
PCT	Plant Community Type
PMST	Protected Matters Search Tool
Project footprint	Areas of direct impacts associated with the Project
Shoalhaven DCP	*Shoalhaven Development Control Plan 2014*
Shoalhaven LEP	*Shoalhaven Local Environmental Plan 2019*
SRZ	Structural Root Zone
Subject land	4 Beinda Street and 53 – 57 Bolong Road, Bomaderry (Lots 1-7 DP 25566 and Lot 1 DP 329959
TEC	Threatened Ecological Community
the Project	The construction of a residential flat building comprising 60 apartments for build-to-rent within the subject land
TPZ	Tree Protection Zone

1. Introduction

Cumberland Ecology was commissioned by Landcom to undertake a Flora and Fauna Assessment (FFA) for the proposed development of 4 Beinda Street and 53 – 57 Bolong Road, Bomaderry (Lots 1-7 DP 25566 and Lot 1 DP 329959) (the 'subject land') (see **Figure 1**). The proposed development comprises the construction of a residential flat building comprising 60 apartments for build-to-rent (the 'Project'). This FFA will support a development application (DA) under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1. Purpose

The purpose of this report is to document the findings of an ecological investigation completed within the subject land (see **Figure 1**). Biodiversity values considered include threatened species and communities protected under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main objective of this report is to determine whether the Project is likely to significantly affect threatened biodiversity values and to outline how the Project will incorporate the biodiversity conservation principles of avoidance and mitigation into its planning.

Specifically, the objectives of this FFA are to:

- Document the reasons why the Biodiversity Offsets Scheme (BOS) under the BC Act does not apply to the Project;
- Describe and map vegetation communities of the subject land, identifying threatened ecological communities (TECs) (if present) listed under the BC Act and/or the EPBC Act;
- Identify and map the location of threatened flora and fauna species (if present);
- Assess the likelihood of threatened flora and fauna species occurring within the subject land;
- Assess the potential impacts on threatened entities, including the completion of Tests of Significance under Section 7.3 of the BC Act;
- Assess the potential indirect impacts on the nearby Grey-headed Flying-fox camp; and
- Where relevant, recommend mitigation measures to reduce the impacts of the proposed development on biodiversity values.

This FFA has been prepared in accordance with the requirements detailed in Section 6.2.1 of Chapter G5 of the Shoalhaven Development Control Plan (DCP) 2014.

1.2. Background

1.2.1. Description of the Project

The Project involves the following works:

- Lot consolidation;
- Demolition of existing residential dwellings and associated structures;

- Site preparation works (vegetation removal and earthworks); and
- Construction of a residential flat building comprising 60 apartments for build-to-rent including at-grade car parking and associated works.

The layout of the Project is shown in **Figure 2**.

1.2.2. Description of Subject Land and Project Footprint

The subject land is approximately 0.59 hectares (ha) in area and is located approximately 120 km south-west from Sydney CBD and approximately 2 km north of Nowra, within the Shoalhaven City Council (Council) Local Government Area (LGA). The subject land is zoned R3 Medium Density Residential under the *Shoalhaven Local Environmental Plan 2014* (Shoalhaven LEP), and is bordered by Beinda Street to the north, Bolong Road to the east, and residential dwellings to the south and west. In the immediate surroundings of the subject land, Bomaderry Creek occurs approximately 200 m east of the site, where it runs in a northerly direction before feeding into the Shoalhaven River. Approximately 40 m west of the subject land, a medium sized patch of bushland and a wetland occurs. Within this patch of bushland an active Grey-headed Flying-fox (*Pteropus poliocephalus*) camp occurs, known as the 'Brinawarr St camp'. **Figure 3** illustrates the immediate locality of the subject land.

The subject land currently comprises two residential dwellings and associated structures, which are proposed to be demolished as part of the Project. The subject land has been highly disturbed and is largely cleared, comprising a mix of planted native and exotic vegetation in the east around the existing dwellings and grassland areas at the western end. Native remnant vegetation is mainly limited to remnant trees along the northern boundary of the subject land (**Figure 1**).

The Project footprint is located entirely within the subject land and includes the area assessed as directly impacted by the Project in this report, covering approximately 0.51 ha of the subject land. The location of the Project footprint is shown in **Figure 1**.

1.3. Relevant Legislation

1.3.1. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Commonwealth Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places - defined in the EPBC Act as Matters of National Environmental Significance (MNES). Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES (including nationally listed TECs and species, and listed migratory species) must be referred to the Australian Government Minister for the Environment. The purpose of the referral is to allow a decision to be made about whether an action requires approval on a Commonwealth level. If an action is declared a "controlled action", then Commonwealth approval is required.

1.3.2. Environmental Planning and Assessment Act 1979

The EP&A Act is the overarching planning legislation in NSW. This act provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including

the protection and conservation of native animals and plants. This includes threatened species, communities, habitat and processes as listed under the BC Act and *Fisheries Management Act 1994*.

1.3.3. Biodiversity Conservation Act 2016

The BC Act is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act is supported by a number of regulations, including the *Biodiversity Conservation Regulation 2017*.

To determine the type of assessment required for a project under Part 4 (Local Development), it is necessary to determine whether the project triggers the BOS. The BOS is intended to simplify biodiversity assessment and improve biodiversity outcomes by creating consistent assessment requirements to measure the likely biodiversity loss of development proposals and gains in biodiversity value achieved at offset sites through active management. Impacts to biodiversity are offset through purchase of biodiversity credits or by an equivalent payment to the Biodiversity Conservation Fund.

If entry into the BOS is triggered, then the reporting required will be a Biodiversity Development Assessment Report (BDAR) prepared in the accordance with the Biodiversity Assessment Method (BAM). If entry to the BOS is not triggered, then a FFA can be prepared as a means to document the ecological impacts of a project.

The BOS is intended to simplify biodiversity assessment and improve biodiversity outcomes by creating consistent assessment requirements to measure the likely biodiversity loss of development proposals and gains in biodiversity value achieved at offset sites through active management. The BOS requires an assessment following the BAM by an accredited BAM assessor and the preparation of either a BDAR or Biodiversity Certification Assessment Report.

An assessment of the BOS thresholds in relation to the Project is detailed in ***Section 1.4.***

1.3.4. Biosecurity Act 2015

Problematic weeds in NSW are handled under the NSW *Biosecurity Act 2015* (Biosecurity Act). Under the Biosecurity Act all weeds are required to be controlled by all persons under a "General Biosecurity Duty". The General Biosecurity Duty means that all public and private land owners or managers and all other people who deal with weed species (biosecurity matters) must use the most appropriate approach to prevent, eliminate, or minimise the negative impact (biosecurity risk) of those weeds (DPI 2017).

Under the Biosecurity Act some weed species have been prioritised for management by specific regulations and controls under the act. These are known as State Level Priority Weeds. The state has been divided into 11 regions (each covering a number of LGAs) under the Act. Within each region, additional weed species known as Regional Priority Weeds have been prioritised for management. A further set of weeds are identified within the Regional Strategic Weed Management Plans as being "other weeds of regional concern".

The subject land occurs within the South East Local Land Services region, and weed management within the region is to be undertaken under the direction of the South East Regional Strategic Weed Management Plan

2023-2027 (LLS: South East 2022). Appendix 1 of the Weed Management Plan outlines the State Priority Weeds, Regional Priority Weeds, and other weeds of regional concern.

1.3.5. *State Environmental Planning Policy (Biodiversity and Conservation) 2021*

The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (BC SEPP) recently replaced the now repealed *State Environmental Planning Policy (Koala Habitat Protection) 2021*, which was merged into the new SEPP as a chapter. Chapter 4 'Koala Habitat Protection 2021' of the BC SEPP includes provisions for the assessment of impacts to koalas. Chapter 4 of the BC SEPP applies to the subject land as the LGA is listed in Schedule 2 of the BC SEPP.

Clause 4.10 of Part 4.2 of the BC SEPP applies to the subject land, as it does not have an approved koala plan of management applying to the land and is below one (1) ha in size (including land within the same ownership). Clause 4.10 states the following:

> *A council is not prevented from granting consent to a development application for consent to carry out development on land if—*
>
> *a. the land does not have an approved koala plan of management applying to the land, or*
>
> *b. the council is satisfied that the land is not core koala habitat.*

The BC SEPP includes a definition of 'core koala habitat', as follows:

> *(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.*

Potential koala habitat is defined within the BC SEPP as:

> *Koala habitat means koala habitat however described in a plan of management under this Chapter or a former Koala SEPP and includes core koala habitat.*

The subject land does not comprise any of the Koala Feed Tree species listed in the former Koala SEPPs referred to the in the BC SEPP. However, several *Corymbia maculata* (Spotted Gum) trees, which is listed as a Koala use tree in Schedule 3 of the BC SEPP, occurs in the subject land.

Historical koala occupation of an area according to the fact sheet for development applications under the former Koala SEPP (DPIE 2021) is determined by considering koala records within the last 18 years, within the following maximum distances from the external boundary of the site area:

- 2.5 kilometres of the site (for North Coast, Central Coast, Central & Southern Tablelands, South Coast Koala Management Areas (KMAs));

- 5 kilometres of the site (for Darling Riverine Plains, Far West, North West Slopes, Riverina, Northern Tablelands KMAs); and
- Recorded means recorded in the form of BioNet records.

The subject land is located within the Central & Southern Tablelands and the South Coast KMAs. Based on a review of BioNet records from the past 18 years, the closest previous record is from 2004 and located approximately 3 km south of the subject land. Overall, only three previous records of the Koala occur within the locality (5km search area) of the subject land. As a result, the subject land does not comprise core koala habitat under the BC SEPP.

Based on the findings listed above, no further assessment under Chapter 4 of the BC SEPP is required as no approved koala plan of management applies to the site and the native vegetation in the subject land does not conform to core koala habitat.

1.3.6. Shoalhaven Local Environment Plan 2019

The Shoalhaven LEP aims to make local environmental planning provision for land within the Shoalhaven LGA. The subject land is zoned R3 Medium Density Residential under the Shoalhaven LEP. The objectives of this zone are:

- To provide for the housing needs of the community within a medium density residential environment;
- To provide a variety of housing types within a medium density residential environment;
- To enable other land uses that provide facilities or services to meet the day to day needs of residents; and
- To provide opportunities for development for the purposes of tourist and visitor accommodation where this does not conflict with the residential environment.

The subject land does not occur on land mapped as 'Terrestrial Biodiversity' under the Shoalhaven LEP.

1.3.7. Shoalhaven Development Control Plan (DCP) 2014

The Shoalhaven DCP applies to all land within the Shoalhaven LGA. The objectives of the DCP are to:

- To provide criteria for the assessment of development applications;
- Build upon the Shoalhaven LEP 2014 by providing detailed objectives, and controls for development;
- Foster ecologically sustainable development;
- Ensure development responds to the qualities of the subject land and to the character of the surrounding neighbourhood;
- Encourage innovative housing, commercial and industrial design;
- Maintain and enhance the natural, built and cultural significance of heritage items; and
- Manage the risks to new development from natural hazards including coastal, flood and bushfire risks.

1.4. Assessment of Entry into the Biodiversity Offsets Scheme

To determine the type of assessment required for the Project it is necessary to determine whether the Project triggers the BOS. The criteria for entry into the BOS are outlined below:

- It is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test of significance in Section 7.3 of the BC Act; or
- If clearing exceeds the biodiversity offsets scheme threshold; or
- It is carried out in a declared Area of Outstanding Biodiversity Value (AOBV).

These three criteria as they apply to the Project are assessed in detail below. The results indicate that the Project does not trigger the BOS and therefore an FFA is appropriate to assess the impacts to biodiversity associated with the Project.

1.4.1. Test of Significance

A test of significance in accordance with Section 7.3 of the BC Act was undertaken for all threatened communities and species known, or considered likely, to occur within the subject land (see **Appendix D**). This assessment indicates that none of these communities or species are considered likely to be significantly affected by the Project and therefore the BOS is not triggered by this mechanism.

1.4.2. Biodiversity Offsets Scheme Threshold

A development can exceed the BOS threshold if it is or involves:

- The clearing of native vegetation of an area above a prescribed threshold based on the minimum lot size; or
- The clearing of native vegetation, or other prescribed action, on land included on the Biodiversity Values Map.

These thresholds are assessed in detail below.

1.4.2.1. Clearing of Native Vegetation Threshold

Any development being assessed under Part 4 of the EP&A Act that clears native vegetation above a threshold specified based on minimum lot size would automatically enter into the BOS and may require offsetting. The threshold levels of clearing for each minimum lot size are shown in **Table 1**. The minimum lot size for the subject land is 580 m^2 and therefore the clearing of 0.25 ha or more would trigger entry into the BOS.

Based on pre-lodgement discussions with Shoalhaven City Council (Council), it was determined that the areas identified as exotic dominated grasslands within the subject land could likely be excluded from the areas assessed as native vegetation. On this basis, the Project would only require the clearing of approximately 0.24 ha, and therefore not trigger entry into the BOS.

Table 1 Area of clearing thresholds

Minimum Lot Size of Land	Area of Clearing
Less than 1 hectare	**0.25 hectares or more**
Less than 40 hectares but not less than 1 hectare	0.5 hectares or more
Less than 1,000 hectares but not less than 40 hectares	1 hectare or more
1,000 hectares or more	2 hectares or more

1.4.2.2. Biodiversity Values Map

The subject land is not mapped on the BV Map and Threshold Tool as shown in **Figure 4** and as such, the BOS will not be triggered via this mechanism.

1.4.3. Declared Area of Outstanding Biodiversity Value

The BC Act currently lists the following AOBVs:

- Gould's Petrel habitat;
- Little Penguin population in Sydney's North Harbour habitat;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and
- Wollemi Pine habitat.

The Project is not located within the above AOBVs and therefore the BOS is not triggered by this mechanism.

2. Methodology

2.1. Desktop Assessment

2.1.1. Literature Review

A review of relevant ecological literature, as well as general project related literature, was undertaken as part of this FFA to evaluate the flora and fauna values associated with the subject land. The information collected during the literature review guided the field surveys undertaken for the FFA. Information within the literature reviewed was also utilised in determining the likelihood of threatened species occurring within the subject land and assessing the potential impacts of the Project. The resources used include:

- Department of Climate Change, Energy, the Environment and Water (DEECCW) (2022): NSW State Vegetation Type Map
- Arboriculture Consultancy Australia (2024): Arboricultural Impact Assessment;
- Edmiston Jones (2024). Proposed Bomaderry BTR Landscape Services; and
- Northrop (2024). Bomaderry BTR – 53 & 57 Bolong Road & 4 Beinda Street Bomaderry Civil Engineering Package.

2.1.2. Database Analysis

A number of databases were utilised during the preparation of this FFA. Key databases reviewed included:

- NSW DEECCW BioNet Atlas (DCCEEW (NSW) 2024a);
- Commonwealth DEECCW Protected Matters Search Tool (DCCEEW 2024);
- NSW DEECCW Bionet Vegetation Classification database (DCCEEW (NSW) 2024b);
- NSW DEECCW Threatened Biodiversity Data Collection (DCCEEW (NSW) 2024c); and
- Commonwealth DEECCW Species Profile and Threat Database (DCCEEW (Cwlth) 2024).

Database analysis was conducted for the locality using the DEECCW BioNet Atlas and the Commonwealth DEECCW Protected Matters Search Tool. The locality is defined as the area within a 5 km radius of the subject land. The BioNet Atlas search facility was used to generate records of threatened flora and fauna species and populations listed under the BC Act and/or EPBC Act within the locality. The abundance, distribution and age of records generated within the search areas provided supplementary information for the assessment of likelihood of occurrence of those threatened species within the subject land. The Protected Matters Search Tool generated a list of potentially occurring MNES listed under the EPBC Act within the locality of the subject land.

2.2. Flora Surveys

Flora surveys of the subject land were undertaken by a botanist and an ecologist from Cumberland Ecology on 10 January 2024. Surveys included vegetation mapping, plot-based vegetation survey and threatened flora

surveys. The survey design consisted of random meander searches as well as plot-based surveys and was guided by the following:

- NSW Government (2020): Biodiversity Assessment Method; and
- NSW Government (2020): Surveying threatened plants and their habitats.

The locations of all surveys are shown in **Figure 5**. Further details of field survey methods are provided below.

2.2.1. Vegetation Mapping

The State Vegetation Type Map (SVTM) (DPE 2023b) is a regional-scale map of NSW Plant Community Types (PCTs) and was accessed prior to the survey in order to determine vegetation communities that could occur within the subject land. The vegetation within the subject land was subsequently ground-truthed by Cumberland Ecology. Where vegetation community boundaries were found to differ from the existing mapping, records were made of new boundaries using a hand-held Global Positioning System and mark-up of aerial photographs. The data collected was analysed and the resultant information was synthesised using a Geographic Information System to produce a vegetation map of the subject land.

2.2.2. Plot-based Floristic Survey

A plot-based floristic survey was undertaken within the subject land. The survey was conducted in accordance with the BAM and included establishment of three 20 m x 50 m plots within which the following data was collected:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 m x 20 m plot;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 m x 20m plot;
- Cover of 'High Threat Exotic' weed species;
- Assessment of function attributes within a 20 m x 50 m plot, including:
    - Count of number of large trees;
    - Tree stem size classes, measured as 'diameter at breast height over bark' (DBH);
    - Regeneration based on the presence of living trees with stems <5 cm DBH;
    - The total length in metres of fallen logs over 10 cm in diameter;
- Assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 m x 50 m plot; and
- Number of trees with hollows that are visible from the ground within the 20 m x 50 m plot.

All vascular plants recorded or collected were identified using keys and nomenclature provided in *PlantNET* (Botanic Gardens Trust 2021).

The location of the BAM plots is shown in **Figure 5.**

2.2.3. Targeted Threatened Flora Surveys

Targeted surveys were conducted within potential habitat of the subject land and additional threatened flora surveys were undertaken in conjunction with collection of floristic plot data. Surveys were targeted towards threatened species known to occur in the locality of the subject land.

The targeted threatened flora surveys were undertaken through a combination of a random meander survey and plot survey. Due to the small area of the subject land, a random meander was deemed appropriate for the surveys, and was supplemented with the required plot survey.

2.2.4. Data Analysis

2.2.4.1. Plant Community Types

The primary nomenclature used within this report is locally defined map units that were determined following field investigations within the subject land. Where relevant, the locally defined map units were matched with the equivalent PCTs.

Identification of the PCTs occurring within the subject land was guided by the findings of the floristic plot-based survey. The data collected during surveys of the subject land was analysed in conjunction with a review of the PCTs held within the BioNet Vegetation Classification. Where locally defined map units were not readily able to be matched to PCTs, best-fit communities were selected, or noted as unassigned if comprised of planted or exotic vegetation.

2.2.4.2. Classification of Threatened Ecological Communities

Following review of potentially occurring TECs, the vegetation communities identified within the subject land were examined against the listings of TECs under the BC Act and EPBC Act.

For TECs listed under the BC Act, vegetation communities were examined against the final determinations for potentially occurring TECs. A component of this analysis was to compare the species recorded during the field surveys with the species lists provided in the final determinations. Additional information such as location and geology and landform aspects of each final determination were also considered in the assessment.

For TECs listed under the EPBC Act, vegetation communities were examined against the Commonwealth DEECCW Species Profile and Threats Database and any associated documentation, such as listing advice and policy statements.

2.3. Fauna Surveys

Fauna surveys were undertaken by two ecologists from Cumberland Ecology on 10 January 2024 and 6 March 2024 and included a general habitat assessment, incidental observations, as well as a Grey-headed Flying-fox (GHFF) fly-out survey and verification of the current extent of the GHFF camp. The location of fauna surveys undertaken within the subject land are shown in **Figure 5** and further detailed on each survey method is provided below.

2.3.1. Habitat Assessment

A general fauna habitat assessment was undertaken within the subject land during field surveys on 10 January 2024. This assessment included consideration of important indicators of habitat conditions and complexity as well as the occurrence of micro-habitats such as tree hollows, fallen logs and riparian areas. An assessment of the structural complexity of the vegetation, the age structure of the forest and the nature and extent of human disturbance was also undertaken. Notes were taken on specific habitat features that may be utilised by threatened fauna species known to occur in the locality.

2.3.2. Grey-headed Flying-fox Surveys

2.3.2.1. Mapping

Previous mapping of the GHFF camp by Council provided to Landcom, was utilised to assist with identifying potential locations of roosting bats. The extent of the camp as mapped by Council was verified and any observable changes in roosting locations were mapped using a hand-held global positioning system and 'marked-up' on a hard copy aerial map. The total area of the camp was estimated using geographic information systems.

2.3.2.2. Fly-out Surveys

Fly-out surveys were undertaken by two ecologists, from a location at Beinda Street along the northern boundary of the subject land and from two locations south-west of the subject land (see **Figure 5**). The observation locations were chosen to provide a view from two sides of the camp, in order to identify the general fly-out direction of the GHFFs when leaving the camp at dusk.

The general fly-out direction of the GHFFs were marked up on a hard-copy map.

2.3.3. Incidental Observations

Any incidental fauna species that were observed, heard calling, or otherwise detected on the basis of tracks or signs, were recorded during the fauna surveys and listed in the total species list for the subject land.

2.4. Weather Conditions

Weather conditions during the field surveys were appropriate for detection of a range of flora and fauna species. A summary of weather conditions in the wider locality of the subject land (BOM Weather Station 068072 –Nowra Ran Air Station) during the field surveys is provided in **Table 2**.

Table 2 Weather conditions during field surveys

Date	Temperature Minimum (°C)	Temperature Maximum (°C)	Rainfall (mm)
10/01/2024	17.2	29.0	0.0
6/03/2024	14.6	30.1	0.0

2.5. Limitations

Weather conditions during flora and fauna surveys were generally appropriate for detection of a variety of flora and fauna. The surveys on both days were undertaken during fine weather, as per details provided in **Table 2.**

The flora and fauna of the locality is well known based upon a sizeable database of past records and various published reports. The field survey undertaken by Cumberland Ecology added to this existing database and has helped to provide an indication of the likelihood that various species occur or are likely to occur within the subject land. The data obtained from database assessment and surveys of the subject land furnished an appropriate level of information to support this assessment.

It is considered that the flora and fauna species of conservation value have been adequately considered within the subject land to enable this FFA to be prepared. A range of threatened flora species are known to occur in the locality, however based on ground conditions, none of these species are likely to occur in the subject land. The field surveys were supplemented by literature review, database analysis and a fauna habitat assessment. The combination of these techniques is considered appropriate for assessing the habitat values of the site for threatened fauna within the subject land.

3. Results

3.1. Vegetation Communities

Previous broad-scale mapping of the subject land by DCCEWW (DPE 2023b) maps the majority of the woody vegetation within the site as PCT 3654 – Shoalhaven Lowland Bloodwood Shrub Forest, with small areas in the south-eastern corner identified as PCT 3270 – Shoalhaven Lowland Wet Gully Forest.

Surveys undertaken by Cumberland Ecology refined the broad-scale mapping and determined that two locally defined native vegetation communities were present within the subject land, as well as Exotic Dominated Grasslands and Exotic Vegetation.

The vegetation communities within the subject land are shown within **Table 3**, and the distribution of the vegetation communities are shown in **Figures 6**. A description of each vegetation community including the associated PCTs and their listing status under the BC Act and EPBC Act are provided below.

Table 3 Vegetation communities within the subject land and the extent within the subject land

Vegetation Community	PCT	BC Act Status	EPBC Act Status	Subject Land (ha)
Shoalhaven Lowland Wet Gully Forest	3270	-	-	0.19
South Coast Lowland Shrub-Grass Forest	3273	-	-	0.11
Exotic Dominated Grassland	-	-	-	0.18
Exotic Vegetation	-	-	-	0.05
Cleared Land	-	-	-	0.05
Total				**0.59**

3.1.1. PCT 3270 Shoalhaven Lowland Wet Gully Forest

Vegetation Formation: Wet Sclerophyll Forest (Grassy sub-formation)

Vegetation Class: Southern Lowland Wet Sclerophyll Forests

Percent Cleared Value: 5.23

3.1.1.1. General Description

PCT 3270 within the subject land exists as a grassland with scattered native remnant/regrowth trees, sub-dominated by native grasses with scattered native forbs, which are all associated with the PCT. Despite a substantial percentage of cover of native grasses, these areas are old lawns, and as such dominated by exotic grass species. The grassland areas have a similar composition in open areas, to under remnant/regrowth trees, and planted native and exotic trees, and due to the patchy nature that would result from considering the open grasslands and areas under canopy, both native and exotic, as separate condition zones, with all resultant areas too small to be assessed with BAM plots, this vegetation has been assigned to a single condition zone., taking the form of a degraded, open woodland.

The vegetation community occurs surrounding residential dwellings, which are associated with a south-eastern aspect slope, sloping from a plateau type area in the northern half of the subject land, gradually down offsite to Bomaderry Creek. This area was historically more sheltered than the northern half of the subject land, and due to the slope sandstone outcropping is less prevalent, soils are likely to have been deeper, and a wetter forest type appears to have been present.

A number of trees, small trees, and shrubs, for the most part comprising juveniles of canopy species are present, that are of species consistent with PCT 3270. It is likely that these are resultant from a combination of only partial clearing of properties at the time of construction of the residential dwellings, germination from the soil seed bank following clearing, and from seed fall from trees in the time since utilisation of the properties for residential purposes.

Native tree species occurring which are associated with PCT 3270 are *Acmena smithii*, *Alphitonia excelsa* (Red Ash), *Corymbia maculata, Glochidion ferdinandi,* and *Pittosporum undulatum*, and the shrub *Breynia oblongifolia* (Coffee Bush) is also present. Also occurring within the zone are native species that have been planted, evidenced by the fact that are species not indigenous to the locality, or due to their arrangement, situation, and height in relation to garden beds and exotic plantings. These species include *Grevillea robusta* (Silk Oak), *Lophostemon confertus* (Brush Box), *Tristaniopsis laurina* (Water Gum), and *Callistemon citrinus* (Crimson Bottlebrush). Additionally, a number of exotic tree and shrub species are present in the zone, either as plantings or as weeds. Species include *Ligustrum lucidum, Jacaranda mimosifolia* (Jacaranda), *Lagerstroemia indica* (Crepe Myrtle), and *Cupressus lusitanica* (Mexican Cypress).

The ground layer is variously dominated by exotic grass species including *Sporobolus fertilis*, *Ehrharta erecta*, *Paspalum dilatatum,* and *Cenchrus clandestinus*. Other exotic grass species are present and include *Bromus catharticus,* and *Eragrostis tenuifolia*. Exotic forbs are common and include *Hypochaeris radicata*, *Bidens pilosa,* and *Taraxacum officinale*.

Sub-dominant to exotic grasses, and collectively comprising up to 30% foliage coverage in some areas are the native grasses *Microlaena stipoides* var. *stipoides* and *Oplismenus aemulus* (Basket Grass), with other less frequently occurring species including *Chloris truncata* (Windmill Grass). Native sedges are present and include *Cyperus gracilis*, *Cyperus laevis*, and *Cyperus polystachyos*, and native forbs such as *Commelina cyanea* and *Dichondra repens* are also scattered infrequently in the ground layer.

Examples of PCT 3270 in the subject land are shown in **Photographs 1** and **2**.

Photograph 1 Example of PCT 3270 in the subject land, with *Glochidion ferdinandi* trees and *Breynia oblongifolia* shrub

Photograph 2 Example of PCT 3270, with a ground layer sub-dominated by *Microlaena stipoides* var. *stipoides*

3.1.1.2. Justification of PCT Selection

Justification for the selection of PCT 3270 is detailed below in **Table 4**. As a designation was not able to be made between dry or wet sclerophyll forest formation types, due to the lack of intact areas of vegetation, the PCT Filter search was undertaken broadly, without designation of a vegetation formation or class in the filter.

Table 4 Justification for PCT 3270 Selection

Search Term/Filter	Selection/Discussion
Non-PCT Filter Tool Methods:	-
Potential PCT matches from SVTM over or nearby to PCT 3273 polygons in site-specific mapping	PCT shortlist: 3269, 3270
PCT Filter Tool	
IBRA Bioregion and Subregion	Sydney Basin
	Illawarra
Species (all strata and growth forms)	*Alphitonia excelsa, Breynia oblongifolia, Commelina cyanea* *Corymbia maculata* *Cyperus gracilis* *Cyperus laevis* *Dichondra repens* *Glochidion ferdinandi* *Lobelia purpurascens* *Microlaena stipoides var. stipoides* *Oplismenus aemulus* *Pittosporum undulatum*
Shortlist	Highest matches (12-14) shortlist of 29 PCTs: 3078, 3191, 3327, 3251, 3321, 3323, 3420, 3427, 3433, 3446, 3077, 3139, 3167, 3168, 3169, 3270, 3544, 3620, 3110, 3170, 3233, 3236, 3241, 3244, 3253, 3254, 3258, 3262, 3268
Selection	PCTs 3251, 3321, 3323, 3420, 3427, 3433, 3446, 3139, 3167, 3168, 3169, 3620, 3110, 3170, 3233, 3236, 3241, 3244, 3253, 3254, and 3262 were discarded as these are not associated with the Illawarra Subregion. PCT 3078 was discarded as this community is described as mostly having *Eucalyptus tereticornis* and *Eucalyptus quadrangulata* in the canopy, which were not present within the subject land. PCT 3191 was discarded as the most frequently record canopy species (Eucalyptus muelleriana, Syncarpia glomulifera, Eucalyptus paniculata, Angophora floribunda and the hybrid Eucalyptus botryoides – saligna) are absent from the subject land.

Search Term/Filter	Selection/Discussion
	PCT 3327 was discarded as this community is described as almost always having a canopy with *Eucalyptus tereticornis,* which is absent from the subject land. PCT 3258 was discarded as this community is described as occurring on sandy creeks in the dissected sandstone plateaus of the blue mountains. 3077 was discarded as it is described as occurring on clay-rich sandstones or shales, not Permian sandstones or alluvium, and canopy species mostly dominating the community such as *Streblus brunonianus* are absent. 3544 is discarded as this community is a dry sclerophyll forest on sand deposits, whereas vegetation within this area of the subject land has a mesic influence, and occurs on alluvium. 3268 was discarded as the most frequent canopy species (*Syncarpia glomulifera* and or *Eucalyptus paniculata*, rarely with *Angophora floribunda, Eucalyptus scias* or *Eucalyptus pilularis*) are absent from the subject land. 3269 was discarded as this community is not described as having a mesic understorey, and occurs on Permian siltstones, which does not map the soil landscape mapping (DPE 2023a) across the subject land. 3270 was chosen as it is described as having as having a canopy dominated occasionally by *Corymbia maculata*, includes a number of mesic/coastal rainforest species recorded within the subject land in these areas such as *Acmena smithii*, *Glochidion ferdinandi* and *Alphitonia excelsa* and is described as occurring on lowland in the Shoalhaven region, on Permian sandstone, matching adjacent soil landscape mapping. Species recorded within the onsite occurrence that have been recorded within plots within the community as reported in the BioNET Vegetation Classification page for the community are: *Acmena smithii, Alphitonia excelsa, Breynia oblongifolia, Commelina cyanea, Corymbia maculata, Cyperus laevis, Dichondra repens, Glochidion ferdinandi, Lobelia purpurascens, Microlaena stipoides, Oplismenus aemulus,* and *Pittosporum undulatum.*

3.1.1.3. Alignment with Threatened Ecological Communities

PCT 3270 is not aligned with any TECs that occur in the locality of the subject land.

3.1.2. PCT 3273 South Coast Lowland Shrub-Grass Forest

Vegetation Formation: Wet Sclerophyll Forest (Grassy sub-formation)

Vegetation Class: Southern Lowland Wet Sclerophyll Forests

Percent Cleared Value: 25.86

3.1.2.1. General Description

PCT 3273 South Coast Lowland Shrub-Grass Forest occurs across the treed areas of the western half of the subject land. It occurs in one condition state; degraded. This degraded form of PCT 3273 has a native canopy, and overall is dominated by native species in the shrub and ground layer, though has high percentages of weed cover in the shrub and ground layer patchily across the condition zone, as well as having a sparse understorey in some areas due to previous clearing. The vegetation community occur on relatively flat-topped ground, with shallow soils interspersed by flat outcrops of sandstone (**Photograph 3**).

PCT 3273 in degraded condition occurs as one large patch in the north-western corner of the subject land (**Photograph 4**), and as a single tree in the south-western portion of the subject land (**Photograph 5**). Within the subject land the community is dominated exclusively by *Corymbia maculata* (Spotted Gum), which also occurs as younger, regrowth individuals in both the sub-canopy and the shrub layer. Other species in the sub-canopy, generally consisting of single individuals, include *Acacia mearnsii* (Black Wattle), *Pittosporum undulatum* (Swet Pittosporum), and *Exocarpos cupressiformis* (Brush Cherry), and the non-indigenous native *Grevillea robusta* (Silky Oak) is present in layer as a weed. The shrub layer is mostly dominated by native species, however a large patch of *Lantana camara* is present in the south of the large patch, and other exotic shrubs are present and include *Ligustrum lucidum* (Broad-leaved Privet), *Ligustrum sinense* (Small-leaved Privet), and *Olea europaea* subsp. *cuspidata* (African Olive). Native species present in the shrub layer include *Kunzea ambigua* (Tick Bush), *Leptospermum polygalifolium* subsp. p*olygalifolium, Daviesia ulicifolia* (Gorse Pea)*, Hakea dactyloides* (Finger Hakea), and *Dillwynia ramosissima*.

The ground layer is variously dominated by native and exotic species, with exotic weeds more common in the south of the large patch. Native species present include the grasses *Cymbopogon refractus* (Barbwire Grass), *Sporobolus creber* (Slender Rat's Tail Grass) and *Entolasia stricta*, the graminoids *Lomandra confertifolia* and *Lomandra longifolia* (Spiny-headed Mat-rush), and the forbs *Tricoryne simplex* and *Plectranthus parviflorus*. Also present are climbers and twiners including *Parsonsia straminea* (Common Silkpod) and *Glycine clandestina* (Twining Glycine).

Exotic species present in the layer include the forbs *Asparagus aethiopicus* (Ground Asparagus), *Chlorophytum comosum* (Spider Plant), and *Bryophyllum delagoense* (Mother of millions), and grasses *Cenchrus clandestinus* (Kikuyu), *Ehrharta erecta* (Panic Veldtgrass), and *Paspalum dilatatum* (Paspalum).

In the south of the large patch there are higher occurrences of mesic species in the understorey, indicating this area may have historically been a transitional area with PCT 3270, occurring to the south. Species include *Glochidion ferdinandi* and *Alphitonia excelsa*.

The understorey of the patch in the west consisting of a single large *Corymbia maculata* tree, has a shrub layer of regrowth *Glochidion ferdinandi,* and a ground layer predominately dominated by the exotic grass *Cenchrus clandestinus*.

Examples of this vegetation community are shown **Photographs 4** and **5.**

Photograph 3 Sandstone outcrops in the north-western portion of the subject land

Photograph 4 PCT 3273 in within the western portion of the subject land

Photograph 5 PCT 3273 in the south-western corner of the site

3.1.2.2. Justification of PCT Selection

Justification for the selection of PCT 3273 is detailed below in **Table 5**. As a designation was not able to be made between dry or wet sclerophyll forest formation types, due to the lack of intact areas of vegetation, the PCT Filter search was undertaken broadly, without designation of a vegetation formation or class in the filter.

Table 5 Justification for PCT 3273 Selection

Search Term/Filter	Selection/Discussion
Non-PCT Filter Tool Methods	
Potential PCT matches from SVTM over or nearby to PCT 3273 polygons in site-specific mapping	PCT shortlist: 3654, 3269, 3270
PCT Filter Tool	
IBRA Bioregion and Subregion	Sydney Basin
	Illawarra
Species (all strata and growth forms)	*Acacia mearnsii, Allocasuarina littoralis, Alphitonia excelsa, Breynia oblongifolia, Commelina cyanea, Corymbia maculata, Cymbopogon*

Search Term/Filter	Selection/Discussion
	refractus, Cyperus laevis, Daviesia ulicifolia, Dichondra repens, Dillwynia ramosissima, Entolasia marginata, Entolasia stricta, Eragrostis brownii, Exocarpos cupressiformis, Glochidion ferdinandi, Glycine clandestina, Glycine microphylla, Hakea dactyloides, Leptospermum polygalifolium, Leucopogon juniperinus, Lobelia purpurascens, Lomandra confertifolia, Lomandra longifolia, Maekawaea rhytidophylla , Microlaena stipoides, Panicum simile, Parsonsia straminea, Pimelea linifolia, Pittosporum undulatum, Plectranthus parviflorus, Rytidosperma tenuius, Sacciolepis indica, Sporobolus creber, Tricoryne simplex, Veronica plebeia, Viola banksii.
Shortlist	Highest matches (27-31) shortlist of fourteen PCTs: 3321, 3244, 3262, 3433, 3330, 3446, 3273, 3251, 3315, 3320, 3427, 3581, 3592, 3616
Selection	PCTs 3321, 3244, 3262, 3433, 3446, 3251, 3315, 3320, 3427, 3581, 3592, and 3616 were discarded as these are not associated with the Illawarra Subregion. PCT 3654 was discarded as it is described as nearly always having a canopy with *Corymbia gummifera*, and frequently with *Syncarpia glomulifera* - neither species was recorded within vegetation within the subject land which was dominated by *Corymbia maculata* with no other species occurring in the canopy. The shrub layer is also stated to nearly always include *Banksia spinulosa,* with *Persoonia linearis,* and *Lomatia silaifolia* also commonly being present. These species were also absent. PCT 3269 was discarded as this community commonly has an understorey of *Melaleuca decora*, which was not present within the subject land, and is associated with Permian siltstones. Soils in this vegetation area within the subject land are associated with sandstone, with sandstone outcrops present, and soil landscape mapping (DPE 2023a) indicates the subject land is at the interface of the Nowra landscape, derived from Nowra Sandstone (a Permian sandstone type), and the Shoalhaven landscape, derived from sandstone and shale alluvium overlying estuarine sediments. PCT 3270 was discarded as the lower layers are described as being dominated by mesic or semi-mesic species such as *Acmena smithii, Synoum glandulosum, Elaeocarpus reticulatus,* and *Eupomatia laurina*. The vegetation within this area included mostly sclerophyllous understorey species such as *Kunzea ambigua*, *Daviesia ulicifolia*, *Hakea dactyloides*, and *Exocarpos cupressiformis*. PCT 3330 was discarded as this community is described as most frequently having a canopy including *Eucalyptus longifolia and tereticornis Eucalyptus tereticornis*, occurring over a mid-storey dominated by *Melaleuca* spp. These species are all absent from the subject land. PCT 3273 was chosen as this community is described as being dominated by *Corymbia maculata* in some locations (the canopy is described as being variable across its range), and the description describing a dry shrub layer matches the species composition within the subject land.

Search Term/Filter	Selection/Discussion
	The community is described as occurring in some areas on Permian sandstones, which matches the Nowra soil landscape adjoining the subject land, and the occurrence of outcrops of sandstone throughout the northern half of the subject land (DPE 2023a). The PCT has a high number of matches of species (32) recorded within the occurrence within the subject land. Species recorded within the onsite occurrence that have been recorded within plots within the community as reported in the BioNET Vegetation Classification page for the community are: *Acacia mearnsii, Allocasuarina littoralis, Alphitonia excelsa, Breynia oblongifolia*, *Commelina cyanea, Corymbia maculata, Cymbopogon refractus, Daviesia ulicifolia, Dichondra repens, Entolasia marginata, Entolasia stricta, Eragrostis brownii, Exocarpos cupressiformis, Glochidion ferdinandi, Glycine clandestina, Glycine microphylla, Hakea dactyloides, Leptospermum polygalifolium, Leucopogon juniperinus, Lobelia purpurascens, Lomandra confertifolia, Lomandra longifolia, Maekawaea rhytidophylla , Microlaena stipoides, Panicum simile, Parsonsia straminea, Pimelea linifolia, Pittosporum undulatum, Plectranthus parviflorus, Rytidosperma tenuius, Veronica plebeia,* and *Viola banksii*.

3.1.2.3. Alignment with Threatened Ecological Communities

PCT 3273 is not aligned with any TECs that occur in the locality of the subject land.

3.2. Other Vegetation Types

3.2.1. Exotic Dominated Grassland

Exotic Dominated Grassland occurs across most of the western half of the subject land and exists as a large open area of grassland dominated by exotic grass species, with scattered native forbs present, as well as being sub-dominated by a native grass (*Sporobolus creber)*. This is a highly degraded area with only scattered native species (~30 percent of the total cover). Native species present with a scattered distribution include the grasses *Sporobolus creber, Eragrostis brownii* (Brown's Lovegrass) and *Bothriochloa macra* (Redleg grass), the sedges *Cyperus polystachyos* and *Fimbristylis dichotoma* (Common Fringe-sedge), and the forbs *Centella asiatica* (Indian Pennywort), and *Crassula sieberiana* (Australian Stonecrop).

Exotic grass species common or dominating this community include *Cynodon dactylon* (Common Couch), *Paspalum dilatatum,* and *Sporobolus fertilis* (Giant Parramatta Grass), and a number of other species such as *Axonopus fissifolius* (Carpet Grass) and *Eragrostis tenuifolia* occur less frequently. Exotic forbs are common and include *Senecio madagascariensis* (Fireweed), *Bidens pilosa* (Cobbler's Pegs), and *Hypochaeris radicata* (Catsear).

An example of Exotic Dominated Grassland within the subject land is shown in **Photograph 6.**

Photograph 6 Exotic Dominated Grassland in the western portion of the subject land

3.2.2. Exotic Vegetation

Areas within the subject land heavily dominated by exotic species, with little to no presence of native species have been mapped as Exotic Vegetation. These include patches of lawn in the east, dominated by exotic grasses such as *Cenchrus clandestinus* and *Cynodon dactylon*, and not sub-dominated by native species. Also included is a large patch of exotic woody species, predominately *Ligustrum lucidum*, with other exotics present including *Monstera deliciosa* and *Asparagus aethiopicus,* which is dense to the extent a ground layer is nearly completely excluded due to lack of light.

There is also a large patch in the western half of the subject land which comprises waste and woody debris, which has become colonised by a range of exotic species including shrubs *Solanum mauritianum* (Wild Tobacco Bush) and *Ligustrum lucidum*, forbs such as *Bryophyllum delagoense* and *Bidens pilosa*, and grasses including *Cenchrus clandestinus*. There was a single shrub sized individual of the native *Melia azedarach* (White Cedar) in this waste pile.

Examples of Exotic Vegetation are shown in **Photographs 7, 8** and **9**.

Photograph 7 Exotic woody weeds in the eastern portion of the subject land

Photograph 8 Exotic grassland areas in the eastern parts of the subject land

Photograph 9 Exotic weeds over woody debris in the western parts of the subject land

3.3. Flora

3.3.1. General Species

A total of 141 flora species have been recorded within the subject land. Species present within the subject land consists of a mix of exotics (60%, n = 85) and native species (40%, n = 56). The floral assemblage across the subject land is a reflection of previous clearing for residential development and current land uses which have resulted in the subject land being dominated by exotic ground cover and understorey, combined with remnant native canopy species. A total flora species list for the subject land is provided in **Appendix A**.

3.3.2. Threatened Species

No threatened flora species have been recorded within the subject land or are likely to occur. The understorey vegetation in the subject land is too disturbed and predominantly comprises previously cleared areas, exotic grasses and other weeds. An analysis of the likelihood of occurrence within the subject land for all threatened flora species recorded within the locality or that have the potential to occur is provided in **Appendix B**. Of the ten threatened species known or predicted to occur within the locality, none were assessed as having potential to occur within the subject land.

3.3.3. Priority Weeds and Weeds of National Significance

The subject land is located within the Priority region for the South East. Two species present within the subject land, *Asparagus asparagoides* (Bridal Creeper) and *Rubus fruticosus* sp. aggregate (Blackberry Complex) are listed as priority weeds under the South East Regional Strategic Weed Management Plan 2023 –2027 (LLS:

South East 2022) and both are considered to be Weeds of National Significance WoNS. The spread of these types of species must be minimised to the extent possible, and the sale or distribution of these species is prohibited. These species are detailed below in **Table 6**.

Table 6 Priority Weeds recorded within the subject land

Scientific Name	Common Name	Status	WoNS
Asparagus aethiopicus	Asparagus Fern	SP	Yes
Lantana camara	Lantana	SP	Yes
Senecio madagascariensis	Fireweed	SP	Yes

Key: SP = State Priority weed

3.4. Fauna

3.4.1. Fauna Habitat

Fauna habitat within the subject land is limited due to previous land disturbances. The majority of the subject land has been subject to historical clearing for the existing dwellings and now comprises predominantly regrowth vegetation and planted garden vegetation as well as exotic dominated/exotic grasslands. However, the treed areas within the subject land provide some limited habitat for native fauna species.

Habitat features recorded within the subject land include:

- Nectar-producing trees – foraging habitat for insects, blossom-dependant birds, arboreal mammals and megachiropteran bats (Flying-foxes). These features are mainly confined to treed areas of PCT 3270 and PCT 3273; and
- Hollow-bearing trees – four trees with potential hollows have been recorded in the subject land, as shown in **Figure 6** with details provided in **Table 7.**

Additionally, although in general good condition, there is the potential for the existing built structures in the subject land to form potential roosting and shelter habitat for some fauna species.

Table 7 Details of hollow-bearing trees recorded within the subject land

Habitat ID	Habitat Type	Tree Number AIA*	Description
H1	Hollow-bearing tree	75	*Corymbia maculata*, possible small hollow (<10cm diameter)
H2	Hollow-bearing tree	82	*Corymbia maculata*, possible small hollow (<10cm diameter)
H3	Hollow-bearing tree	80	*Corymbia maculata*, small hollow (<10cm diameter)
H4	Hollow-bearing tree	56	*Corymbia maculata*, possible small hollow (<10cm diameter)

**Refers to matching tree number in Arboricultural Impact Assessment (AIA).*

3.4.2. General Species

Numerous vertebrate fauna species are known to occur within the locality. Several common fauna species were recorded within the subject land during the survey period including the Indian Myna (*Acridotheres tristis*), Galah (*Eolophus roseicapilla*), Rainbow Lorikeet (*Trichoglossus moluccanus*), and the Eastern Water Skink (*Eulamprus quoyii*). These are common and widespread species that often occur in urban areas. This is not an exhaustive list of species, and a suite of other fauna species are expected to occur within the subject land from time to time.

3.4.3. Threatened Species

No threatened fauna species were recorded within the subject land during surveys, however one threatened species was recorded flying over the site; the Grey-headed Flying-fox which is listed as Vulnerable under both the BC Act and EPBC Act. The GHFF individuals recorded flying over the site are associated with the nearby camp, located approximately 200 m south-west of the subject land. A discussion of the species and the camp present nearby is provided in ***Section 3.4.3.1.***

An analysis of the likelihood of occurrence within the subject land for all threatened fauna species recorded within the locality that have the potential to occur is provided in **Appendix C**. Based on the results of the subject land inspection and the habitat requirements of each threatened fauna species, 17 threatened species are considered as having the potential to utilise habitats within the subject land. These are listed in **Table 8** below.

Table 8 Threatened fauna with potential to occur within the subject land

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status
Aves	*Stagonopleura guttata*	Diamond Firetail	V	V
Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-
Aves	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V	E
Aves	*Glossopsitta pusilla*	Little Lorikeet	V	-
Aves	*Ninox strenua*	Powerful Owl	V	-
Aves	*Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V	V
Mammalia	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V	-
Mammalia	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-
Mammalia	*Cercartetus nanus*	Eastern Pygmy-possum	V	-
Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V	-
Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V
Mammalia	*Phascolarctos cinereus*	Koala	E	E
Mammalia	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V	-

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V
Mammalia	*Myotis macropus*	Southern Myotis	V	-
Mammalia	*Petaurus australis*	Yellow-bellied Glider	V	V
Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-

3.4.3.1. Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable under the BC Act and EPBC Act. The Grey-headed Flying-fox is distributed primarily along the eastern coastal plain from Bundaberg in Queensland, through NSW and south to eastern Victoria (NSW Scientific Committee 2004). Within its extent, the Grey-headed Flying-fox occurs in rainforests, open forest, woodlands, Melaleuca swamps and Banksia woodlands (NSW Scientific Committee 2004). The species roosts in camps that are often close to water and within 20 km of a regular food source, and leaves the camps at dusk to forage and returns at dawn. The species is known to travel upwards to 50 km to forage, but more commonly commutes less than 20 km (OEH 2016).

The subject land offers some foraging habitat for the Grey-headed Flying-fox in the form of existing trees and shrubs such as the *Corymbia maculata* trees. The subject land is located approximately 200 m north-east of an active roosting camp, known as the Brinawarr St camp. Although a known camp is in close proximity, the habitat within the subject land would only be utilised by the species as part of a broader foraging range.

Based on surveys to date, and information provided by Council, the extent of the Brinawarr St camp varies between years. The current extent of the camp verified during field surveys by Cumberland Ecology, as well as the largest known extent of the camp based on information by Council is shown in **Figure 7.** According to the information within the Commonwealth DCCEEW's National Flying-fox monitoring viewer (DCCEEW 2023a), the population of the camp varies between 500-16,000 individuals depending on the year.

The general fly-out directions from the camp observed during surveys was in a northerly direction (west of the subject land) and southerly direction, before turning west, as shown in **Figure 7.** Scattered individuals were also recorded flying over the subject land.

As shown within **Figure 7,** several existing residential properties occur nearby the Brinawarr St camp. The area directly surrounding the camp also includes several recent developments that have been constructed adjacent to the GHFF camp since 2018, including a residential development directly north of the camp along Brinawarr St, as well as an ongoing development just south of the camp on the southern side of Bolong Road.

4. Impact Assessment

4.1. Introduction

This chapter considers the ecological impacts of the Project on the biodiversity values within the subject land. The ecological impacts of the Project are largely related to the direct disturbance of vegetation and associated habitat loss, represented by the removal of relatively small areas of degraded forms of PCT 3270 and PCT 3273, as well as Exotic Dominated Grasslands and Exotic Vegetation. Secondary impacts due to indirect impacts are also relevant to the Project and are discussed in subsequent sections, including potential indirect impacts on the Brinawarr St GHFF camp.

The Project is not anticipated to significantly impact native vegetation and habitat within the subject land. The Project has been designed to reduce impacts to native vegetation and as such the majority of large remnant trees along Beinda Street will be retained by the Project, with most of the impacts being associated with exotic dominated/exotic vegetation and already cleared land.

4.2. Direct Impacts

The direct impacts of the Project include clearing of native vegetation and habitat within the Project footprint. The extent of impacts from the Project on vegetation communities within the subject land is shown in **Table 9** and **Figure 8**. The total direct impact on native vegetation is approximately 0.24 ha (47%), whilst the impact on exotic dominated/exotic vegetation and cleared land is approximately 0.27 ha (53%).

Table 9 Extent of impacts as a result of the Project

Vegetation Community	Subject Land (ha)	Project Footprint (ha)
PCT 3270: Shoalhaven Lowland Wet Gully Forest (degraded)	0.19	0.17
PCT 3273: South Coast Lowland Shrub-Grass Forest	0.11	0.07
Exotic Dominated Grassland	0.18	0.16
Exotic Vegetation	0.05	0.05
Cleared Land	0.05	0.05
Total	**0.59**	**0.51**

** In some cases totals may not equal the appropriate total number due to rounding*

4.3. Indirect Impacts

The Project will result in some indirect impacts on the ecological values of remaining vegetation and habitat within the subject land and surrounding areas, including fragmentation and edge effects.

Additionally, a number of construction and operational impacts, such as those relating to dust, noise, light and erosion, may also impact the remaining vegetation and habitat in the subject land and surrounds. Indirect impacts relevant to the Project are considered in more detail below. Whilst it is acknowledged that indirect impacts will occur as a result of the Project, such impacts cannot be mapped or accurately calculated in advance.

4.3.1. Fragmentation

Fragmentation is the process where habitats that were once continuous become divided into separate fragments isolated from each other by non-forest land (Primack 1993, Fahrig 2003, Lindenmayer and Fischer 2006). Habitat fragmentation affects biodiversity by reducing the amount of available habitat for some species to occupy due to increased distances between habitat patches. Plants and other sessile organisms are usually directly removed, while mobile animals (especially birds and mammals) retreat into other remnant patches of habitat (Lindenmayer and Fischer 2006). The displacement of mobile fauna can reduce the survivorship of species in the case where there are limited areas of sufficiently large habitat within dispersal distance to retreat to.

The Project is not considered likely to significantly increase fragmentation within the subject land. The majority of the understorey vegetation within the subject land has previously been cleared and consists of exotic dominated/exotic grasslands. The Project has been designed to predominantly utilise previously cleared areas, with a focus on retention of the larger remnant trees, and as a result only a small area of predominantly foraging habitat will be removed. However, the construction of the residential flat building will result in some minor increases in fragmentation between retained vegetation in the subject land.

4.3.2. Edge Effects

Edge effects are impacts that occur at the interface between natural habitats, especially forests and disturbed or developed land (Yahner 1988). When an edge is created between woodland and a cleared area, changes to ecological processes within the vegetation can extend between 10 m and 100 m from the edge (Yahner 1988). These include microclimatic changes in light, temperature, humidity and wind, which can favour a suite of different species and therefore cause significant changes to the ecology of the patch (Lindenmayer and Fischer 2006). Edge effects can also result from the increase in noise and artificial light from a project.

The Project is not considered likely to result in significant edge effects to vegetation within the subject land. Due to the already modified, fragmented nature of the vegetation and habitat within the subject land, removal of a relatively small area of predominantly exotic dominated grassland and exotic vegetation is unlikely to result in an increase in edge effects on the surrounding retained vegetation beyond current conditions.

4.3.3. Construction Impacts

A number of indirect impacts relevant to the construction phase of the Project have the potential to impact the remaining ecological values of the subject land, such as those relating to dust, noise, light and erosion.

Specific discussion of indirect impacts on the GHFF camp are discussed in ***Section 4.6.1.***

4.3.3.1. Noise

Noise can affect animal physiology and behaviour, and if it becomes an ongoing stress, it can be injurious to an animal's energy budget, reproductive success and long-term survival. There are other potential impacts that include habitat loss through avoidance, reduced reproductive success and a retreat away from favourable habitats (AMEC 2005).

It is likely that most animal species will habituate to the periodic noise disturbance (AMEC 2005), and the construction phases of the Project are likely to cause temporary disturbance only to fauna. In the long term, the levels of noise are likely to only be marginally higher than existing levels in a highly urbanised environment, to which resident fauna will habituate over time and are not expected to have a significant, long-term, impact on any wildlife populations.

4.3.3.2. Light

The Project has the potential to increase the level of artificial light in the natural environment. Increased light levels may adversely impact wildlife by direct glare, chronic or periodic increased illumination and temporary unexpected fluctuations in light levels (Saleh 2007, Longcore and Rich 2010).

While the construction and operational phases of the Project will have some effect on the surrounding woodland environment, the impacts from light pollution are likely to remain close to the disturbance and similar to current conditions, with only limited glare into the surrounding natural vegetation. It is likely that most fauna species would habituate to the periodic disturbance and light pollution from the Project is unlikely to have a significant or long-term impact on any fauna species.

4.3.3.3. Erosion

During the construction of the proposed Project the retained vegetation can be impacted by sedimentation and erosion. Cutting and filling of the subject land for foundations is likely to increase potential erosion. Eroded sediment can smother retained vegetation if appropriate control measures are not implemented. Smothering can reduce regeneration of groundcover species and enter drainage lines. Sediment and eroded material can also contain weed matter and nutrients, and movement of this material into the retained vegetation can facilitate the spread of weeds. Increased weed invasion can result in changes to community composition.

With the implementation of appropriate sediment control methods, the risk of sedimentation is considered to be minor and temporary.

4.4. Impacts to Threatened Ecological Communities

No TECs have been mapped as occurring within the subject land. Nonetheless, a number of mitigation measures are proposed to minimise the impacts to native vegetation and are provided in **Chapter 5**.

4.5. Impact to Threatened Flora Species

No threatened flora species are considered to have the potential to occur within the subject land due to the highly disturbed and modified nature of the subject land, and none have been recorded as occurring in the subject land. Therefore, the proposed development is unlikely to impact on any threatened flora species listed under the BC Act or EPBC Act, or suitable habitat for threatened species.

4.6. Impacts to Threatened Fauna Species

The Project has the potential to result in a number of direct and indirect impacts to the habitat of potentially occurring threatened fauna species within the subject land, in particular to foraging habitat for the Grey-

headed Flying-fox. In addition to the direct removal and modification of vegetation within the subject land, potential indirect impacts to fauna habitat include:

- Habitat disturbance during the construction phase of the Project (e.g. changes in noise);
- Runoff, erosion and sedimentation;
- Increased pollution; and
- Modification of microhabitat features resulting from long and short-term edge effects (e.g. changes in light filtration).

A number of these impacts are already present with the subject land due to previous clearing and surrounding land uses. The potential changes to the retained individuals resulting from indirect impacts are expected to be localised and overall are not considered to cause a substantial change in the habitat of the potentially occurring threatened fauna species.

A Test of Significance required under Section 7.3 of the BC Act has been prepared for the potentially occurring threatened fauna species listed in **Table 8**, in accordance with the *Threatened Species Test of Significance Guidelines* (NSW Government 2018). This assessment is provided in **Appendix D** and concludes that the Project is unlikely to significantly affect the potentially occurring threatened fauna species.

A number of mitigation measures are proposed to minimise the impacts to these species and are provided in **Chapter 5**.

4.6.1. Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable under the BC Act and EPBC Act. An existing active camp occurs approximately 200 m south-west of the subject land and the species is expected to utilise most of the wooded areas of the subject land for foraging purposes.

The Grey-headed Flying-fox may be impacted by the Project through direct removal of some of the foraging habitat within the Project footprint. Approximately 0.24 ha of suitable foraging habitat will be removed, which is represented by blossom-producing trees within PCT 3270 and PCT 3273. However, although the ongoing loss of foraging habitat is a threatening process to the species, the foraging habitat within the subject land is likely utilised as part of a much broader foraging range. The species is known to travel upwards to 50 km to forage, but more commonly commutes less than 20 km (DCCEEW 2023b).

The primary impact from the Project on the GHFF is considered to be the potential for indirect impacts to occur and negatively impact the Brinawarr St camp, mainly during the construction period but also post-construction. These indirect impacts are:

- Temporary and permanent increase in noise level, as discussed in ***Section 4.3.3.1***. Increase in noise level has the potential to disturb the GHFF individuals in the camp, especially during breeding season; and

- Temporary and permanent increase in light pollution, as discussed in ***Section 4.3.3.2***. Increase in light spill into the GHFF camp has the potential to disturb the camp during the morning fly-in and evening fly-out periods, as well as cause stress to juveniles left in the camp overnight during breeding season.

A range of impact avoidance and mitigation measures have been developed for the Project and these are presented in **Chapter 5**. A number of these measures are specifically relevant to the Grey-headed Flying-fox, as details in ***Section 5.3***.

Furthermore, a number of developments have been constructed nearby the camp in recent years. These developments are located closer to the camp than the subject land. The potential indirect impacts of the Project associated with noise levels and light pollution are unlikely to be greater than the developments adjacent to the camp.

5. Avoidance, Mitigation and Compensatory Measures

The purpose of this chapter is to outline the avoidance, mitigation and offset measures proposed to ameliorate the impacts of the Project on biodiversity values. As demonstrated in previous chapters, despite the subject land being highly modified, and comprising a high proportion of exotic species, it provides some habitat for threatened entities. The site is also located near an active GHFF camp. As a result, there is a need to implement measures to minimise impacts to these entities. The impact reduction measures for the Project include the following hierarchy of principles:

- Avoid - to the extent possible, the Project has been designed to avoid or minimise ecological impacts; and
- Mitigate - where certain impacts are unavoidable through design changes, mitigation measures have been introduced to ameliorate the ecological impacts of the Project; and
- Compensate - the residual impacts of the Project, following the implementation of mitigation measures, have been compensated to offset what would otherwise be a net loss of habitat.

5.1. Project Avoidance Measures

The Project layout has undergone several iterations in order to maximise the retention of large remnant trees located along Beinda Street within the subject land. The impact to areas of native vegetation has been limited to approximately 0.24 ha. However, as remnant native canopy trees consisting of the species *Corymbia maculata* occur within the subject land, the Project has been designed to retain the majority of these remnant trees (4 out of 5 trees) along Beinda Street as they provide important foraging habitat to the nearby Grey-headed Flying-fox population and constitute Koala use trees under the BC SEPP. This includes the retention of two trees with potential hollows. The Project footprint has also been located within a portion of the subject land which has been predominantly cleared, containing mostly Exotic Dominated Grasslands, Exotic Vegetation and cleared land.

Furthermore, avoidance measures have been outlined within the Arboricultural Impact Assessment (2024), to ensure remnant canopy trees are protected within the subject land. This includes the establishment of Tree Protection Zones (TPZs) and Structural Root Zones (SRZs) in accordance with the Australian Standard - *Protection of trees on development sites* (AS4970-2009). The ecological investigation undertaken for this assessment indicates that impacts to native vegetation and threatened species are manageable and not significant.

5.2. Mitigation Measures: General

5.2.1. Inductions

Site inductions are to be given by the civil contractor to ensure all site workers and visitors are aware of ecological issues associated with the subject land and the locations of any no access areas.

5.2.2. Access Restrictions

To avoid unnecessary removal or damage to vegetation within the subject land, the clearing area should be clearly demarcated and signed to ensure no vegetation beyond these boundaries is removed. Clearing works and equipment should be excluded from areas outside the clearing area.

5.2.3. Tree Protection

Tree protection measures are to be implemented in accordance with the Arboricultural Impact Assessment (2024). TPZs and SRZs are to be established and appropriate signage installed. Tree protection measures are to include trunk, branch, and root protection.

5.2.4. Pre-clearing and Clearing Surveys

Pre-clearing surveys are to be undertaken by a suitably qualified ecologist. Pre-clearing surveys will include:

- Demarcation of key habitat features such as hollow-bearing trees and buildings to be demolished; and
- Provision of a report following the completion of a pre-clearing survey, detailing the location and type of each habitat feature.

To minimise impacts to native fauna species, clearing is to be undertaken in the following two-stage process under the supervision of a suitably qualified ecologist:

- The initial phase of clearing will involve clearing around identified habitat features and leaving the features overnight; and
- The second stage will involve clearing of the habitat features left overnight followed by an inspection.

Provisions will be made to protect any immobile native fauna during clearing activities by the following means:

- All persons working on the vegetation clearing will be briefed about the possible fauna present and should avoid injuring any present;
- Animals disturbed or dislodged during the clearance but not injured should be assisted to move to the adjacent bushland; and
- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal.

5.2.5. Erosion, Sedimentation and Pollution Control

To reduce sedimentation on the construction site, erosion control measures should be implemented. This includes minimising the amount of exposed soils on the site at any given time. All soil stockpiles should be adequately covered when not in use to prevent erosion through heavy rainfall.

Sediment fences should be established around the perimeter of the development area to prevent the impacts of sedimentation on retained vegetation within the subject land. During development, precautions should be taken to ensure that no pollution, such as petrochemical substances or water containing suspended solids, escapes the construction site. Pollution traps and efficient removal of pollution to an off-site location would help to minimise pollution impacts.

5.2.6. Weed Control Measures

Priority weed species occurring within the subject land should be managed in order to prevent further spread. As such, it is recommended that all vegetation removed from the subject land should be disposed of appropriately as identified in the South East Regional Strategic Weed Management Plan 2023 – 2027 (LLS: South East 2022).

5.2.7. Nest Box Installation

To mitigate any potential impacts on native fauna associated with the removal of any hollow-bearing trees, it is recommended that nest boxes are installed within the retained areas of vegetation in the subject land. It is recommended that any removal of confirmed hollow-bearing trees is replaced with nest boxes at a ratio of 1:1. The confirmation of number of actual hollows will form part of the pre-clearing and clearing surveys detailed in ***Section 5.2.4.***

5.2.8. Other General Construction and Operational Measures

A number of general construction and operation measures will be implemented for the Project, in accordance with best practice guidelines. These include:

- Dust minimisation – reduces the indirect impacts on vegetation condition and the habitat quality for all native species;
- Noise minimisation – reduces the indirect impacts on fauna species in habitat surrounding the subject land; and
- Lighting management – reduces the indirect impacts on fauna species in habitat surrounding the subject land.

5.3. Mitigation Measures: Grey-headed Flying-fox

In addition to the relevant mitigation measures outlined in ***Section 5.2***, this section focuses on specific mitigation measures to minimise the potential for indirect impacts on the GHFF in the nearby Brinawarr St camp.

5.3.1. Construction Mitigation Measures

5.3.1.1. Noise Minimisation

To minimise the potential for increased noise levels indirectly impacting the GHFF camp, it is recommended that construction noise should be shielded at its source where possible. Where possible, construction equipment should be positioned as far from the camp as possible. All equipment used during construction is to meet Australian standards to minimise noise generation.

Furthermore, it is recommended that the following measures associated with the timing of the works should be adhered to:

- Loud construction works should be avoided during periods of high camp activity (dawn and dusk) and during part of the breeding season, with a focus on the last weeks of pregnancy (usually between October-November);
- No works to commence prior to 6:30am, to allow GHFF individuals to return to the camp during the morning fly-in; and
- Avoid use of loud equipment or machinery producing a sudden impact noise, such as a chainsaw. Alternatively, consideration should be given to starting such equipment as far away from the camp as possible, in the most eastern parts of the subject land.

5.3.1.2. Light Management

To minimise the potential for light spill impacting the GHFF camp, mobile and temporary construction lighting should be situated so that where possible, the lights will be directed away from the existing camp. The use of hoods and directional mobile lighting should be implemented where appropriate. Additionally, the time in which lighting is needed should generally be minimised, with lighting to be turned off at night to assist in the GHFF navigation. The lowest possible brightness on light sources and machinery should be used at all times.

The management of light spill is specifically critical during parts of the breeding season of the GHFF, during the last weeks of pregnancy and when juveniles are left at the camp at night (usually between October and January) (AMBS Ecology & Heritage 2019).

5.3.1.3. Stop Works Triggers

It is recommended that all construction works should stop in the event that any of the triggers listed below occur during the construction period. If any of the triggers occur, the client must consult with Council to determine whether additional mitigation measures are required.

- If more than 30%of the GHFF colony takes flight other than at dusk or dawn;
- Adverse weather conditions or severe weather warnings as issued by the Bureau of Meteorology, including days predicted to exceed 35ºC;
- Individuals are in flight more than 20 minutes other than at dusk or dawn; or
- If GHFFs have been killed, injured or are showing signs of fatigue due to the development activities.

5.3.1.4. Other Mitigation Measures

The following additional mitigation measures are recommended to be implemented for the Project:

- Placement of large machinery and plant equipment will be minimised in the south-western portion of the site; and
- Pump silencers are to be used on all large concrete pumps to the western side of the site.

5.3.2. Post-construction Measures

It is recommended that the following mitigation measures are considered for the post-construction period of the Project:

- Providing educational material for the residents of the constructed building, such as educational brochures and permanent signage on the western border closest to the GHFF camp. Educational material should describe the ecology of the GHFF, potential health risks, and contact details for Wires in the event of an encounter with an injured individual;
- Permanent outdoor lighting should be restricted to face away from the camp and have a sensor to limit the time the light is turned on overnight; and
- Restrictions on certain types of noisy outdoor activities during breeding season.

5.4. Compensate

As detailed within ***Section 1.4***, the Project does not trigger the BOS and a subsequent requirement for biodiversity offsetting. Therefore, no formal offsetting using biodiversity credits is required.

Nonetheless, in addition to the protection of vegetation as outlined in ***Section 5.2***, it is recommended that species characteristic of either PCT 3270 and/or PCT 3273 be incorporated into future landscape planting in order to enhance retained vegetation and habitat within the subject land (see below).

5.4.1. Landscaping

In order to enhance areas of retained native vegetation within the subject land it is recommended that future landscape plantings incorporate characteristic species of either PCT 3273 and/or PCT 3270. All native plantings should be sourced from local nurseries or come from seed sourced from the subject land. A complete list of characteristic species of PCT 3270 and PCT 3273 can be found within the BioNet Vegetation Classification database (DCCEEW (NSW) 2024b). These species include (but are not limited to) the following native trees, shrubs and groundcovers:

- *Acmena smithii* (Lilly Pilly)
- *Notelaea longifolia* (Mock-olive)
- *Elaeocarpus reticulatus* (Blueberry Ash)
- *Acacia mabellae* (Mabel's wattle)
- *Melaleuca linariifolia* (Snow in Summer)
- *Leucopogon lanceolatus*
- *Leucopogon juniperinus* (Prickly Beard-heath)
- *Allocasuarina littoralis*
- *Persoonia linearis* (Narrow-leaved Geebung)
- *Banksia spinulosa* (Hairpin Banksia)
- *Callistemon citrinus*
- *Pittosporum revolutum* (Wild Yellow Jasmine)
- *Lomandra longifolia* (spiny-headed mat-rush)
- *Imperata cylindrica* (Blady Grass)
- *Blechnum cartilagineum* (Gristle fern)
- *Doodia aspera* (prickly rasp fern)

6. Conclusion

The Project involves the construction of a residential flat building comprising 60 apartments for build-to-rent within the subject land. An assessment was undertaken to examine the impacts of the Project on the biodiversity values of the subject land. The Project did not trigger the BOS under the BC Act and therefore this FFA has been prepared to document the findings of an ecological investigation undertaken within the subject land.

To facilitate the proposed development, a total of approximately 0.51 ha of land will be impacted, of which 0.27 ha comprises Exotic Dominated Grasslands and Exotic Vegetation and already cleared land. The project will remove approximately 0.24 ha of degraded native vegetation, as well as potential habitat for a number of threatened fauna species. Furthermore, there is the potential for indirect impacts on the nearby Grey-headed Flying-fox camp at Brinawarr St, including noise impacts and light spill.

The ecological investigation undertaken for this assessment indicates that threatened species issues are manageable and not significant. Notwithstanding this, a suite of mitigation measures are proposed to minimise the impacts on biodiversity values. With the implementation of the proposed mitigation measures, no significant impacts are predicted to occur to threatened species, populations or communities listed under the BC Act and/or EPBC Act. No referral to the Commonwealth is required.

7. References

AMBS Ecology & Heritage. 2019. Western Sydney Stadium Bioidiversity Operational Management Plan.

AMEC. 2005. Mackenzie Gas Project: Effects of Noise on Wildlife. AMEC Americas Limited.

Arboriculture Consultancy Australia. 2024. Arboriculatural Impact Assessment.

Botanic Gardens Trust. 2021. PlantNET. National Herbarium of NSW, Royal Botanic Gardens, Sydney.

DCCEEW. 2023a. National Flying-fox Monitoring Viewer.

DCCEEW. 2023b. Pteropus poliocephalus — Grey-headed Flying-fox in Species Profile and Threats Database. Australian Govenment, Department of Climate Change, Energy, the Environment and Water, ACT.

DCCEEW. 2024. EPBC Protected Matters Search Tool. Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW (Cwlth). 2024. Species Profile and Threat Database.

DCCEEW (NSW). 2024a. Bionet Atlas.

DCCEEW (NSW). 2024b. BioNet Vegetation Classification database.

DCCEEW (NSW). 2024c. Threatened Biodiversity Data Collection.

DPE. 2023a. eSPADE V2.0.*in* D. o. P. a. Environment, editor.

DPE. 2023b. NSW State Vegetation Type Map.

DPI. 2017. Fact Sheet: Weed Management Legislation is Changing.

DPIE. 2020. Biodiversity Assessment Method.*in* I. a. E. Department of Planning, editor. Environment, Energy and Science, Parramatta.

DPIE. 2021. Koala SEPP 2021: FAQ - development applications.

Edmiston Jones. 2024. Proposed Bomaderry BTR Landscape Services.

Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. Annual Review of Ecology Evolution and Systematics **34**:487–515.

Lindenmayer, D. B., and J. Fischer. 2006. *Habitat fragmentation and landscape change:* An Ecological and Conservation Synthesis. Island Press, Washington D.C.

LLS: South East. 2022. South East Regional Strategic Weed Management Plan 2023-2027. South East Local Land Services.

Longcore, T., and C. Rich. 2010. Light Pollution and Ecosystems. ActionBioscience.org original article.

Northrop. 2024. Bomaderry BTR - 53 & 57 Bolong Road & 4 Beinda Street Bomaderry Civil Engineering Package.

NSW Government. 2018. Threatened Species Test of Significance Guidelines. Office of Environment and Heritage, Sydney.

NSW Government. 2020. Surveying threatened plants and their habitats. NSW survey guide for the Biodiversity Assessment Method. Environment, Energy and Science. Department of Planning, Industry and and Environment, Parramatta.

NSW Scientific Committee. 2004. Grey-headed Flying-fox - vulnerable species listing. Department of Environment and Conservation (NSW), Hurstville.

OEH. 2016. Grey-headed Flying-fox - profile. Office of Environment and Heritage, Hurstville.

Primack, R. B. 1993. Essentials of Conservation Biology. Sinauer Associates Inc, Sunderland.

Saleh, T. 2007. Effects of Artificial Lighting on Wildlife. The Road-RIPorter (Summer Solstice Issue) **12**.

Yahner, R. H. 1988. Changes in wildlife communities near edges. Conservation Biology **2**:333-339.

APPENDIX A :
Flora Species List

Table 10 Flora species recorded in the subject land

Family	Scientific Name	Common Name	Exotic
Agavaceae	*Agave americana*	Century Plant	*
Alliaceae	*Agapanthus praecox subsp. orientalis*		*
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	
Anthericaceae	*Chlorophytum comosum*	Spider Plant	*
Anthericaceae	*Tricoryne simplex*		
Apiaceae	*Centella asiatica*	Indian Pennywort	
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	*
Apiaceae	*Hydrocotyle sibthorpioides*		
Apocynaceae	*Araujia sericifera*	Moth Vine	*
Apocynaceae	*Nerium oleander*	Oleander	*
Apocynaceae	*Parsonsia straminea*	Common Silkpod	
Apocynaceae	*Plumeria sp.*	Frangipani	*
Araceae	*Monstera deliciosa*	Fruit Salad Plant	*
Araceae	*Syngonium podophyllum*	Arrowhead vine	*
Arecaceae	*Syagrus romanzoffiana*	Cocos Palm	*
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	*
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	*
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	*
Asteraceae	*Conyza sumatrensis*	Tall fleabane	*
Asteraceae	*Gamochaeta americana*	Purple Cudweed	*
Asteraceae	*Hypochaeris radicata*	Catsear	*
Asteraceae	*Lactuca saligna*	Willow-leaved Lettuce	*
Asteraceae	*Senecio madagascariensis*	Fireweed	*
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	*
Asteraceae	*Taraxacum officinale*	Dandelion	*
Balsaminaceae	*Impatiens sp.*		*
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*
Brassicaceae	*Cardamine hirsuta*	Common Bittercress	*
Buxaceae	*Buxus microphylla*		*
Campanulaceae	*Lobelia purpurascens*	whiteroot	
Caprifoliaceae	*Abelia chinensis*		*
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	*
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak	

Family	Scientific Name	Common Name	Exotic
Commelinaceae	*Commelina cyanea*	Native Wandering Jew	
Convolvulaceae	*Dichondra repens*	Kidney Weed	
Crassulaceae	*Bryophyllum delagoense*	Mother of millions	*
Crassulaceae	*Crassula multicava*		*
Crassulaceae	*Crassula sieberiana*	Australian Stonecrop	
Cupressaceae	*Cupressus lusitanica*	Mexican Cypress	*
Cyperaceae	*Cyperus brevifolius*		*
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	
Cyperaceae	*Cyperus laevis*		
Cyperaceae	*Cyperus polystachyos*		
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	
Ericaceae	*Leucopogon juniperinus*	Prickly Beard-heath	
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge	*
Euphorbiaceae	*Euphorbia prostrata*	Red Caustic Weed	*
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata*		*
Fabaceae (Faboideae)	*Daviesia ulicifolia*	Gorse Bitter Pea	
Fabaceae (Faboideae)	*Dillwynia ramosissima*		
Fabaceae (Faboideae)	*Erythrina sykesii*	Coral tree	*
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	
Fabaceae (Faboideae)	*Glycine microphylla*	Small-leaf Glycine	
Fabaceae (Faboideae)	*Maekawaea rhytidophylla*		
Fabaceae (Faboideae)	*Medicago minima*	Woolly Burr Medic	*
Fabaceae (Faboideae)	*Medicago polymorpha*	Burr Medic	*
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	*
Fabaceae (Faboideae)	*Vicia sativa*	Common vetch	*

Family	Scientific Name	Common Name	Exotic
Fabaceae (Mimosoideae)	*Acacia mearnsii*	Black Wattle	
Iridaceae	*Sisyrinchium rosulatum*	Scourweed	*
Iridaceae	*Watsonia borbonica*		*
Juncaceae	*Juncus cognatus*		*
Lamiaceae	*Plectranthus parviflorus*		
Liliaceae	*Lilium formosanum*	Formosan Lily	*
Liliaceae	*Liriope muscari*	big blue lilyturf	*
Lomandraceae	*Lomandra confertifolia*	Matrush	
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	
Lythraceae	*Lagerstroemia indica*		*
Lythraceae	*Lythrum hyssopifolia*	Hyssop Loosestrife	
Malaceae	*Rhaphiolepis indica*	Indian Hawthorn	*
Malaceae	*Spiraea cantoniensis*	Reeves' meadowsweet	*
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	*
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*
Meliaceae	*Melia azedarach*	White Cedar	
Musaceae	*Musa acuminata*	Edible banana	*
Myrtaceae	*Acmena smithii*	Lilly Pilly	
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush	
Myrtaceae	*Corymbia maculata*	Spotted Gum	
Myrtaceae	*Leptospermum polygalifolium subsp. polygalifolium*		
Myrtaceae	*Lophostemon confertus*	Brush Box	
Myrtaceae	*Tristaniopsis laurina*	Kanooka	
Ochnaceae	*Ochna serrulata*	Mickey Mouse Plant	*
Oleaceae	*Jasminum polyanthum*	White Jasmine	*
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	*
Oleaceae	*Olea europaea subsp. cuspidata*	African Olive	*
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	*
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	
Phyllanthaceae	*Glochidion ferdinandi*	Cheese Tree	
Pinaceae	*Pinus elliotii*	Slash Pine	*
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	

Family	Scientific Name	Common Name	Exotic
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	*
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell	
Plumbaginaceae	*Plumbago auriculata*	Cape leadwot	*
Poaceae	*Agrostis capillaris*	Browntop Bent	*
Poaceae	*Andropogon virginicus*	Whisky Grass	*
Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass	*
Poaceae	*Bothriochloa macra*	Red Grass	
Poaceae	*Briza maxima*	Quaking Grass	*
Poaceae	*Bromus catharticus*	Praire Grass	*
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	*
Poaceae	*Cenchrus setaceus*	Fountain Grass	*
Poaceae	*Chloris truncata*	Windmill Grass	
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	
Poaceae	*Cynodon dactylon*	Common Couch	*
Poaceae	*Digitaria sanguinalis*	Crab Grass	*
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*
Poaceae	*Eleusine tristachya*	Goose Grass	*
Poaceae	*Entolasia marginata*	Bordered Panic	
Poaceae	*Entolasia stricta*	Wiry Panic	
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	
Poaceae	*Eragrostis tenuifolia*	Elastic Grass	*
Poaceae	*Lachnagrostis filiformis*		
Poaceae	*Lolium perenne*	Perennial Ryegrass	*
Poaceae	*Microlaena stipoides var. stipoides*	Weeping Grass	
Poaceae	*Oplismenus aemulus*		
Poaceae	*Panicum simile*	Two-colour Panic	
Poaceae	*Paspalum dilatatum*	Paspalum	*
Poaceae	*Rytidosperma tenuius*		
Poaceae	*Sacciolepis indica*	Indian Cupscale Grass	
Poaceae	*Setaria parviflora*		*
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	
Poaceae	*Sporobolus fertilis*	Giant Parramatta Grass	*
Poaceae	*Stenotaphrum secundatum*	Buffalo Grass	*
Polygonaceae	*Acetosa sagittata*	Rambling Dock	*
Polygonaceae	*Rumex conglomeratus*	Clustered Dock	*

Family	Scientific Name	Common Name	Exotic
Portulacaceae	*Portulaca oleracea*	Pigweed	
Proteaceae	*Grevillea robusta*	Silky Oak	
Proteaceae	*Hakea dactyloides*	Finger Hakea	
Rhamnaceae	*Alphitonia excelsa*	Red Ash	
Rosaceae	*Prunus sp.*		*
Rosaceae	*Rosa canina*	Dog Rose	*
Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart	
Solanaceae	*Solanum mauritianum*	Wild Tobacco Bush	*
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*
Thymelaeaceae	*Pimelea linifolia*	Slender Rice Flower	
Tropaeolaceae	*Tropaeolum majus*	Nasturtium	*
Ulmaceae	*Ulmus parvifolia*	Chinese Elm	*
Verbenaceae	*Lantana camara*	Lantana	*
Verbenaceae	*Verbena bonariensis*	Purpletop	*
Violaceae	*Viola banksii*		

APPENDIX B :
Threatened Flora Likelihood of Occurrence

Table 11 Threatened flora likelihood of occurrence

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
EPBC Act PMST	*Acacia bynoeana*	Bynoe's Wattle, Tiny Wattle		V	0	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Occurs in heath or dry sclerophyll forest on sandy soils. The species apparently prefers open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species in the form of dry or heath sclerophyll forest. Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected.
EPBC Act PMST	*Caladenia tessellata*	Thick-lipped Spider-orchid, Daddy Long-legs		V	0	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, no previous records of the species occur in the locality.
EPBC Act PMST	*Calochilus pulchellus*	Pretty Beard Orchid, Pretty Beard-orchid		E	0	Known populations are found in low Scribbly Gum dominated woodland with low heath understorey, tall	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. The

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						heath, or in among scattered clumps of emergent eucalyptus or Banksias.	subject land is not located near a known population and no previous records of the species occur in the locality.
NSW BioNet, EPBC Act PMST	*Cryptostylis hunteriana*	Leafless Tongue Orchid	V	V	1	Occur in a wide variety of habitats including heathlands, heathy woodlands, sedgelands, Xanthorrhoea spp. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests. Soils are generally considered to be moist and sandy, however, this species is also known to grow in dry or peaty soils. Is associated with the community Bloodwood / Scribbly Gum / Silver-top Ash Forest on the South Coast. Species is known to have occurrence associated with other Cryptostylis species.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the known flowering period for the species and it was not detected.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						Flowering occurs generally from November to February.	
EPBC Act PMST	*Cynanchum elegans*	White-flowered Wax Plant		E	0	Usually associated with dry rainforest vegetation and in coastal communities. Can occur in clay influenced woodland associated with *Eucalyptus tereticornis* and *Corymbia maculata*.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected.
EPBC Act PMST	*Daphnandra johnsonii*	Illawarra Socketwood		E	0	Generally occupies rocky hillsides and gullies. Associated vegetation includes rainforest and moist eucalypt forest, on loams and clay loams.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the recommended survey period

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
							for the species and it was not detected.
NSW BioNet, EPBC Act PMST	*Eucalyptus langleyi*	Albatross Mallee	V	V	1	Occurs inland in two stands south-west of Nowra. The species is locally common on shallow, poorly drained sandy soil over sandstone or associated with laterite. It occurs on plateaux in highly dissected areas, often in heath patches surrounded by woodland of Red Bloodwood (Corymbia gummifera), Yertchuk (Eucalyptus consideniana) and a 'Scribbly Gum', probably E. racemosa.	Unlikely to occur. The subject land does not occur on plateaus and is not associated with laterites. Furthermore, the species is conspicuous and was not recorded during field surveys.
NSW BioNet	*Genoplesium baueri*	Bauer's Midge Orchid	E	E	1	Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely to occur. Vegetation in the subject land is characteristic of wet schlerophyll forest and would be unlikely to support viable habitat for the species
EPBC Act PMST	*Genoplesium baueri*	Yellow Gnat-orchid, Bauer's Midge Orchid,		E	0	Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely to occur. Vegetation in the subject land is characteristic of wet schlerophyll forest and would

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
		Brittle Midge Orchid					be unlikely to support viable habitat for the species
EPBC Act PMST	*Grevillea parviflora subsp. parviflora*	Small-flower Grevillea		V	0	Grows in light sandy or clay soils over thin shales, often with lateritic ironstone gravels and nodules. Is known to occur in Shale/Sandstone Transition Forest.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, no previous records of the species occur in the locality.
EPBC Act PMST	*Haloragis exalata subsp. exalata*	Wingless Raspwort, Square Raspwort		V	0	Species requires protected and shaded damp situations in riparian habitats.	Unlikely to occur. Riparian habitats are not present in the subject land.
NSW BioNet	*Hibbertia stricta subsp. furcatula*		E		1	Hibbertia stricta subsp. furcatula is known to occur in two metapopulations, one in the southern outskirts of Sydney, and one near Nowra on the mid-South Coast of NSW. Habitat of the Southern Sydney metapopulation is broadly dry sclerophyll forest and woodland. Habitat of the South Coast metapopulation is poorly recorded, but appears to be dry sclerophyll	Unlikely to occur. Vegetation in the subject land is characteristic of wet schlerophyll forest and would be unlikely to support viable habitat for the species

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						forest or woodland associations in sandy soils over sandstone, with one record from gravelly clay soil.	
EPBC Act PMST	*Irenepharsus trypherus*	Delicate Cress, Illawarra Irene		E	0	Typically inhabits steep rocky slopes near cliff lines and ridge tops from the upper slopes of the ridge systems that extend south and east of the Illawarra escarpment and in sandstone gorges of the Shoalhaven River. Is commonly associated with moist sclerophyll forest, Ironwood thicket, and rainforest.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected.
EPBC Act PMST	*Leucopogon exolasius*	Woronora Beard-heath		V	0	Found along the upper Georges River area and in Heathcote National Park. Occurs in woodland on sandstone.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. The subject land does not occur within the known distribution of the species, and no previous

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
							records of the species occur in the locality.
EPBC Act PMST	*Melaleuca biconvexa*	Biconvex Paperbark		V	0	Occurs in damp areas, often near watercourses, on alluvium soils over shale. Vegetation communities associated with the species include 'Eucalypt open-forest' with Sydney Blue Gum (Eucalyptus saligna), Swamp Mahogany (Eucalyptus robusta) and Mountain Cedar Wattle (Acacia elata) and in 'Paperbark scrub' with Prickly-leaved Paperbark (Melaleuca styphelioides), Snow-in-summer (Melaleuca linariifolia), White Feather Honeymyrtle (Melaleuca decora), Sieber'sPaperbark (Melaleuca sieberi) and Melaleuca nodosa.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected.
EPBC Act PMST	*Persicaria elatior*	Knotweed, Tall Knotweed		V	0	Species in known to occur in Raymond Terrace and Grafton areas. Grows in damp places, preferring areas near streams	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						and lakes and occasionally found in swamp forest.	Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected.
EPBC Act PMST	*Pimelea spicata*	Spiked Rice-flower		E	0	On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey. Coastal headlands and hilltops are the favoured sites.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected.
EPBC Act PMST	*Pomaderris brunnea*	Rufous Pomaderris, Brown Pomaderris		V	0	In the region, the species is only found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It grows in moist woodland or forest on	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, the subject land is not located within the known distribution of the species and

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						clay and alluvial soils of flood plains and creek lines.	no previous records of the species occur in the locality.
EPBC Act PMST	*Pomaderris cotoneaster*	Cotoneaster Pomaderris		E	0	Cotoneaster Pomaderris has a very disjunct distribution, being known from the Nungatta area, northern Kosciuszko National Park (near Tumut), the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, Bungonia State Conservation Area, the Yerranderie area, Kanangra-Boyd National Park, the Canyonleigh area and Ettrema Gorge in Morton National Park. Habitats that the species is found within include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, the subject land is not located within the known distribution of the species and no previous records of the species occur in the locality.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						in steep gullies between sandstone cliffs.	
EPBC Act PMST	*Prasophyllum affine*	Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid		E	0	Species is known from only three areas south-east of Nowra. Generally grows on poorly drained grey clay soils that support low heathland and sedgeland communities.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, the subject land is not located within the known distribution of the species and no previous records of the species occur in the locality.
EPBC Act PMST	*Prostanthera densa*	Villous Mintbush		V	0	Prostanthera densa generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
NSW BioNet, EPBC Act PMST	*Pterostylis gibbosa*	Illawarra Greenhood	E	E	127	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species is confined to worriggee Nature Reserve where it is estimated 400 plants exists, and grows in woodland dominated by Eucalyptus tereticornis (Forest Red Gum), E. longifolia (Woollybutt), and Melaleuca decora (White Feather Honey-myrtle). Near Nowra, the species grows in open forest of Corymbia maculata (Spotted Gum), E. tereticornis, and E. paniculata (Grey Ironbark). It is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The species is currently only known to occur at five sites three in the Illawarra, one near	Unlikely to occur. The subject land is not within the only known extent for the species in the Shoalhaven Region (Worrigee Nature Reserve)

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						Nowra, and one at Milbrodale in the Hunter Valley.	
EPBC Act PMST	*Pterostylis pulchella*	Pretty Greenhood		V	0	Found on cliff faces close to waterfalls and creek banks and mossy rocks alongside running water. Flowers appear from February to May.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat in the form of creek banks and mossy rocks alongside running water.
NSW BioNet	*Pterostylis vernalis*		E	CE	1	Grows in open sites in shallow soil over sandstone sheets, in heath and heathy forest. Species is restricted to sections of rock shelf where there is only a thin layer of soil over the rock shelf and where these sites are subject to	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat in the form of heath and heathy forest.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						particular hydrological conditions. Flowers in Spring.	
EPBC Act PMST	*Pterostylis vernalis*	Halbury Rustyhood		CE	0	Grows in open sites in shallow soil over sandstone sheets, in heath and heathy forest. Species is restricted to sections of rock shelf where there is only a thin layer of soil over the rock shelf and where these sites are subject to particular hydrological conditions. Flowers in Spring.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat in the form of rock shelves.
EPBC Act PMST	*Rhizanthella slateri*	Eastern Underground Orchid		E	0	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. The species is 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.	Unlikely to occur. The subject land is highly degraded and has been historically modified. Furthermore, no previous records occur in the locality of the subject land.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						Flowers September to November.	
NSW BioNet, EPBC Act PMST	*Rhodamnia rubescens*	Scrub Turpentine	E	CE	1	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. The species is distributed in coastal districts north from Batemans Bay in New South Wales to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm.	Unlikely to occur. The species is conspicuous and was not recorded during surveys within the subject land.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
EPBC Act PMST	*Rhodomyrtus psidioides*	Native Guava		CE	0	Currently known to occur from Broken Bay, approximately 30 km north of Sydney, to the Queensland (Qld) border. Populations of the species extend north to Gympie, Qld. NSW populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges. There is a single outlying and unvouchered survey record north of Nowra in NSW which is disjunct from other known populations; the occurrence at this disjunct locality has not been recently confirmed but is not implausible in terms of suitable habitat.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
NSW BioNet, EPBC Act PMST	*Syzygium paniculatum*	Magenta Lilly Pilly	E	V	1	On south coast of NSW occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Unlikely to occur. The subject land does not contain littoral rainforest and as such, does not contain suitable habitat for this species. Furthermore, the species is conspicuous and was not recorded during field surveys.
EPBC Act PMST	*Thelymitra kangaloonica*	Kangaloon Sun Orchid		CE	0	Species is only known to occur on the southern tablelands of NSW in the Moss Vale / Kangaloon / Fitzroy Falls area at 550-700 m above sea level. It is found in swamps and in sedgelands over grey silty grey loam soils. It is thought to be a short-lived perennial, flowering in late October and early November.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species. Furthermore, there are no previous records in the locality of the subject land.
EPBC Act PMST	*Thesium australe*	Austral Toadflax, Toadflax		V	0	Found in very small populations scattered across eastern NSW. Occurs in grassland on coastal	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (Themeda australis).	Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected
NSW BioNet, EPBC Act PMST	*Triplarina nowraensis*	Nowra Heath Myrtle	E	E	1	Grows in poorly drained, sandy soils on sandstone, close to stream channels, swampy slopes or bedrock surfaces with impeded drainage. Surrounding vegetation is often eucalypt woodland comprising of Grey Gum (Eucalyptus punctata), Black Gum (E. aggregata), Hard-leaved Scribbly Gum (E. sclerophylla), Yertchuk (E. consideniana), Sydney Peppermint (E. piperita), Red Bloodwood (E. gummifera) and in sedgelands dominated by Kunzea ambigua.	Unlikely to occur. The subject land does suitable habitat or vegetation associated with this species. Furthermore, the species is conspicuous and was not recorded during field surveys.
EPBC Act PMST	*Xerochrysum palustre*	Swamp Everlasting, Swamp Paper Daisy		V	0	Grows in wetlands including sedge-swamps and shallow freshwater marshes, often on heavy black clay soils.	Unlikely to occur. The subject land is highly degraded and does not provide suitable habitat for the species.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						Commonly associated genera include Amphibromus, Baumea, Carex, Chorizandra, Craspedia, Eleocharis, Isolepis, Lachnagrostis, Lepidosperma, Myriophyllum, Phragmites, Themeda and Villarsia.	Furthermore, surveys were undertaken during the recommended survey period for the species and it was not detected
NSW BioNet, EPBC Act PMST	*Zieria baeuerlenii*	Bomaderry Zieria	E	E	410	The species occurs in only one location north-west of Nowra. The population occurs in a total of 43 colonies in six discrete clusters, on both sides of Bomaderry Creek. It is found on skeletal sandy loam overlaying sandstone, on a rocky plateau amongst sandstone boulders in either shrubby open forest, shrubby woodland or closed scrub.	Unlikely to occur. The subject land is not within the only known extent for the species (Bomaderry Creek)

APPENDIX C :

Threatened Fauna Likelihood of Occurrence

Table 12 Threatened fauna likelihood of occurrence

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
Amphibia							
NSW BioNet, EPBC Act PMST	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	3	Occurs in heath, woodland and open dry sclerophyll forest on a variety of soil types. Breeding habitat for this species usually contains soaks or pools within first of second order streams.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet, EPBC Act PMST	*Litoria aurea*	Green and Golden Bell Frog	E	V	306	The species is found in a wide range of water bodies except fast moving streams. It commonly inhabits disturbed sites such abandoned quarries and mines, though generally breeds in habitats that include still, shallow, unpolluted water bodies, that are unshaded, contain aquatic plants are free of Mosquito fish and other predators, with a range of diurnal shelter sites	Unlikely to occur. The subject land does not contain wetland habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						(emergent aquatic vegetation).	
EPBC Act PMST	*Litoria watsoni*	Southern Heath Frog, Watson's Tree Frog		E	0	The species is forest-dependent, and found in wet and dry forest, woodland, bushland and heathland. The frog is known to prefer moister areas, and reliant on presence of long lasting pools of water for the tadpoles, with surrounding habitat comprising leaf litter and low native vegetation on sandy soils.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet, EPBC Act PMST	*Mixophyes balbus*	Stuttering Frog, Southern Barred Frog (in Victoria)		V	0	Typically found in association with permanent streams through temperate and sub-tropical rainforest, and wet sclerophyll forest. It is rarely found in dry, open, tableland, riparian vegetation, and moist gullies in dry forest.	Unlikely to occur. The subject land does not contain suitable habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
Aves							
EPBC Act PMST	*Limnodromus semipalmatus*	Asian Dowitcher		V	0	The species occurs in sheltered coastal environments, such as coastal lagoons, estuaries and tidal creeks. Generally found in shallow waters and exposed mudflats and sandflats.	Unlikely to occur. The subject land does not contain suitable habitat such as shallow waters or mudflats.
NSW BioNet, EPBC Act PMST	*Botaurus poiciloptilus*	Australasian Bittern	E	E	1	Occurs in freshwater wetlands, and more rarely, estuarine wetlands. It favours wetlands with tall, dense vegetation, and forages in shallow water up to a depth of 0.3m. It nests in deep vegetative cover over shallow pools.	Unlikely to occur. The subject land does not contain wetland habitat.
EPBC Act PMST	*Sternula nereis nereis*	Australian Fairy Tern		V	0	Species nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. It has been found in embayments of a variety of habitats including offshore, estuarine or	Unlikely to occur. The subject land does not contain suitable habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						lacustrine (lake) islands, wetlands and mainland coastline. It roosts on beaches at night.	
EPBC Act PMST	*Rostratula australis*	Australian Painted Snipe	E	E	0	Inhabits fringes of shallow inland wetlands, swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Unlikely to occur. The subject land does not contain wetlands habitats.
NSW BioNet, EPBC Act PMST	*Limosa lapponica*	Bar-tailed Godwit		M	61	It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt marsh, salt lakes and brackish wetlands, sandy ocean beaches and rock platforms. It is a migratory wader, arriving in NSW for part of the year (August - October) before departing overseas, with only a few individuals overwintering. It	Unlikely to occur. No coastal or wetland habitat is available within the subject land.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						has been recorded in the Tweed, Richmond, Clarence, Macleay, Hastings, Hunter and Shoalhaven river estuaries, Port Stephens and Botany Bay. It is a rare visitor to wetlands away from the coast with scattered records as far west as along the Darling River and the Riverina.	
NSW BioNet	*Ixobrychus flavicollis*	Black Bittern	V		5	Inhabits terrestrial and estuarine wetlands, generally in areas containing permanent water and dense vegetation. The species can occur in flooded grassland, woodland, rainforest, and mangroves. It feeds on frogs, reptiles, fish, and invertebrates such as snails, dragonflies, shrimp and crayfish. It roosts during the day on the ground amongst dense reeds or within trees. It	Unlikely to occur. There are no terrestrial or estuarine wetlands within the subject land.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						nests in branches overhanging water.	
NSW BioNet	*Falco subniger*	Black Falcon	V		1	Inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees. They are generally associated with streams or wetlands, visiting them in search of prey and often using standing trees as lookout posts zones.	Unlikely to occur. The subject land is highly degraded and not located within arid or semi arid zones that comprise suitable habitat. Furthermore, there are no recent records from the locality, with the only previous records from 1985.
EPBC Act PMST	*Limosa limosa*	Black-tailed Godwit	V	E	0	Found in coastal habitats such as mudflats, estuaries, bays and intertidal sandflats.	Unlikely to occur. The subject land does not contain suitable habitat such as mudflats or estuaries.
EPBC Act PMST	*Neophema chrysostoma*	Blue-winged Parrot	V	V	0	Inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often	Unlikely to occur. The subject land does not contain wetlands habitats.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						found near wetlands both near the coast and in semi-arid zones. Pairs or small parties of blue-winged parrots forage mainly near or on the ground for seeds of a wide range of native and introduced grasses, herbs and shrubs.	
EPBC Act PMST	*Climacteris picumnus victoriae*	Brown Treecreeper (south-eastern)	V	V	0	Found in eucalypt woodlands and dry open forest of the inland slopes and plains inland of the Great Dividing Range. The species favours woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Fallen timber is an important habitat component for foraging.	Unlikely to occur. The subject land does not contain suitable habitat in the form of fallen timber.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
NSW BioNet	*Burhinus grallarius*	Bush Stone-curlew	E		1	found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	Unlikely to occur. Subject land is in a residential area and does not form part of a woodland or forest.
NSW BioNet	*Hydroprogne caspia*	Caspian Tern		M	13	Prefers sheltered coastal embayments but is known to occur in near-coastal or inland terrestrial wetlands. Builds nests in open areas or areas with low vegetation.	Unlikely to occur. The subject land does not comprise coastal or wetland habitat required for the species.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
EPBC Act PMST	*Tringa nebularia*	Common Greenshank, Greenshank		E	0	Occurs in a wide variety of inland wetlands and sheltered coastal areas. Species does not breed in Australia.	Unlikely to occur. The subject land does not contain wetlands habitats.
NSW BioNet	*Thalasseus bergii*	Crested Tern		M	21	Nesting habitat typically comprises low-lying sandy, rocky, or coral islands, sometimes amongst stunted shrubs, often without any shelter at all. When not breeding, the greater crested tern will roost or rest on open shores, less often on boats, pilings, harbour buildings and raised salt mounds in lagoons. It is rarely seen on tidal creeks or inland waters.	Unlikely to occur. The subject land is approximately 12km from the coast and does not contain suitable roosting or breeding habitat.
EPBC Act PMST	*Calidris ferruginea*	Curlew Sandpiper	E	CE	0	The Curlew Sandpiper is found in coastal areas with intertidal mudflats, including estuaries, inlets and lagoons, and ponds in saltworks. The	Unlikely to occur. The subject land does not contain wetlands habitats.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						species have also occasionally been recorded inland around lakes, dams and waterholes with mud or sand present. Main requirements for feeding habitats are the presence of mudflats or shallow water up to 60mm. The Curlew Sandpiper may also forage in saltmarsh environments and flooded paddocks.	
EPBC Act PMST	*Stagonopleura guttata*	Diamond Firetail	V	V	0	Occurs in grassy eucalypt woodland, open forest and riparian areas.	Potential to occur. The species may use the subject land for foraging as part of a broader foraging range.
NSW BioNet	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V		3	In NSW the species is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. The Dusky Woodswallow is found in woodlands and dry open sclerophyll forests, usually	Potential to occur. The subject land does provide potential foraging and nesting habitat for the species. A low number of records from the locality suggest the species is unlikely to be reliant on

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						dominated by eucalypts, including mallee associations. The species primarily eats invertebrates, mainly insects, which are captured whilst hovering and sallying above the canopy or over water.	the small area of potential habitat that is available.
NSW BioNet, EPBC Act PMST	*Dasyornis brachypterus*	Eastern Bristlebird	E	E	1	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	Unlikely to occur. The subject land does not contain dense heathy vegetation.
NSW BioNet, EPBC Act PMST	*Numenius madagascariensis*	Eastern Curlew		CE, M	2	Prefers sheltered coasts, especially estuaries, bays, harbours, inlets and lagoons. Also known to occur in	Unlikely to occur. The subject land is approximately 12km from

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						sewage farms, wetlands and mangroves. Species roosts on sandy spits and in low Saltmarsh or mangroves.	the coast and does not contain any wetlands.
NSW BioNet	*Thinornis cucullatus cucullatus*	Eastern Hooded Dotterel	E	V	1	In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh.	Unlikely to occur. Subject land is approximately 12km from the coast, and does not contain sandy habitat similar to those found at the coast.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
NSW BioNet	*Pandion cristatus*	Eastern Osprey	V		3	Found in littoral and coastal habitats and terrestrial wetlands. They generally are found in coastal areas though will travel inland along major water courses. They visit a wide range of wetland habitats including inshore waters, reefs, bays, coastal cliffs, estuaries, mangrove swamps, broad rivers, reservoirs, large lakes, and water holes. They feed on fish over clear, open water, and nest in trees or dead trees, generally within one kilometre of the ocean.	Unlikely to occur. No foraging habitat is present within the subject land. The species typically nests in large trees along coastal areas and major watercourse of which do not occur within the subject land. No nests were observed within the subject land and the low number of records in the locality suggest the species is unlikely to occur.
EPBC Act PMST	*Pachyptila turtur subantarctica*	Fairy Prion (southern)		V	0	In Australia, breeding is recorded on two rock stacks off Macquarie Island and on the nearby Bishop and Clerk Island. The population may have been larger prior to the arrival of black rats on Macquarie Island. The	Unlikely to occur. The subject land does not contain suitable habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						subspecies digs burrows among rocks or low vegetation in which to nest. Burrows may be dug below mat forming herbs. Feeds by plucking food from the ocean surface. Some individuals may migrate towards New Zealand and southern Australia in winter	
NSW BioNet	*Stictonetta naevosa*	Freckled Duck	V		422	This species occurs primarily in south-eastern and south-western Australia and occurs as a vagrant elsewhere. It breeds in large, temporary swamps created during flood events in the Bulloo and Lake Eyres basins and along the Murray-Darling river system. During inland droughts the species disperses to wetlands in the Murray River basin, and occasionally to coastal areas. The species prefers permanent freshwater swamps and creeks heavy	Unlikely to occur. No suitable foraging or nesting habitat in the form of wetland or dense vegetation is present within the subject land.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						with shrub, sedge, and rush growth. It rests in dense cover during the day, usually in deep water and feeds at dusk and sawn on algae, seeds, and vegetative parts of aquatic sedges and grasses. It nests generally during October to December in dense vegetation near to the water level.	
NSW BioNet, EPBC Act PMST	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V	E	13	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. In NSW, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the	Potential to occur. The subject land does not contain suitable habitat in the form of heavily timbered and mature wet sclerophyll forests. However marginal foraging habitat is available within the subject land which may be utilised as part of a broader foraging range.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						Central Tablelands and south-west slopes.	
EPBC Act PMST	*Calidris tenuirostris*	Great Knot	V	V	0	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	Unlikely to occur. The subject land does not contain wetlands habitats.
EPBC Act PMST	*Charadrius leschenaultii*	Greater Sand Plover, Large Sand Plover	V	V	0	Found in coastal areas.	Unlikely to occur. The subject land does not contain suitable habitat.
EPBC Act PMST	*Falco hypoleucos*	Grey Falcon	V	V	0	Typically restricted to semi-arid and arid regions in grassland, woodland and along watercourses. Occasionally found east of the Great Dividing Range in open woodlands.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet	*Pluvialis squatarola*	Grey Plover		M	1	Found in coastal areas where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on	Unlikely to occur. Subject land is approximately 12km from the coast and does not contain any

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons.	mudflats, sandflats or wetlands.
EPBC Act PMST	*Gallinago hardwickii*	Latham's Snipe, Japanese Snipe		V	0	Seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture.	Unlikely to occur. The subject land does not contain wetlands habitats.
EPBC Act PMST	*Charadrius mongolus*	Lesser Sand Plover, Mongolian Plover	V	E	0	Occurs in coastal areas.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet	*Hieraaetus morphnoides*	Little Eagle	V		1	The Little Eagle occupies habitats rich in prey within open eucalypt forest, woodland, or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	Unlikely to occur. The subject land is highly degraded and located within a residential area. It does not provide suitable foraging or nesting habitat required for the

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						For nest sites it requires a tall living tree within a remnant patch.	species. Furthermore, there are no recent records from the locality, with the only previous records from 1986.
NSW BioNet	*Glossopsitta pusilla*	Little Lorikeet	V		2	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Also utilises isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts.	Potential to occur. The subject land is highly degraded however the remnant trees provide marginal potential nesting and foraging habitat for the species.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
NSW BioNet	*Tyto novaehollandiae*	Masked Owl	V		1	Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats.	Unlikely to occur. No large hollows on the subject land and no suitable forest habitat available for foraging. Only one previous record within the locality suggests the species is unlikely to occur
EPBC Act PMST	*Neophema chrysogaster*	Orange-bellied Parrot	CE	CE	0	Recent records of this species in NSW are rare, but it has been recorded at Comerong Island, Shoalhaven Estuary, in June 1986. It is found in salt marshes, coastal dunes, pastures, shrub lands, estuaries, islands, beaches and moorlands within 10 km of the coast. Species utilises holes in eucalypts for nesting.	Unlikely to occur. The subject land does not contain wetlands habitats.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
EPBC Act PMST	*Grantiella picta*	Painted Honeyeater	V	V	0	Occurs in Boree, Brigalow and Box-Gum Woodlands and Box-Ironbarks. Feeds primarily on mistletoe fruit and insects.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet	*Calidris melanotos*	Pectoral Sandpiper		M	1	Species prefers shallow fresh to saline wetlands and is known to utilise lagoons, estuaries, bays, swamps, lakes, inundated grasslands and other waterbodies. Species does not breed in Australia.	Unlikely to occur. No wetland habitat in the subject land.
NSW BioNet, EPBC Act PMST	*Pycnoptilus floccosus*	Pilotbird		V	1	Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter.	Unlikely to occur. The subject land is not part of a dense forest.
NSW BioNet	*Ninox strenua*	Powerful Owl	V		18	In NSW the Powerful Owl lives in forests and woodlands occurring in the coastal,	Potential to occur. The subject land does not provide suitable roosting

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						escarpment, tablelands and western slopes environments. Specific habitat requirements include eucalypt forests and woodlands on productive sites on gentle terrain; a mosaic of moist and dry types, with mesic gullies and permanent streams; presence of leafy sub canopy trees or tall shrubs for roosting; presence of large old trees to provide nest hollows. Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials.	habitat in the form of large hollow bearing trees. However, the species may utilise the subject land for foraging as part of a broader foraging range.
EPBC Act PMST	*Calidris canutus*	Red Knot, Knot		E	0	Found on the coast in sandy estuaries with tidal mudflats.	Unlikely to occur. The subject land does not contain wetlands habitats.
NSW BioNet, EPBC Act PMST	*Anthochaera phrygia*	Regent Honeyeater	E	CE	5	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River	Unlikely to occur. Outside of the mapped important habitat for Regent Honeyeater.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						Sheoak. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes.	
EPBC Act PMST	*Arenaria interpres*	Ruddy Turnstone		V	0	Occurs along the coastline and only occasionally inland.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet	*Petroica boodang*	Scarlet Robin	V		2	Occurs in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Habitat usually contains abundant logs and fallen timber: these	Unlikely to occur. Subject land does not contain abundant logs and fallen timber.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						are important components of its habitat. Nests are often found in a dead branch in a live tree, or in a dead tree or shrub.	
EPBC Act PMST	*Calidris acuminata*	Sharp-tailed Sandpiper		V	0	Species prefers muddy edges of shallow fresh or brackish wetlands with inundated or low vegetation. Known to occur lagoons, swamps, lakes, dams, and other waterbodies. Roosts at the edges of wetlands.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet	*Ardenna tenuirostris*	Short-tailed Shearwater		M	1	The short-tailed shearwater is the most abundant Australian seabird. Their migratory path has been difficult to define because they don't come to shore during the months of the migration. Their colonies are usually found on headlands and islands covered with tussocks and succulent vegetation such as pigface and iceplant.	Unlikely to occur. The subject land is not part of a headland or island.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
NSW BioNet	*Tyto tenebricosa*	Sooty Owl	V		2	Occurs in coastal rainforest, including dry, subtropical, and temperate rainforests, and moist eucalypt forests. Utilises tall trees in heavily vegetated areas for day time resting. It hunts during the night for small ground or tree dwelling mammals such as the Common Ringtail Possum or Sugar Glider. The species requires very large tree hollows for nesting.	Unlikely to occur. No large hollows on the subject land, and the subject land is not heavily vegetated.
NSW BioNet, EPBC Act PMST	*Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V	V	240	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (Allocasuarina littoralis), Forest She-oak (A. torulosa) or Drooping She-oak (A. verticillata) occur.	Potential to occur. The subject site does not provide suitable hollows for roosting, however contains *Allocasuarina littoralis* which may be utilised as part of a much broader foraging range.
EPBC Act PMST	*Melanodryas cucullata cucullata*	South-eastern Hooded Robin,	V	E	0	Hooded Robins are found in lightly timbered woodland,	Unlikely to occur. The subject land does not contain suitable habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
		Hooded Robin (south-eastern)				mainly dominated by acacia and/or eucalypts.	
NSW BioNet	*Circus assimilis*	Spotted Harrier	V		1	Occurs throughout mainland Australia except in densely forested or wooded habitats of the coast, escarpment, and ranges. It inhabits open grassy woodland, shrubland, and grassland. It nests in trees and preys on terrestrial mammals, birds, and reptiles, and will occasionally consume carrion	Unlikely to occur. The subject land is located within a residential area and is not considered to provide suitable foraging resources. Marginal nesting habitat is present in the form of Eucalyptus canopy species however no large stick nests were recorded during field surveys. Furthermore, there are no recent records from the locality, with the only previous records from 1987.
NSW BioNet	*Lophoictinia isura*	Square-tailed Kite	V		28	Found in a variety of timbered habitats including dry woodlands and open forests. It is a specialist hunter preying on passerine birds, especially honeyeaters and targets predominately nestlings and	Unlikely to occur. The subject land is located within a residential area and is not considered to provide suitable foraging resources. Marginal nesting habitat is present

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						insects occuring in the tree canopy. It nests in tree forks or on large horizontal tree limbs located mostly along or near watercourses.	in the form of Eucalyptus canopy species however no large stick nests were recorded during field surveys. Only four records from the locality suggest the species is unlikely to occur.
NSW BioNet, EPBC Act PMST	*Lathamus discolor*	Swift Parrot	E	CE	6	In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon, and E. albens. Breeds in Tasmania in spring and summer.	Unlikely to occur. The subject land has been subject to a high level of disturbance and does not provide preferred habitat for the species. The subject land is not mapped as an important habitat area on the BAM Important Area Map.
NSW BioNet	*Daphoenositta chrysoptera*	Varied Sittella	V		7	Inhabits eucalypt forests and woodlands, especially those	Unlikely to occur. Although some potential

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Inhabits most of mainland Australia except the treeless deserts and open grasslands.	foraging habitat is available in the form of smooth bark Eucalypts, the degraded nature of the subject land and the low number of recent records from the locality suggest the species is unlikely to occur.
NSW BioNet	*Ardenna pacifica*	Wedge-tailed Shearwater		M	9	Species is pelagic with only one breeding area on the mainland.	Unlikely to occur. The species is pelagic and the subject land is not located within the only known breeding area.
NSW BioNet	*Numenius phaeopus*	Whimbrel		M	1	Occurs primarily in intertidal mudflats or sheltered coasts, but also occurs in sheltered coastal areas and saline or brackish lakes near the coast. Nesting usually occurs in mangroves and tall coastal trees.	Unlikely to occur. Subject land is approximately 12km from the coast and does not contain any mudflats or wetlands.
NSW BioNet	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V		8	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the	Unlikely to occur. The subject land is located within a residential area

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water.	and is not considered to provide suitable foraging resources. Marginal nesting habitat is present in the form of Eucalyptus canopy species, however no large stick nests were recorded during field surveys.
NSW BioNet	*Epthianura albifrons*	White-fronted Chat	V		3	This is a gregarious species generally found foraging on bare or grassy ground in wetland areas, alone or in pairs. They feed on insects, mainly flies and beetle caught on the ground or close to. It occupies foothills and slopes up to 1000 m ASL, though in coastal areas is predominately found in areas of salt marsh, and occasionally in low shrubs bordering wetland areas.	Unlikely to occur. Subject land does not contain wetlands or saltmarshes.
EPBC Act PMST	*Hirundapus caudacutus*	White-throated Needletail	V	V	0	Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the	Unlikely to occur. The subject land does not contain suitable habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						ground. Occur over most types of habitat, particularly above wooded areas including open forest and rainforest, between trees or in clearings and below the canopy.	
Mammalia							
EPBC Act PMST	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V	0	Prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges, and isolated rock stacks. Vegetation types associated with the species include dense forest, wet sclerophyll forest, vine thicket, dry sclerophyll forest, and open forest.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V		6	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry	Potential to occur. Potential roosting and foraging habitat occurs within the subject land.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	This species would likely utilise the habitat within the subject land as part of a broader foraging range.
NSW BioNet	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V		4	Favours hollow trunks of Eucalypt trees over 20m high in wet sclerophyll forest and coastal mallee. Occasionally found in old wooden buildings.	Potential to occur. Potential roosting and foraging habitat occur within the subject land. This species would likely utilise the habitat within the subject land as part of a broader foraging range.
NSW BioNet	*Cercartetus nanus*	Eastern Pygmy-possum	V		6	Species is found in a broad range of habitats from rainforest to wet and dry sclerophyll forests through to woodland and heath. Woodland and heath habitats are preferred. The species feeds on pollen and nectar from banksias, eucalypts, and bottlebrushes, though will eat soft fruits when flowers are unavailable, and will also eat insects throughout the year.	Potential to occur. Potential roosting and foraging habitat occur within the subject land.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						They shelter in tree hollows, rotten stumps, holes in the ground, abandoned birds nests and Ringtail Possum dreys, and thickets of vegetation. Tree hollows are preferred for nesting but the species will also nest under tree bark and shredded bark in tree forks.	
NSW BioNet	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V		6	Found mainly in the gullies and river systems that drain the Great Dividing Range. Usually roosts in tree hollows and buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects.	Potential to occur. Potential roosting and foraging habitat occur within the subject land. This species would likely utilise the habitat within the subject land as part of a broader foraging range.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
EPBC Act PMST	*Petauroides volans*	Greater Glider (southern and central)	E	E	0	Occurs in eucalypt forests and woodlands from north-eastern Queensland to the Central Highlands of Victoria. The species has a relatively small home range which consists of numerous tree hollows.	Unlikely to occur. The subject land does not contain suitable habitat.
NSW BioNet, EPBC Act PMST	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	102525	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Potential to occur.
NSW BioNet, EPBC Act PMST	*Phascolarctos cinereus*	Koala	E	E	3	Inhabit eucalypt woodlands and forests.	Potential to occur. The subject land is in a residential area with few, remnant trees, and is not

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
							part of a koala movement corridor. The closest record to the subject land is from 3 km away. However, the species has been included as 'potential to occur' on a precautionary basis, considering the presence of Koala use trees in the subject land.
NSW BioNet	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V		10	Forages above the canopy and eats mostly moths. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	Potential to occur. Although no roosting habitat was identified within the subject land, the species may utilise the subject land for foraging as part of a broader foraging range.
NSW BioNet, EPBC Act PMST	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	7	The species is associated with areas dominated by sandstone escarpments; sandstone cliffs and fertile woodland valley habitat occurring in close proximity to	Potential to occur. Although no roosting habitat was identified within the subject land, the species may utilise the subject land for foraging

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						each other is important for the species. It roosts in cliff/escarpment areas and forages in fertile forest. Roosting is predominately in arch caves with dome roofs, but has been observed in disused mines shafts, overhangs, and disused Fairy Martin nests.	as part of a broader foraging range.
EPBC Act PMST	*Potorous tridactylus trisulcatus*	Long-nosed Potoroo (southern mainland)	V	V	0	Occurs in coastal heaths and dry and wet sclerophyll forests. Species prefers areas with a dense understorey with occasional open areas.	Unlikely to occur. The subject land does not contain suitable habitat.
EPBC Act PMST	*Pseudomys novaehollandiae*	New Holland Mouse, Pookila		V	0	Occurs in open habitats (heathland, woodland and forest) with a heath understorey and vegetated sand dunes. The species prefers deep soft top soils in order to burrow.	Unlikely to occur. The subject land does not contain suitable habitat.
EPBC Act PMST	*Notamacropus parma*	Parma Wallaby	V	V	0	Inhabits wet sclerophyll forest with a thick, shrubby understorey and nearby	Unlikely to occur. The subject land does not contain suitable habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						grassy patches. The species also occurs in dry sclerophyll forest with a dense understorey and occasionally in rainforest.	
EPBC Act PMST	*Isoodon obesulus*	*obesulus* Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern)	E	E	0	Within NSW, the species is rare and almost exclusively restricted to the coastal fringe of the state, from the southern side of the Hawkesbury River in the north to the Victorian border in the south. More specifically, the subspecies is considered to occur primarily in two areas: Ku-ring-gai Chase and Garigal National Parks; and in the far south-east corner of the state. Occurs within their distribution in a variety of habitats including heathland, shrubland, sedgeland, heathy open forest and woodland.	Unlikely to occur. The subject land does not contain suitable habitat.

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
NSW BioNet	*Myotis macropus*	Southern Myotis	V		14	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. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Potential to occur. Potential roosting habitat in the form of hollow-bearing trees occur within the subject land. No foraging habitat is present within the subject land.
NSW BioNet, EPBC Act PMST	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	4	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. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	Unlikely to occur. The subject land is highly degraded and does not contain suitable habitat for the species.
NSW BioNet, EPBC Act PMST	*Petaurus australis*	Yellow-bellied Glider	V	V	216	Occurs in tall, mature, eucalypt forest generally in areas with high rainfall and nutrient rich soils. It feeds	Potential to occur. Although the subject land is highly disturbed, the remnant native vegetation

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
						primarily on plant and insect exudate, with insects providing protein. It extracts sap from trees by biting into the trunk and branches leaving distinctive 'V' shaped scars. It dens in large hollows within trees, in groups of two to six individuals.	offers potential foraging habitat, which may be used as part of a much broader foraging range. No suitable roosting habitat is present within the subject land.
NSW BioNet	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V		1	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Potential to occur. Potential roosting and foraging habitat occur within the subject land. This species would likely utilise the habitat within the subject land as part of a broader foraging range.
Reptilia							

Source	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Habitat Requirements	Likelihood of Occurrence
EPBC Act PMST	*Hoplocephalus bungaroides*	Broad-headed Snake	E	E	0	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500m of escarpments in summer.	Unlikely to occur. No suitable habitat is present within the subject land.
NSW BioNet	*Varanus rosenbergi*	Rosenberg's Goanna	V		1	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component.	Unlikely to occur. No suitable habitat is present within the subject land.

APPENDIX D :
Tests of Significance

D.1. Introduction

This appendix presents formal Tests of Significance required under Section 7.3 of the BC Act, that have been prepared in accordance with the *Threatened Species Test of Significance Guidelines* (NSW Government 2018). The Test of Significance provides a means by which to gauge the significance of predicted impacts to threatened species and communities listed under the BC Act.

Both direct and indirect impacts are considered within these assessments. Direct impacts have been quantified within the assessments and are represented by the development footprint boundary. Whilst it is acknowledged that indirect impacts can potentially be significant for a variety of species, such impacts cannot be mapped or accurately calculated in advance.

Each component of the test of significance is provided in italicised text below, and a response supplied beneath in plain text.

D.2. Threatened Entities

Threatened entities present within the subject land, or with the potential to be impacted directly or indirectly by the Project are limited to fauna species and include:

- Diamond Firetail (*Stagonopleura guttata);*
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus);*
- Eastern Coastal Free-tail Bat (*Micronomus norfolkensis);*
- Eastern False Pipistrelle *(Falsistrellus tasmaniensis);*
- Eastern Pygmy-possum (*Certartetus nanus);*
- Gang-gang Cockatoo (Callocephalon fimbriatum);
- Greater Broad-nosed Bat (*Scoteanax rueppellii);*
- Grey-headed Flying-fox (*Pteropus poliocephalus);*
- Koala (Phascolarctos cinereus);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis);*
- Large-eared Pied Bat (*Chalinolobus dwyeri);*
- Little Lorikeet (Glossopsitta pusilla);
- Powerful Owl (Ninox strenua);
- South-eastern Glossy Black-Cockatoo (*Calyptorhyncus lathami lathami);*
- Southern Myotis *(Myotis macropus);*

- Yellow-bellied Glider (*Petaurus australis);*
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris).*

Tests of Significance for these entities are provided in separate subsections below.

D.2.1. Threatened Microchiropteran Bats

The following threatened microchiropteran bat (microbat) species have been assessed collectively in the following Test of Significance:

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*);
- Eastern False Pipistrelle *(Falsistrellus tasmaniensis)*;
- Greater Broad-nosed Bat (*Scoteanax rueppellii);*
- Large Bent-winged Bat (*Miniopterus orianae oceanensis);*
- Large-eared Pied Bat (*Chalinolobus dwyeri);*
- Southern Myotis *(Myotis macropus); and*
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris)*.

D.2.1.1. Test of Significance

(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 above listed bat species have not been recorded in the subject land, but they have been recorded within the locality. The local populations of these potentially occurring species are considered to extend beyond the subject land and are assessed as viable.

All seven of the microbat species are highly mobile and have large foraging ranges, so are unlikely to depend on the removal 0.46 ha of degraded foraging habitat, which consists of exotic vegetation and a few scattered remnant trees and shrubs. Although two of the four potential hollow-bearing trees that occur on the subject land will be removed for the Project, the two retained hollow-bearing trees will continue to provide potential roosting habitat for the species, while nest boxes are proposed to be installed at a ratio of 1:1 for any hollows removed from by the Project. Furthermore, the subject land is in close proximity to numerous national parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River, which would provide more suitable roosting and foraging habitat of higher quality than the subject land.

Due to its poor quality and small area, the habitat to be impacted by the Project is not considered important for the long-term survival of these species within the locality. Sufficient habitat will be retained within the subject land, and more suitable habitat in the form of reserves is found within the locality, and so the Project is not considered to have an adverse impact on the lifecycle of these species such that a viable local population is likely to be placed at risk.

(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

(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

Approximately 0.46 ha of degraded vegetation will be removed from the subject land including 0.24 ha of native vegetation, which comprises potential foraging habitat for the assessed threatened microbat species. However, most of the large trees are proposed to be retained along the northern boundary of the subject land, fronting Beinda Street. The potential changes to retained suitable vegetation resulting from indirect impacts are expected to be localised and overall are not considered to cause a substantial change in the extent of the habitat for these species.

The removal of vegetation is unlikely to result in the fragmentation of an area of habitat for any of the threatened microbat species as they are all highly mobile species which can access resources over a large area. Connectivity will remain throughout the subject land and into the wider locality, as several large trees will be retained. As such, while the Project will encroach slightly into the area of existing foraging habitat, it will not isolate it and will only fragment it to a minor degree. The potential habitat on the subject land represents only a very small area available to these species in the locality and as the species are highly mobile and access resources from across a large foraging range, the Project is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality or within or between local populations. Accordingly, the Project will not remove, modify, fragment or isolate important habitat.

Previous land uses have resulted in the modification of the habitat of the assessed threatened microbat species within the subject land. Given the condition of the habitat and its already fragmented nature, the small area of habitat directly and indirectly impacted by the Project is not considered important for the long-term survival of these species within the locality.

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

The BC Act currently lists the following AOBVs:

- Gould's Petrel habitat;
- Little Penguin population in Sydney's North Harbour habitat;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and
- Wollemi Pine habitat.

The Project is not located within or in proximity to the aforementioned AOBVs and is therefore not likely to have an adverse effect on any AOBVs.

(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 threatening process

The Project could result in the following key threatening process:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities.

The key-threatened process of 'clearing of native vegetation' could potentially impact the foraging habitat for these microbat species. However, the vegetation on the subject land is highly modified and degraded and is not considered optimal foraging habitat for these species. The majority of the subject land has been previously cleared and is now dominated by exotic grasslands. As several large trees are proposed to be retained, potential habitat will remain in the subject land, and the clearing of native vegetation is not likely to significantly impact habitat for the potentially occurring threatened microbat species.

Conclusion

Approximately 0.46 ha of degraded foraging habitat, including 0.24 ha of native vegetation, will be removed within the subject land. However, large areas of higher-quality foraging habitat are available within the locality, such as adjoining properties, the wilderness areas of contiguous reserves and National Parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River, which would provide more suitable roosting and foraging habitat than available within the subject land. As such, any local population of these species is unlikely to depend on the limited resources contained within the subject land for its survival.

Reserves and National Parks within the locality will remain in perpetuity and contain high habitat values on par or exceeding the contextually small areas of habitat proposed to be removed and modified within the subject land. As such, the proposal is not likely to place a viable local population of these species at risk of extinction. All seven species are highly mobile and are expected to move between areas of remaining habitat within the immediate vicinity of the subject land and wider locality.

The Project is not likely to have a significant detrimental impact upon any of the species and subsequently a BDAR is not required.

D.2.2. Grey-Headed Flying Fox

(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 Grey-Headed Flying-Fox (*Pteropus poliocephalus*) is a highly mobile species that has vast foraging ranges, and as such the species is unlikely to rely on the small, 0.24 ha of potential foraging habitat to be removed for the Project in the form of native vegetation. The closest breeding camp of the Grey-Headed Flying Fox is ~200m to the south-west of the subject land, therefore, the local population of the species may access and utilise the vegetation within the subject land. However, they would also have access to much larger, higher-quality foraging areas available within the locality, such as adjoining properties, the wilderness areas of contiguous reserves and National Parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River. The habitat to be removed as part of the proposal represents a very small portion of potential foraging habitat available in the locality. As such, the proposal is not considered to affect the life cycle of the Grey-headed Flying-fox such that a viable local population is 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.

(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

Approximately 0.24 ha of native vegetation within the subject land will be completely removed. However, most of the large remnant native trees are proposed to be retained along the Beinda Street frontage of the subject land, which will continue to provide foraging habitat.

The removal of vegetation is unlikely to result in the fragmentation of an area of habitat as the Grey-Headed Flying-Fox is a highly mobile species which accesses resources over a large area. While the proposed development may result in encroachment slightly into the area of existing foraging habitat, it will not isolate it and will only fragment it to a small degree, most of the large remnant trees will be retained. The potential

habitat on the subject land represents only a very small area available to the species in the locality and as the species is highly mobile and accesses resources from across a vast foraging range, the Project is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality, or within or between local populations. Accordingly, the Project will not remove, modify, fragment or isolate important habitat.

The habitat to be removed is of low importance to the long-term survival of the species in the locality as it represents a small area in comparison to the vast forested areas within the locality, and does not form part of the nearby Brinawarr St roosting and breeding camp.

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

The BC Act currently lists the following AOBVs:

- Gould's Petrel habitat;
- Little Penguin population in Sydney's North Harbour habitat;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and
- Wollemi Pine habitat.

The Project is not located within or in proximity to the aforementioned AOBVs and is therefore not likely to have an adverse effect on any AOBVs.

(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 threatening process

The Project will result in the following key threatening process:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities.

The key threatening process of 'clearing of native vegetation' could potentially impact habitat for this species by reducing available foraging habitat. However, the vegetation within the subject land to be removed is not considered to constitute significant habitat for the Grey-Headed Flying-Fox. Substantial areas of potential habitat will remain in the locality, and as such the loss of a small area of potential foraging habitat is not likely to significantly impact habitat for the species.

Conclusion

A small area of potential foraging habitat will be removed within the subject land, however large areas of higher quality foraging habitat are available within the locality, such as adjoining properties, the wilderness areas of contiguous reserves and National Parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River. The local population of this species associated with the nearby camp is

unlikely to depend on the limited resources contained on the subject land for its survival and large areas of suitable habitat remain in the locality.

Reserves and National Parks within the locality will remain in perpetuity and contain high habitat values on par or exceeding the contextually small areas of habitat proposed to be removed and modified within the subject land. Although the Brinawarr St camp occurs nearby the site, no breeding habitat exists and there are no camps found within the subject land, and the proposal is not likely to place a viable local population of this species at risk of extinction. The Grey-Headed Flying-Fox is highly mobile and is expected to move between areas of remaining habitat within the immediate vicinity of the subject land and wider locality.

The Project is not likely to have a significant detrimental impact upon the Grey-Headed Flying-Fox and subsequently a BDAR or referral to the Commonwealth is not required.

D.2.3. Threatened Birds

The following threatened bird species have been assessed collectively in the following Test of Significance:

- Diamond Firetail (*Stagonopleura guttata);*
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus);*
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Little Lorikeet (*Glossopsitta pusilla*);
- Powerful Owl (*Ninox strenua*); and
- South-eastern Glossy Black-Cockatoo (*Calyptorhyncus lathami lathami);*

(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

Birds are highly mobile species that have vast foraging ranges, and as such any species are unlikely to rely on the small, 0.46 ha of potential foraging habitat to be removed as a result of the Project, including 0.24 ha of native vegetation. They would also have access to the much larger, high quality foraging areas available within the locality, such as adjoining properties, the wilderness areas of contiguous reserves and National Parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River. The habitat to be removed as part of the Project represents a very small portion of potential foraging habitat available in the locality. As such, the Project is not considered to affect the life cycle of these species such that a viable local population is 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.

(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

Approximately 0.46 ha of vegetation within the subject land will be completely removed, including 0.24 of native vegetation. However, most of the large remnant native trees are proposed to be retained which will continue to provide foraging and breeding habitat for the assessed threatened birds.

The removal of vegetation is unlikely to result in the fragmentation of an area of habitat as these species are highly mobile species which accesses resources over a large area. While the Project may result in encroachment slightly into the area of existing foraging habitat, it will not isolate it and will only fragment it to a small degree, as most of the large remnant trees will be retained. The potential habitat on the subject land represents only a very small area available to the species in the locality and as the species is highly mobile and accesses resources from across a vast foraging range, the Project is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality, or within or between local populations. Accordingly, the Project will not remove, modify, fragment or isolate important habitat.

Previous land uses have resulted in the modification of the habitat of the assessed threatened bat species within the subject land. Given the condition of the habitat and its fragmented nature, the small area of habitat directly and indirectly impacted by the Project is not considered important for the long-term survival of these bird species within the locality.

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

The BC Act currently lists the following AOBVs:

- Gould's Petrel habitat;
- Little Penguin population in Sydney's North Harbour habitat;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and
- Wollemi Pine habitat.

The Project is not located within or in proximity to the aforementioned AOBVs and is therefore not likely to have an adverse effect on any AOBVs.

(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 threatening process

The Project will result in the following key threatening process:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities.

The key threatening process of 'clearing of native vegetation' could potentially impact habitat for these species by reducing available foraging habitat. However, the vegetation within the subject land to be removed is not considered to constitute significant habitat for these bird species. Substantial areas of potential habitat will remain in the locality, and as such the loss of a small area of foraging habitat is not likely to significantly impact habitat for these potentially occurring threatened bird species.

Conclusion

A small area of potential foraging habitat will be removed within the subject land however large areas of higher quality foraging habitat are available within the locality, such as adjoining properties, the wilderness areas of contiguous reserves and National Parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River. Any local population of these species is unlikely to depend on the limited resources contained on the subject land for their survival and large areas of suitable habitat remain in the locality.

Reserves and National Parks within the locality will remain in perpetuity and contain high habitat values on par or exceeding the contextually small areas of habitat proposed to be removed and modified within the subject land. No breeding habitat such as stick nests were found within the subject land, and the proposal is not likely to place a viable local population of this species at risk of extinction. These species are highly mobile and are expected to move between areas of remaining habitat within the locality.

The Project is not likely to have a significant detrimental impact upon these threatened bird species and subsequently a BDAR or referral to the Commonwealth is not required.

D.2.4. Threatened Arboreal Mammals

The following threatened arboreal mammals have been assessed collectively in the following Test of Significance:

- Eastern Pygmy Possum (*Certartetus nanus); and*
- Yellow-bellied Glider (*Petaurus australis).*

(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 assessed arboreal mammals have not been recorded in the subject land, but have been recorded within the locality. The local population of these species is considered to extend beyond the subject land and is assessed as viable.

Although the subject land contains potential foraging, nesting and breeding habitat for these species, they are unlikely to utilise the subject land due to its highly disturbed nature and the availability of higher condition habitat available within the locality, such as adjoining properties, the wilderness areas of contiguous reserves and National Parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River. Although two trees containing potential small hollows will be removed as part of the Project, another two hollow-bearing trees will be retained and continue to provide habitat. Furthermore, nest boxes are proposed to be installed at a ratio of 1:1 for any hollows removed from by the Project. As such, the Project will mainly reduce the foraging habitat available to the Eastern Pygmy Possum and Yellow-bellied Glider.

Due to its poor quality and small area, the habitat to be impacted by the Project is not considered important for the long-term survival of the species within the locality. Sufficient habitat will be retained within the subject land, and more suitable habitat in the form of reserves and National Parks is available within the locality. As such, the Project is not considered to have an adverse impact on the lifecycle of these species such that a viable local population is likely to be placed at risk.

(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

(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

Approximately 0.46 ha of degraded vegetation, including 0.24 of native vegetation, will be removed from the subject land, which comprises potential foraging habitat for the assessed arboreal mammals. Additionally, two trees containing potential small hollows will also be impacted, which comprise nesting and breeding habitat for the species. The potential changes to retained habitat resulting from indirect impacts are expected to be

localised and overall are not considered to cause a substantial change in the extent of the habitat for these species.

The removal of vegetation is unlikely to result in the fragmentation of the area of habitat used by the Eastern Pygmy Possum or Yellow-bellied Glider. The subject land is already highly fragmented as it is in a residential area, and connectivity occurs through the gardens of neighbouring properties. As most of the large trees are due to be retained, connectivity will remain throughout the subject land and into the broader locality. As such, while the Project will encroach slightly into the area of existing foraging habitat, it will not isolate it and will only fragment it to a minor degree. Accordingly, the Project will not remove, modify, fragment or isolate important habitat.

Previous land uses have resulted in the modification of the habitat of the species within the subject land. Given the condition of the habitat and its fragmented nature, the small area of habitat directly and indirectly impacted by the Project is not considered important for the long-term survival of these species within the locality.

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

The BC Act currently lists the following AOBVs:

- Gould's Petrel habitat;
- Little Penguin population in Sydney's North Harbour habitat;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and
- Wollemi Pine habitat.

The Project is not located within or in proximity to the aforementioned AOBVs and is therefore not likely to have an adverse effect on any AOBVs.

(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 threatening process

The project could result in the following key threatening processes:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities; and
- Predation by feral cats.

The key-threatened process of 'clearing of native vegetation' could potentially impact the foraging habitat for the Eastern Pygmy Possum or Yellow-bellied Glider. However, the vegetation within the subject land is highly modified and degraded and is not considered optimal foraging habitat for the species. The majority of the subject land has been previously cleared and is now dominated by exotic grassland. As most of the large trees along the Beinda St frontage are proposed to be retained, potential habitat will remain in the subject land and

wider locality, and the clearing of native vegetation is not likely to significantly impact habitat for the assessed arboreal mammals.

The key threatening process of 'Predation by feral cats' will not impact habitat for the Eastern Pygmy Possum or Yellow-bellied Glider as the species tend to nest high up in trees in hollows out of reach of feral cats. Feral cats are likely already present within the subject land due to residential development in nearby areas and the Project is not likely to result in a substantial increase in feral cat numbers.

Conclusion

Approximately 0.46 ha of degraded foraging habitat will be removed within the subject land, including 0.24 ha of native vegetation as well as two trees comprising potential nesting and breeding habitat. However, additional nesting/breeding will be retained in the subject land. Any local population of either of these species is unlikely to depend on the limited resources contained within the subject land for their survival and large areas of suitable habitat remain in the locality.

Reserves and National Parks within the locality will remain in perpetuity and contain high habitat values on par or exceeding the contextually small areas of habitat proposed to be removed and modified within the subject land. As such, the proposal is not likely to place a viable local population of the Eastern Pygmy Possum or Yellow-bellied Glider at risk of extinction. The Project is not likely to have a significant detrimental impact upon these species and subsequently a BDAR is not required.

D.2.5. Koala

(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 Koala (*Phascolarctos cinereus*) has not been recorded in the subject land and has only been recorded three times within the locality, however this species has been assessed in this report on a precautionary basis as Koala use trees are present within the subject land. The local population of this species is considered to extend beyond the subject land and is assessed as viable.

Although the subject land contains suitable foraging habitat for the species, in the form of a number of large remnant *Corymbia maculata* trees, the species is unlikely to utilise the subject land due to its highly disturbed nature and the availability of higher condition habitat available within the locality, such as adjoining properties, the wilderness areas of contiguous reserves and National Parks, including Budderoo, Bugong and Jervis Bay, as well as the vegetated riparian corridor of Shoalhaven River. As such, the Project will mainly reduce an area of sub-optimal foraging habitat available to the Koala in the form of tree removal of Koala use trees.

Due to its poor quality and small area, the habitat to be impacted by the Project is not considered important for the long-term survival of the species within the locality. Sufficient habitat will be retained within the subject land, as most large remnant koala use tree species will be retained along Beinda St, and more suitable habitat in the form of reserves and National Parks is available within the locality. As such, the Project is not considered to have an adverse impact on the lifecycle of this species such that a viable local population is likely to be placed at risk.

(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

(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

Approximately 0.24 ha of degraded vegetation, including a number of Koala use trees, will be removed from the subject land, which comprises potential foraging habitat for the Koala. The potential changes to retained habitat resulting from indirect impacts are expected to be localised and overall are not considered to cause a substantial change in the extent of the habitat for these species.

The removal of vegetation is unlikely to result in the fragmentation of the area of habitat used by the Koala. The subject land is already highly fragmented as it is in a residential area, and connectivity occurs through the gardens of neighbouring properties. As most of the large trees are due to be retained, connectivity will remain throughout the subject land and into the broader locality. As such, while the Project will encroach slightly into the area of existing foraging habitat, it will not isolate it and will only fragment it to a minor degree. Accordingly, the Project will not remove, modify, fragment or isolate important habitat.

Previous land uses have resulted in the modification of the habitat of the species within the subject land. Given the condition of the habitat and its fragmented nature, the small area of habitat directly and indirectly impacted by the Project is not considered important for the long-term survival of this species within the locality.

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

The BC Act currently lists the following AOBVs:

- Gould's Petrel habitat;
- Little Penguin population in Sydney's North Harbour habitat;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and

- Wollemi Pine habitat.

The Project is not located within or in proximity to the aforementioned AOBVs and is therefore not likely to have an adverse effect on any AOBVs.

(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 threatening process

The project could result in the following key threatening processes:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities.

The key-threatened process of 'clearing of native vegetation' could potentially impact the foraging habitat for the Koala. However, the vegetation within the subject land is highly modified and degraded and is not considered optimal foraging habitat for the species. The majority of the subject land has been previously cleared and is now dominated by exotic grassland. As most of the large trees along the Beinda St frontage, which are Koala use trees, are proposed to be retained, potential habitat will remain in the subject land and wider locality, and the clearing of native vegetation is not likely to significantly impact habitat for the Koala.

Conclusion

Approximately 0.24 ha of degraded foraging habitat will be removed within the subject land, including a number of Koala use trees. However, most of the large Koala use trees will be retained along the Beinda St frontage of the subject land. Any local population of the species is unlikely to depend on the limited resources contained within the subject land for its survival and large areas of suitable habitat remain in the locality.

Reserves and National Parks within the locality will remain in perpetuity and contain high habitat values on par or exceeding the contextually small areas of habitat proposed to be removed and modified within the subject land. As such, the proposal is not likely to place a viable local population of the Koala at risk of extinction. The Project is not likely to have a significant detrimental impact upon this species and subsequently a BDAR is not required.

FIGURES

Legend

Subject Land

Project Footprint

Image Source:
Image © NearMap (2024)
(dated 14-10-2023)

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
Shoalhaven City Council LGA

Coordinate System: MGA Zone 56 (GDA 94)

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0 10 20 30 m

I:\...\23162\Figures\RP1\20240410\Figure 1. Aerial Photograph_Subject Land

Figure 1. Aerial photograph of the subject land and adjoining lands

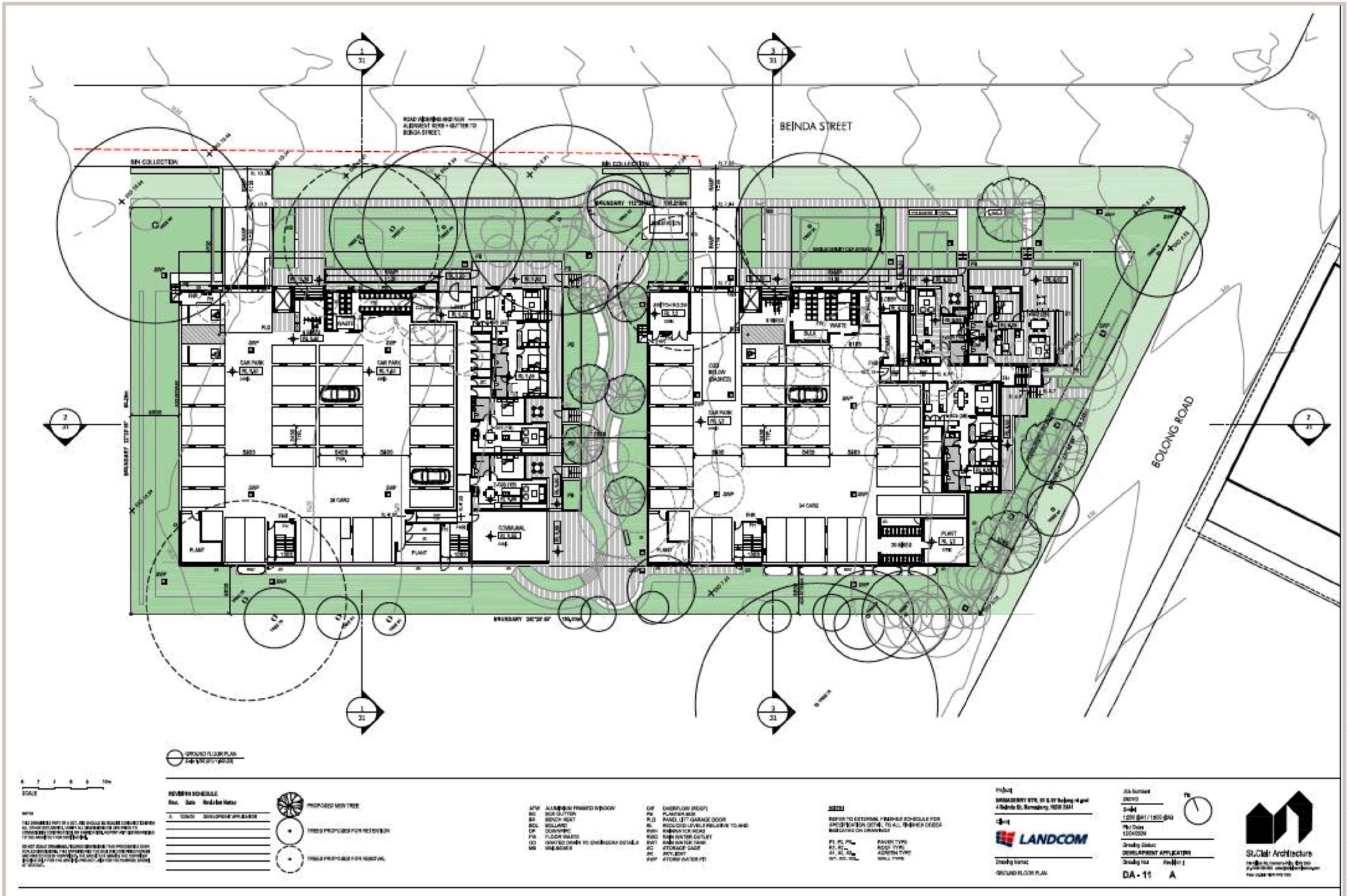

Figure 2. Development layout

Image Source: St. Clair Architecture (2024). DA-11, Rev A

I:\...\23162\Figures\RP1\20240410\Figure 2. Development Layout

Legend

- Subject Land
- Project Footprint
- Watercourse

PCT

- 0, Not classified
- 3013, Illawarra Lowland Subtropical Rainforest
- 3045, South Coast Temperate Gully Rainforest
- 3153, Illawarra Escarpment Bangalay x Blue Gum Wet Forest
- 3269, Shoalhaven Lowland Spotted Gum-Paperbark Forest
- 3270, Shoalhaven Lowland Wet Gully Forest
- 3273, South Coast Lowland Shrub-Grass Forest
- 3327, Illawarra Lowland Red Gum Grassy Forest
- 3588, Shoalhaven Foothills Bloodwood Heathy Forest
- 3654, Shoalhaven Lowland Bloodwood Shrub Forest
- 3962, Coastal Floodplain Phragmites Reedland

Image Source:
Image © NearMap (2024)
(dated 14-10-2023)

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
Shoalhaven City Council LGA

NSW State Vegetation Type Map.
© State Government of NSW and DCCEEW 2023.

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\23162\Figures\RP1\20240410\Figure 3. Locality Features

Figure 3. Locality features map

Image Source:
Image © NearMap (2024)
(dated 14-10-2023)

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
Shoalhaven City Council LGA

NSW Government (2024).
Biodiversity Values Map.
Downloaded 28-03-2024

Coordinate System: MGA Zone 56 (GDA 94)

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0 25 50 75 m

I:\...\23162\Figures\RP1\20240410\Figure 4. BV Map

Figure 4. Biodiversity Values Map

Legend

- Subject Land

Survey Locations

- BAM Plot
- Habitat Assessment
- Flora Random Meander
- GHFF Fly-out Survey

Image Source:
Image © NearMap (2024)
(dated 14-10-2023)

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
Shoalhaven City Council LGA

Coordinate System: MGA Zone 56 (GDA 94)

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0 20 40 60 m

I:\...\23162\Figures\RP1\20240410\Figure 5. Survey Locations

Figure 5. Survey locations

Legend

- Subject Land
- Habitat Item

Vegetation Community

- PCT 3270: Shoalhaven Lowland Wet Gully Forest
- PCT 3273: South Coast Lowland Shrub-Grass Forest
- Exotic Dominated Grassland
- Exotic Vegetation
- Cleared Land

Image Source:
Image © NearMap (2024)
(dated 14-10-2023)

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
Shoalhaven City Council LGA

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\23162\Figures\RP1\20240410\Figure 6. Vegetation Communities_Subject Land

Figure 6. Vegetation communities within the subject land

0 10 20 30 m

Figure 7. Grey-headed Flying-fox: current extent of camp and fly-out direction

Legend

- Subject Land
- Project Footprint
- Habitat Item

Vegetation Community

- PCT 3270: Shoalhaven Lowland Wet Gully Forest
- PCT 3273: South Coast Lowland Shrub-Grass Forest
- Exotic Dominated Grassland
- Exotic Vegetation
- Cleared Land

Image Source:
Image © NearMap (2024)
(dated 14-10-2023)

Data Source:
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Shoalhaven City Council LGA

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\23162\Figures\RP1\20240410\Figure 8. Impacts_Project

Figure 8. Impacts of the Project

0 10 20 30 m