



**FLORA & FAUNA SURVEYS AND
BIODIVERSITY IMPACT ASSESSMENT
FOR
PROPOSED DEVELOPMENT AT
61 LOOMBAH ST,
BILGOLA PLATEAU, NSW, 2107**

PREPARED FOR

**Mr Cedric Amoyal
61 Loombah Street,
Bilgola Plateau 2107**

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ACS Environmental P/L

Flora and Fauna Surveys, Biodiversity Impact Assessment &
Bushland and Vegetation Management Plan Services
Australian Business Number (ABN) 24 154 491 120
3/28 Tullimbar Rd, Cronulla NSW. 2230

Tel: 9527 5262; Mob: 0403 081902

Email: acs@actinotus.com.au

Web: [www@actinotus.com](http://www.actinotus.com)

ACS Environmental Consultants

Peter Stricker BSc. (Hons) (Syd) ²



²

Member Ecological Consultants Association NSW Inc

Consultants experience

The director of 'Actinotus Consultancy Services (ACS) – Environmental P/L' (formerly Actinotus Environmental Consultants) has worked in the area of biodiversity impact and bushfire hazard assessment services for a period of greater than 20 years. He also has over 20 years of experience in scientific research (ecological) and teaching in biological science.

The principal of the former 'Actinotus Environmental Consultants' has completed the NSW Consulting Planners Bushfire Training Course organised by the Planning Institute of Australia NSW Division for planning consultants and allied professionals relating to the implementation of 'Planning for Bushfire Protection', in June 2003.

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EXECUTIVE SUMMARY

‘ACS Environmental’ was commissioned by Mr. C. Amoyal to survey for flora and undertake a biodiversity impact assessment for a proposed development at Lot 128 within DP 221639 at 61 Loombah St, Bilgola Plateau NSW 2107.

The allotment 61 Loombah Street has a street front boundary of 10.74m and is an irregular polygon in shape to a depth of 50.5m, falling away from Loombah Street to the southwest. The total area of the subject land at 61 Loombah St, Bilgola Plateau is 979m². The proposed development is to utilise part of the existing upper section for a carport and the lower sections above the cliffline for the location of a dwelling house.

The proposed works involve the clearing of about 250m² (0.025ha) of existing vegetation for the construction.

The arboricultural report indicates that of 30 trees located on the subject site, 12 trees are located within the design footprint and cannot be retained. A total of 18 trees and tall shrubs will be retained as well as much of the Grass-Tree dominated ground cover.

The vegetation occurring on the subject site is assessed as and described as **PCT 3592: Sydney Coastal Enriched Sandstone Forest**, which is not listed as an endangered ecological community. Sydney Coastal Enriched Sandstone Forest is commonly encountered on the upper slopes and dry gullies of Sydney urban areas. PCT 3592 is a tall to very tall shrubby sclerophyll open forest found on slightly enriched Hawkesbury sandstone soils on sheltered slopes and occasionally crests on the Sydney coastal sandstone plateaus (DPE 2023).

DPE Bionet Atlas of Wildlife (January 2023) records for an area of 5km radius around the subject site indicate that thirteen (13) flora species of conservation significance have been recorded within the last 20 years. Habitat for these threatened species does not appear to occur at the subject site. Targeted searches for these, mostly conspicuous life-form species, did not locate any of these or any other threatened flora species in the subject development area. None is expected to be impacted by the proposed development.

The DPE Bionet Atlas of NSW Wildlife database (2023) listed thirty seven (37) species of terrestrial and avifauna (threatened under the BC Act) within a 5 km radius of the subject site. Some species of fauna such as the Powerful Owl, Grey-headed Flying Fox, Eastern Pygmy Possum and Large-Bentwinged Bat may occasionally forage across or within the site, but as much of the vegetation including 18 individuals of trees will be retained, it is highly unlikely that foraging or roosting potential for these fauna would be greatly impacted.

In regard to potential biodiversity offsets, there would be minor loss of potential habitat of area about 250m² as a result of the proposal, and as such, the development does not meet the offset criteria in relation to the potential area to be impacted.

The reconciled BV map (DPE 2022) indicates potential biodiversity value attributed to mapping of Pittwater Spotted Gum Forest below a distinct sandstone cliffline occurring at the lower sections of the subject site (Figures 2, 8 & 12). However, ground-truthing and further assessment appears to indicate that the ecological community that occurs below the cliffline is more likely described as Coastal Enriched Sandstone Moist Forest, a plant community type that is not listed on registers of the BC Act or EPBC Act.

GLOSSARY AND ACRONYMS

APZ – Asset Protection Zone

BC Act – Biodiversity Conservation Act

CCPD – Crown Canopy Projective Density

CEEC – Critically Endangered Ecological Community

CEMP - Construction Environmental Management Plan

DCCEEW – Dept Climate Change, Environment, Energy and Water

DEC – State Department of Environment and Conservation

DECCW – State Department of Environment, Climate Change and Water

DPE – Dept Planning and Environment

EEC – Endangered Ecological Community

EPA Act – Environment Protection Act

EPBC Act – Environment Protection and Biodiversity Conservation Act

IPA – Inner Protection Area

NPWS – State National Parks and Wildlife Service

OEH – Office of the Environment and Heritage

OPA – Outer Protection Area

PCT - Plant Community Type

RoTAP – Rare and Threatened Australian Plants

SMCMA – Sydney Metropolitan Catchment Management Authority

TEC - Threatened Ecological Community

TPZ - Tree Protection Zone

1. INTRODUCTION

1.1. PROPOSED DEVELOPMENT

'ACS Environmental' was commissioned by Mr. C. Amoyal to survey for flora and fauna and undertake a biodiversity impact assessment for a proposed development at Lot 128 within DP 221639 at 61 Loombah St, Bilgola Plateau NSW 2107.

Figure 1 is an aerial depiction of the land in relation to the surrounding landscape (NearMap 2022).

Figure 2 is a detail site plan and contour survey of the subject property at 61 Loombah St, Bilgola Plateau (Studio Haptic 2022).

Figure 3 is an aerial image of the subject property at 61 Loombah St, Bilgola Plateau (Nearmap 2022).

The total area of the subject land at 61 Loombah St, Bilgola Plateau is 979m² (C.M.S Surveyors 2022).

Figure 4 is an aerial depiction of the subject area showing the land in relation to established development in the local area (NearMap 2022).



Figure 1 - Aerial image of subject property at 61 Loombah St (blue marker) (image from Nearmap November 2022)

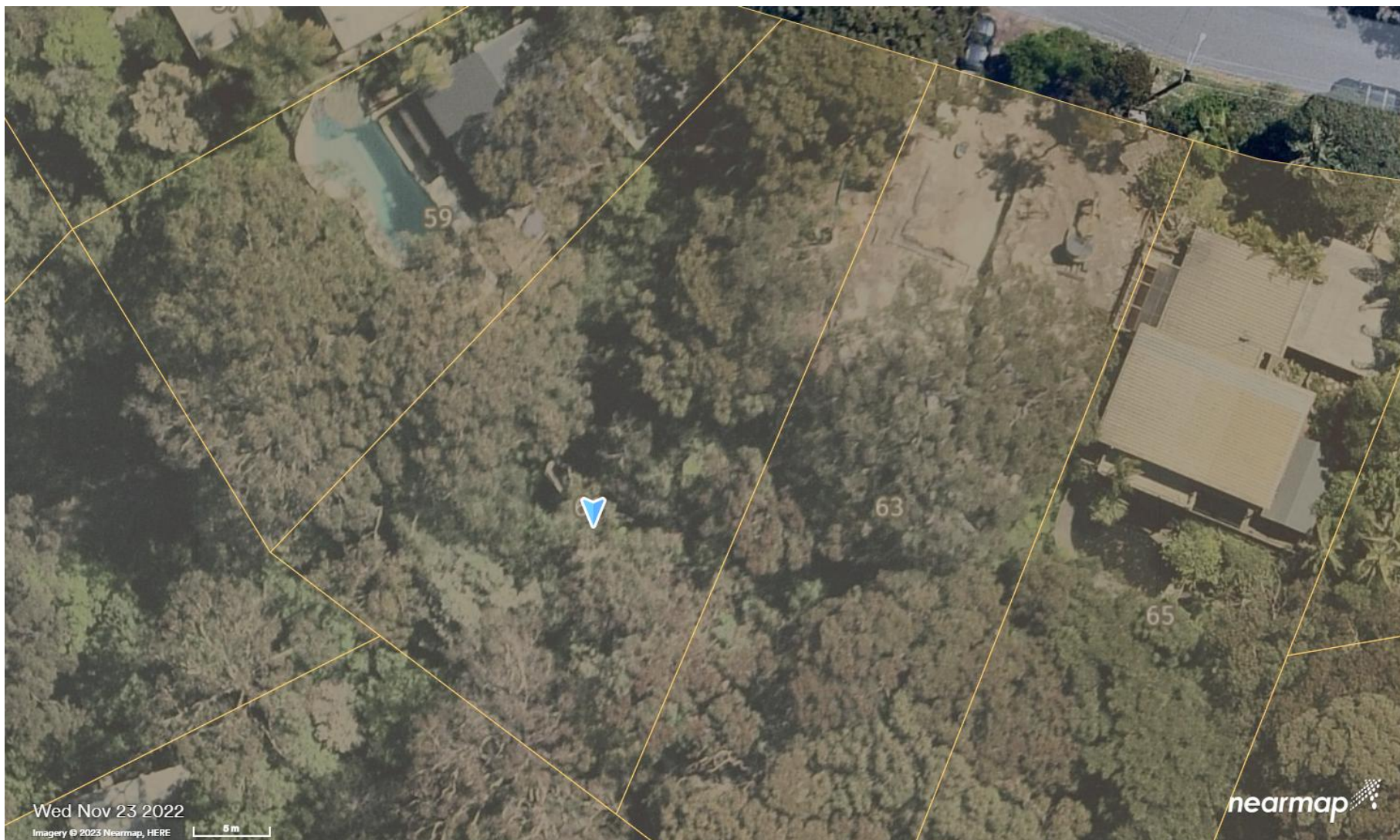


Figure 3 - Aerial image of subject property at 61 Lombah Street, Bilgola Plateau in relation to immediate neighbouring properties (Nearmap November 2022)

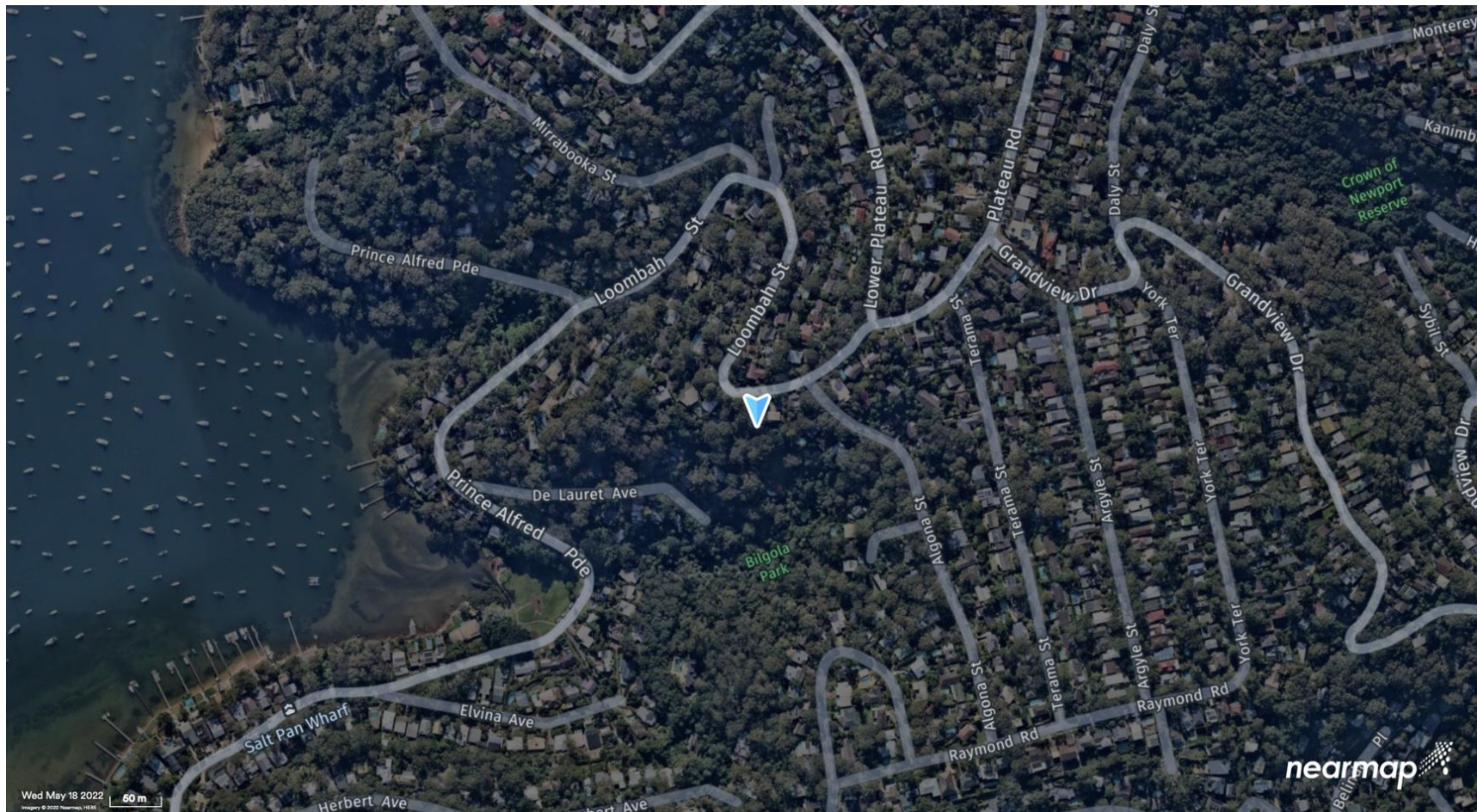


Figure 4 - An aerial depiction of the subject area showing the land in relation to established development in the local area (NearMap 2022).

1.2. PURPOSE OF BIODIVERSITY IMPACT ASSESSMENT REPORT

The purpose of the flora and fauna surveys and ecological impact assessment is to document existing and expected biota and to ensure all necessary safeguards are described and complied with in relation to the proposal as required by Pittwater Local Environment Plan (2014), Pittwater Development Control Plan (2004) and the State Environmental Planning Policy (2004).

1.3. STATUTORY AND LEGISLATIVE REQUIREMENTS

Planning controls provided by State and Commonwealth Legislation include the following:

- Environmental Planning and Assessment Act (EP & A Act) (1979),
- Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act) (1999),
- Biodiversity Conservation Act (BC Act) (2016). The BC Act (2016) includes Preliminary Determinations of the NSW Scientific Committee (to January 2023) as well as Provisional Listings of Endangered Species on an emergency basis (to January 2023),

The objectives of this Act are:

- to provide for the conservation of threatened species, populations and ecological communities of animals and plants. The Act sets out a number of specific objects relating to the conservation of biological diversity and the promotion of ecologically sustainable development.
- Planning for Bushfire Protection (2019).
- Biosecurity Weeds Act 2015 (NSW).

The objectives of this Act are:

- to reduce the negative impact of weeds on the economy, community and environment of this State by establishing control mechanisms to:
 - prevent the establishment in this State of significant new weeds, and
 - restrict the spread in this State of existing significant weeds, and
 - reduce the area in this State of existing significant weeds,
 - to provide for the monitoring of and reporting on the effectiveness of the management of weeds in this State

Local Council planning controls include the:

- *Pittwater Local Environment Plan (2014)*
- *Pittwater Development Control Plan (2004)*

This flora and fauna assessment report includes an account of:

- Threatened flora and fauna species, populations, endangered ecological communities and their habitats, as listed under the Biodiversity Conservation Act (BC Act), 2016;
- Nationally significant flora species, as listed under the Environment Protection and Biodiversity Conservation Act (EPBC Act), 1999;
- Rare or threatened Australian plants (RoTAP) as listed in Briggs and Leigh (1996); and
- Any regionally or locally significant species in the Northern Beaches Council LGA.

1.4. DOCUMENTS PROVIDED

- Owen Tebbutt (Consulting Arborist, All Arbor Solutions) (2022), Arboricultural Impact Assessment, 61 Loombah St, Bilgola Plateau.
- Studio Haptic (2022) Site Plan and Master Plan Set for proposed development at 61 Loombah St, Bilgola Plateau.
- C.M.S. Surveyors (2021) Detail and Contour Survey of Lot 128 in DP 221639 at 61 Loombah Street, Bilgola Plateau
- Taylor Consulting (2022) Stormwater Management Plan for Lot 128 in DP 221639 at 61 Loombah Street, Bilgola Plateau

1.5. OBJECTIVES OF THE STUDY

- To carry out detailed flora and fauna surveys on the subject land;
- To prepare a comprehensive report qualifying potential biodiversity impacts and describing mitigation measures in relation to the above assessments.

1.6. SCOPE OF THE STUDY

The survey work was undertaken to provide Mr. C Amoyal with current and detailed information on the following:

- Identification of the flora and fauna that occur at the subject site including documentation of species lists and mapping of identifiable plant communities;
- Identification of Threatened (Endangered and Vulnerable) species, populations, communities and habitats as listed in Schedules 1 & 2 of the Biodiversity Conservation Act 2016 (BC Act) including Preliminary Determinations of the NSW Scientific Committee, and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), ROTAP species (Briggs & Leigh 1996) and regionally and locally significant species that could potentially be impacted upon by the proposed development;
- Identify listed migratory species (as listed in international treaties referred to in the EPBC Act);
- Identification of fauna species, including species of amphibians, reptiles, birds or mammals, not directly recorded during surveys but that could potentially occur in the study area as indicated by the presence of associated habitat;
- Preparation of a report describing vegetation communities on the subject land indicating their current condition and level of degradation;
- Recording of the area and extent of Biosecurity (and other significant High Threat Weed) weed species in the study area;
- Assessment of potential impacts of the proposal on existing flora and fauna within the study area;
- Submission of draft report; Incorporation of relevant review comments and amendment of draft report; and
- Submission of a final report within 1 week of receiving review comments.

2. EXISTING ENVIRONMENT

2.1. TOPOGRAPHY, GEOLOGY AND SOILS

The site has a south-westerly aspect sloping downwards at gradients of 20 - 30⁰ from Loombah Street (Figure 1).

The local substrate geology of the upslope part of the subject area appears to be Hawkesbury Sandstone (Herbert 1983). The lower section of the subject land may occur at the boundaries of the uppermost Hawkesbury Sandstone overlying sediments of the Narrabeen Sandstone.

The Sandstone-based substrate is largely comprised of medium to coarse-grained quartz sandstone with minor shale and laminite lenses whereas the Narrabeen Sandstone is comprised of interbedded laminite, shale and quartz, to lithic quartz sandstone (Herbert 1983).

The soil landscape series of the Hawkesbury Sandstone component of the landscape is the colluvial Hawkesbury Soil Landscape Series whereas the Watagan Soil Landscape Series is associated with the Narrabeen Sandstone sediments (Chapman & Murphy 1989).

2.2. EXISTING VEGETATION – LOCAL PLANT ASSEMBLAGE

The subject land can be separated into two sections – the area located above the sandstone cliff-face indicated in Figure 2 and the section below.

The upper and middle sections are dominated by a high ground cover of the Grass-tree *Xanthorrhoea arborea* and medium to tall sized trees of Sydney Red Gum and other species to a canopy cover of about 60% with a moderate shrub canopy to 40% and ground cover to 50% (Figures 5 & 6). Exposed sandstone outcrops and boulders comprise about 30 - 40% of this landscape with about 20% leaf litter (Figures 5, 6 & 7). This is where the main sections of the development, including the proposed dwelling and decks, carport and driveway, and pedestrian walkway to the proposed house are located (Figure 2).

The lower section (Figure 8) consists of forested vegetation, including rocky outcrops, ledges and cliffed sections. The impact to this section will be avoided as it occurs below the level of the rear deck of the proposed dwelling (Figure 2).



Figure 5 – Image of middle section of subject land indicating Grass-tree populations occurring throughout the ground stratum, small trees of Forest Oak where the dwelling house will be constructed with large individuals of Sydney Red Gum such occurs in the centre of the image, retained.



Figure 6 – Image from middle section of property showing individual of Sydney Red Gum, individuals of Burrawang in the background, extensive rock and boulder exposure and a high cover of leaf litter in the ground layer.



Figure 7 – Image showing rocky outcropping toward upper sections of subject area with individuals of Sydney Red Gum and Sydney Peppermint with Grass Tree and immature individuals of Cabbage Palm



Figure 8 – Image showing forested vegetation occurring within proposed building site, beyond which the land is steep and stepped with sandstone cliffs and ledges below the building site location and where individuals of Spotted Gum are apparent in adjoining allotments (see Figure 2)

2.3 CURRENT AND SURROUNDING LAND USE

The subject site, 61 Loombah Street Bilgola Plateau, Lot 128 DP221639, is zoned C4 'Environmental Living' under the Pittwater Local Environment Plan 2014.

The subject property has two adjoining allotments, 63 Loombah St - a two-storey dwelling undergoing construction to the east and 59 Loombah St – a developed allotment located to the west (Figures 1 & 3).

The site is not listed within a bushfire prone area, and neither listed as being a heritage item or within a heritage zone.

The aerial view of the subject land at No. 61 Loombah St, Bilgola Plateau shows that the surrounding locality consists of a long established low-density residential development (Figure 4) (NearMap 2022).

3. FLORA AND FAUNA SURVEY AND ASSESSMENT

3.1 METHODS

3.1.1 Literature review

Existing information on 'Threatened Flora of the Locality', defined as an area of 5km radius around the site, was accessed from the DPE Bionet Atlas of NSW Wildlife (January 2023), Commonwealth DCCEW Environmental Reporting Tool (January 2023) and RoTAP (Briggs & Leigh, 1996) databases.

Other literature detailing locally threatened flora and fauna, as well as endangered populations and plant communities of the Study Area included NSW Scientific Committee Final Determinations (1996-2023), Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer *et al* 2010), Native Vegetation of the Cumberland Plain – Final Edition (DEC 2002) and The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area (OEH 2016).

Searches for fauna were undertaken from the DPE Bionet Atlas of NSW Wildlife database (January 2023) for a 5km radius of the site, as well as the Commonwealth (DCCEW) 'Protected Matters Search Tool' Database (January 2023) for threatened fauna species or populations of fauna likely to occur in the Study Area. Searches of JAMBA (Japan and Australia Migratory Bird Agreement), CAMBA (China and Australia Migratory Bird Agreement) and ROKAMBA (Republic of Korea Migratory Bird Agreement) databases were also consulted in regard to the distribution of migratory bird species.

3.1.2 Site survey

The subject site was inspected by 'ACS Environmental P/L' on the 23rd of January 2023.

3.1.2.1 Flora Survey

Comprehensive surveys of the Study Area were undertaken on foot by the diversity search method of Cropper (1993) and DEC 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities' (2004) to identify the existence of extant and exotic flora.

The survey included a complete floristic inventory of indigenous and exotic species and an assessment of the presence, or likelihood of occurrence, of any threatened, rare (RoTAP), regionally or locally significant species or ecological plant community occurring in the Study Area.

Survey design

For the area within the designated vegetation of the subject land where part of the construction is proposed to be located (Figure 2), sampled as an area of a single identifiable vegetation community, a polygon of area 400m² (quadrat) was comprehensively surveyed including for cover values for all included species (BAM 2017) (Figure 9).

The lower sections of the subject land were surveyed for functional aspects of the biodiversity, including presence of logs on the ground, hollows in trees, stem widths of trees and leaf litter.

3.1.2.2 Fauna Survey

The survey effort complies with the survey effort recommended by the Draft Guidelines for Threatened Species Assessment under Part 3A (DEC and DPI, 2004) for the study area size, habitat types available on the site and seasonal factors.

A dedicated ground search was undertaken as was a census of extant birds. The survey involved different search strategies and protocols and all extant fauna or evidence of fauna was recorded. Threatened fauna species not recorded in the surveys but with the potential to be present as indicated by habitat are considered in the final assessment.

Strategies employed for the field investigation of the Study Areas were:

Assessment of the value of habitat suitable for native fauna species and specific habitat structures/resources was identified that were considered important in life cycles. These structures or resources included:

- Mature trees with hollows for breeding, roosting and/or nesting;
- Large woodland stands for sheltering, roosting and foraging;
- Particular foraging resources such as certain tree or shrub species;
- Dispersal, migratory or foraging corridors for fauna;
- Leaf litter and ground search for reptiles, frogs and threatened invertebrates;

- Identification of scats and other indirect evidence to suggest fauna utilisation such as tracks, scratch marks or diggings;
- Assessment was carried out with particular regard for species listed as 'threatened' under the Biodiversity Conservation Act, 2016 (BC Act).

3.1.2.3 Limitations of the study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetative structures. Some species are identifiable above-ground only after particular environmental circumstances occur that may be related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, grazing pressure, biological life-cycle patterns as in the case of small geophytic taxa such as species of orchids etc.

Diurnal surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the Study Area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame, and assess the suitability of habitat for particular species.

These potential limitations to the location of certain cryptic or diurnally active species are not expected to cause any significant constraints to the purposes of this assessment.



Figure 9 - Indicating the location of the sampled 400m² quadrat area (outlined in blue) within the total allotment area of 979m² at the subject property (Nearmap November 2022).

3.2 RESULTS - FLORA

3.2.1 Indigenous Species

Appendix 1 is a floristic species list of indigenous and exotic species occurring within the quadrat (400m² in area) within the subject site. Species occurring within the proposed location of the development and in the undisturbed forested vegetation at the lower sections of the subject land were also recorded.

Some species occurred commonly throughout the surveyed site, whereas some species occur in low frequency and cover value or uncommonly. Species nomenclature follows that of Harden (1990 – 2002; 2023 online).

A total of 25 native species were recorded within the sampled quadrat with another 3 species, Christmas Bush (*Ceratopetalum gummiferum*), Soft Bracken (*Calochlaena dubia*) and Giant Water Vine (*Cissus hypoglauca*) recorded in forested vegetation below the cliffline shown in Figure 2).

The sections of the property where the development is proposed consists of a rocky ground layer that includes a high cover of Grass Tree (*Xanthorrhoea arborea*) and immature individuals of Cabbage Palm (*Livistona australis*) (Figures 5, 7 & 8). A moderate cover of shrub and small tree cover includes Old Man Banksia (*Banksia serrata*), Forest Oak (*Allocasuarina torulosa*), Blueberry Ash (*Elaeocarpus reticulatus*), Burrawang (*Macrozamia communis*) and Sweet Pittosporum (*Pittosporum undulatum*) (Appendix 1).

The main upper tree canopy is comprised of Sydney Red Gum (*Angophora costata*) with Sydney Peppermint (*Eucalyptus piperita*) and Red Bloodwood (*Corymbia gummifera*) also occurring less frequently (Figure 7) (Appendix 1).

A diverse complement of native vines occurring with low cover values include Wombat Berry (*Eustrephus latifolius*), False Sarsaparilla (*Hardenbergia violacea*), Wonga Wonga Vine (*Pandorea pandorana*), Scurvy Weed (*Commelina cyanea*) and Sweet Sarsaparilla (*Smilax glycyphylla*) (Appendix 1).

3.2.2. Exotic Species

A total of 8 exotic plant species were recorded in the surveyed site (Appendix 1). These species mainly occur on the upper section of the property above the cliffline, although Lantana is prevalent in the area below the cliffline. The main weeds occurring in low frequency in the allotment include garden escape exotic species such as Asparagus Fern

(*Asparagus aethiopicus*), Fishbone Fern (*Nephrolepis cordata*), Camphor Laurel (*Cinnamomum camphora*) and Lantana (*Lantana camara*). There are also small patches of Bromelia (*Neoregelia carolinae*) and Ribbon Plant (*Chlorophytum comosum*) occurring in the ground layer.

Four weed species are classed as High Threat Weeds (HTW) including Lantana (*Lantana camara*), Large-leaved Privet (*Ligustrum lucidum*), Small-leaved Privet (*Ligustrum sinense*) and Ground Asparagus (*Asparagus aethiopicus*) (Appendix 1).

3.2.3 Ecological Community

DPE has mapped the forested sections of the subject land at 61 Loombah Street, Bilgola Plateau as Pittwater Spotted Gum Forest (PCT 1214) (Figure 10).

However, from ground-truthing and the attributes of the threatened ecological community 'Pittwater Spotted Gum Forest' (PCT 1214), this assemblage does not appear to occur at the upland sections of the site, whereas below the cliffline, mature individuals of the indicative canopy species Spotted Gum (*Corymbia maculata*) appear dominant with an absence of Sydney Red Gum, a canopy species which is more an indicative species of rocky Hawkesbury Sandstone outcropping sites.

The subject site appears to occur on rocky outcropping sediments derived from Hawkesbury Sandstone, outcrops of which are predominant at this location (Figures 6 & 7).

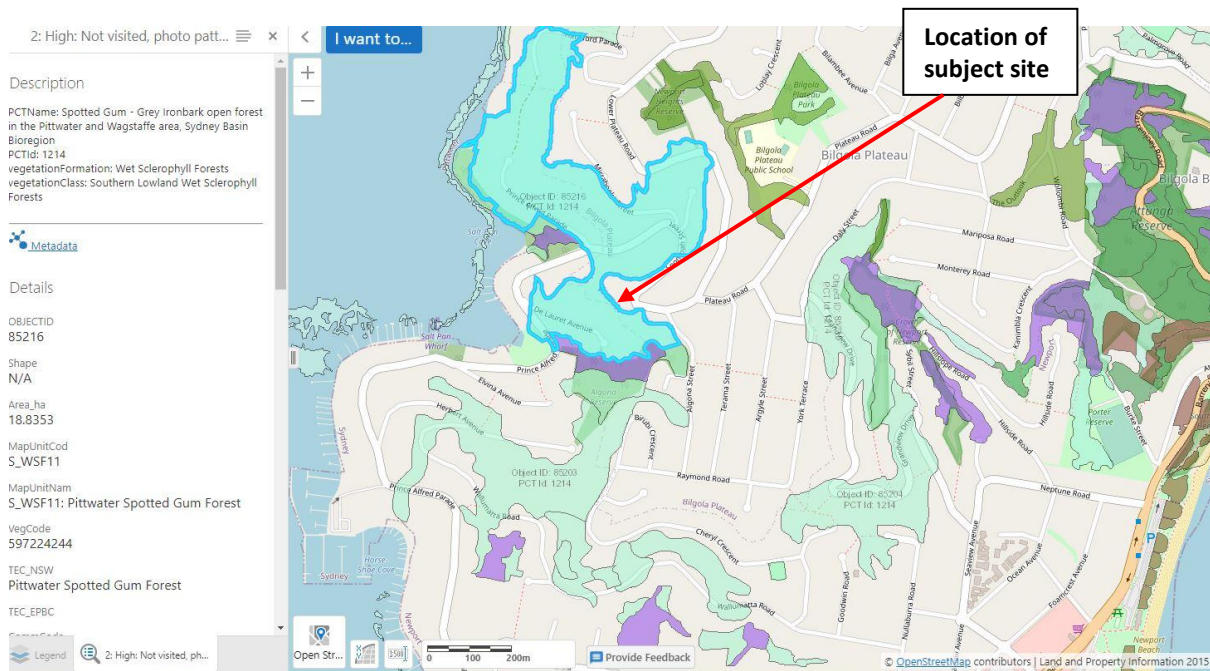


Figure 10 - Mapping of Pittwater Spotted Gum Forest at subject site at 61 Loombah Street, Bilgola Plateau

The lower sections of the subject site appear to occur at the boundary of Hawkesbury Sandstone sediments and those of the Narrabeen Sandstone (Herbert 1983), but the rock outcropping and presence of Sydney Red Gum indicates that the former strata is predominant at the upper sections of the property above the cliffline at the subject site.

The vegetation survey shows that the site is dominated by Sydney Red Gum (*Angophora costata*) with some Sydney Peppermint (*Eucalyptus piperita*) and Red Bloodwood (*Corymbia gummifera*) also present (Figures 5, 6, 7 & 8). These canopy species are not diagnostically positive for Pittwater Spotted Gum Forest, and do not occur in that community (OEH 2016).

Pittwater Spotted Gum Forest is dominated by Spotted Gum (*Corymbia maculata*) with Grey Ironbark (*Eucalyptus paniculata*) also part of the canopy. Neither of these species occur at 61 Loombah Street, Bilgola Plateau.

Plant Community Type analysis by the Bionet Plant Community Type analysis program (DPE 2022) ranked the ecological community above the cliffline as 'Sydney Coastal Enriched Sandstone Forest' (new PCT 3592) as significantly higher than that for any other PCT (rank 25) although PCT 3595 (Sydney Coastal Sandstone Gully Forest) also ranked highly (rank 24).

Even though these two communities have many shrub and ground stratum species in common, a higher count of diagnostically positive species was also found to occur at the site for Sydney Coastal Enriched Sandstone Forest (PCT 3592) with a total of 20 positively diagnostic species occurring within the vegetation (OEH 2016).

The vegetation occurring below the cliffline indicated in Figure 2, with limited species to enter into the Plant Community Analysis (PCA) program, indicated that this forest vegetation is likely described as PCT 3176 'Sydney Enriched Sandstone Moist Forest' with the highest ranking of '10' matches on the PCA program.

In conclusion, the position on the upper part of the slope with exposed Hawkesbury Sandstone and the predominance of Sydney Red Gum at the subject site, together with the absence of any individuals of Spotted Gum or Grey Ironbark, appears to indicate the presence of **Sydney Coastal Enriched Sandstone Forest (PCT 3592)** rather than the mapped area of Pittwater Spotted Gum Forest (PCT 1214) occurring at the subject site.

The profile for Sydney Coastal Enriched Sandstone Forest (PCT id 3592) is as follows (DPE 2023):

Plant Community Type ID (PCT ID): Former (legacy) 1841, 1778, 1776 PCT's; New PCT 3592 (3/07/2020)

Name: Sydney Coastal Enriched Sandstone Forest

Classification Confidence Level: 2-High

Vegetation Description: A tall to very tall shrubby sclerophyll open forest found on slightly enriched Hawkesbury sandstone soils on sheltered slopes and occasionally crests on the Sydney coastal sandstone plateaus.

The tree canopy very frequently includes a high cover of *Angophora costata* commonly in combination with *Corymbia gummifera* and *Eucalyptus piperita*, with *Eucalyptus pilularis* occasionally locally abundant.

A taller mid-stratum is characterised by very frequent however sparse cover of *Pittosporum undulatum* and *Allocasuarina littoralis* or *Allocasuarina torulosa*.

A mid-dense lower shrub layer is comprised of dry sclerophyll species that commonly include *Leptospermum trinervium*, *Persoonia levis*, *Lomatia silaifolia*, *Acacia ulicifolia* and *Dodonaea triquetra*, with *Banksia serrata* and *Banksia spinulosa* recorded occasionally.

The ground layer is typically a sparse cover of graminoids that almost always includes *Dianella caerulea* and *Lomandra longifolia* with the grass *Entolasia stricta* and fern *Pteridium esculentum*, with frequent occurrences of climbers such as *Smilax australis*.

This PCT is primarily distributed at elevations of less than 200 metres asl downslope of shale soils on the north shore of Sydney and Sutherland and on the Narrabeen sandstone escarpment along the Pittwater Peninsular. It grades into a heathy forest PCT 3595 on rocky Hawkesbury sandstone gullies or moist shrub and fern forest PCT 3176 with increased shelter in deeper gullies.

Vegetation Formation: Dry Sclerophyll Forests (Shrubby sub-formation);

Vegetation Class: Sydney Coastal Sclerophyll Forests;

IBRA Bioregion(s): Sydney Basin;

IBRA Sub-region(s): Wyong; Pittwater; Cumberland; Sydney Cataract; Yengo;

TEC Assessed: No associated TEC

Associated TEC Comments: There are currently no TECs associated with this PCT.

PCT Percent Cleared: 60.82

PCT Definition Status: Approve

3.2.4 Conservation status of Sydney Coastal Enriched Sandstone Forest

Description and status of ecological community

Sydney Coastal Enriched Sandstone Forest is a tall to very tall shrubby sclerophyll open forest found on slightly enriched Hawkesbury sandstone soils on sheltered slopes and occasionally crests on the Sydney coastal sandstone plateaus.

The tree canopy very frequently includes a high cover of *Angophora costata* commonly in combination with *Corymbia gummifera* and *Eucalyptus piperita*, with *Eucalyptus pilularis* occasionally locally abundant.

A taller mid-stratum is characterised by very frequent however sparse cover of *Pittosporum undulatum* and *Allocasuarina littoralis* or *Allocasuarina torulosa*

This PCT is primarily distributed at elevations of less than 200 metres asl downslope of shale soils on the north shore of Sydney and Sutherland and on the Narrabeen sandstone escarpment along the Pittwater Peninsular. It grades into a heathy forest PCT 3595 on rocky Hawkesbury sandstone gullies or moist shrub and fern forest PCT 3176 with increased shelter in deeper gullies.

About 60.8% of this community has been cleared with about 40% remaining (DPE 2023), and as such, Coastal Enriched Sandstone Moist Forest is not listed on registers of the NSW BC Act (2016) or Commonwealth EPBC Act (1999).

Status of ecological community occurring at subject site

The mapping and ground-truthing of the subject land indicate that the structure of the natural plant community occurring at the upper sections of the land is indicative of Sydney Coastal Enriched Sandstone Forest (Figures 5, 6, 7 & 8).

The ground stratum includes extensive areas of Grass Tree (*Xanthorrhoea arborea*) occurring within a rocky landscape (Figures 5, 6, 7 & 8; Appendix 1).

3.2.5 Flora Species of Conservation Significance

Threatened species

Current Atlas of NSW Wildlife data (Bionet - January 2023) was accessed to indicate threatened flora species that have been recorded in the locality within the last 20 years. Records for an area of 5km radius around the subject site indicate that 13 species of conservation significance have been recorded within the last 20 years.

Table 1 lists these 13 species with an account of their threatened status, geographical range, physiognomic attributes, habitat features, and likelihood of occurrence in the surveyed area.

Scientific Name	Common Name	NSW status	Comm. status	Records
<i>Tetradlea glandulosa</i>		V		6
<i>Chamaesyce psammogeton</i>	Sand Spurge	E1		5
<i>Lasiopetalum joyceae</i>		V	V	1
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V,3		2
<i>Eucalyptus camfieldii</i>	Camfields Stringybark	V	v	1
<i>Kunzea rupestris</i>		V	V	1
<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A	CE	29
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	8
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E1,P,2	E	1
<i>Microtis angusii</i>	Angus's Onion Orchid	E1,P,2	E	51
<i>Grevillea caleyi</i>	Caleys Grevillea	E4A,3	CE	44
<i>Persoonia hirsuta</i>	Hairy Geebung	E1,P,3	E	5
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	1

Table 1 - Records of 13 threatened flora species recorded within a 5km radius of the subject site within the last 20 years (DPE 2022).

Figure 11 indicates the location of recorded sightings of 5 of the most recorded threatened species (above in Table 1) in relation to the subject site.

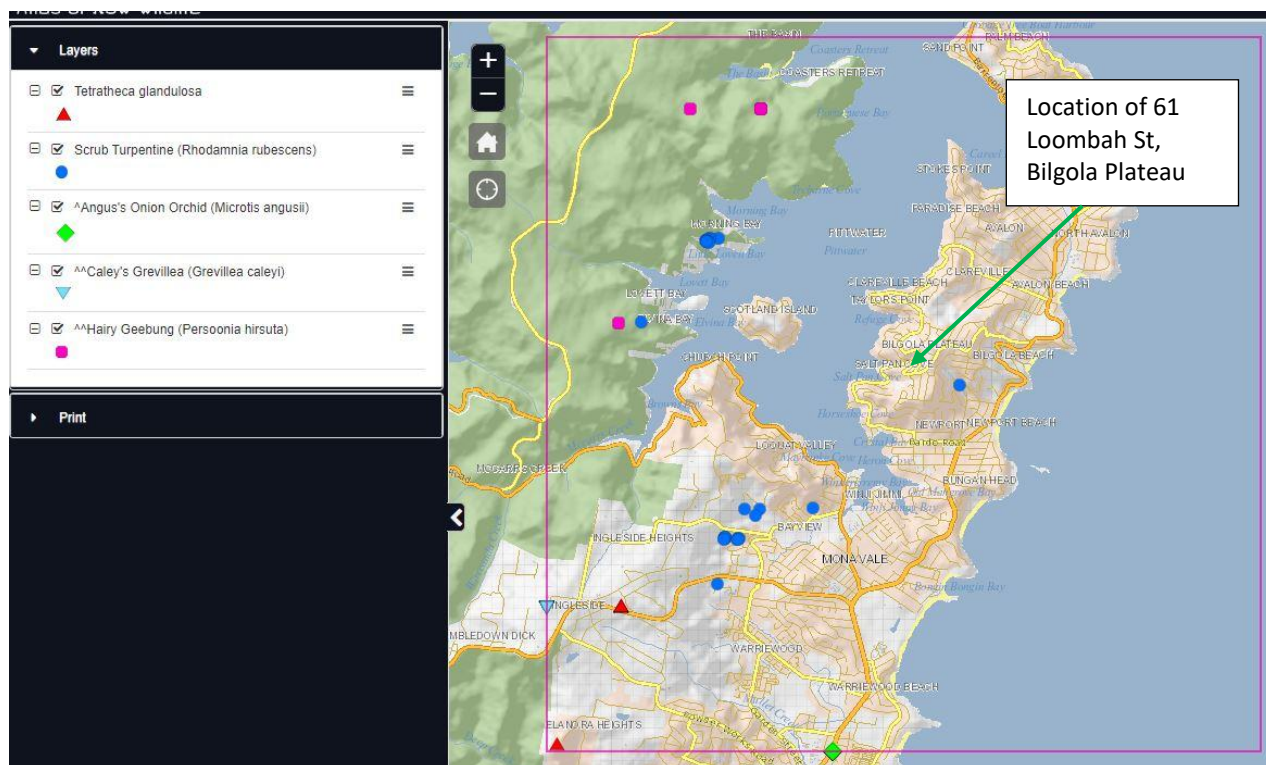


Figure 11 – Location of 5 of the most common threatened species sightings in a 5km radius from property over the last 20 years (Bionet Atlas NSW 2022).

The habitat of the upper sections of the subject land with extensive cover of Grass Tree and Cabbage Palm (Figures 5, 6, 7 & 8) with shallow soils over extensive exposed sandstone outcrops is mostly unsuitable for any of these threatened flora species.

The habitat for Scrub Turpentine is mostly littoral, warm temperate and subtropical rainforest (Fairley & Moore 2010) and wet sclerophyll forest usually on volcanic and sedimentary soils. The upper sections of the subject site appear unsuitable for this species which is characterised as highly to extremely susceptible to infection by Myrtle Rust (DPE 2022).

Targeted searches for these mostly conspicuous life-form species did not locate any of these or any other flora threatened species in the subject area.

3.2.6 Extent of modification of vegetation as a result of development

The arboricultural assessment identified thirty (30) trees for assessment (All Arbor Solutions 2022).

One tree is a council owned street trees located within the road reserve area in front of No. 59 Loombah Street, one tree occurs in the adjacent land at 59 Loombah St and 28 are wholly within the lot boundary of the subject site. Many individuals appear to be in declining health with dieback in upper canopies and termite nests and tracking evident (All Arbor Solutions 2022).

As indicated in the arboricultural impact assessment by All Arbor Solutions (2022) a total of 12 trees will require removal to facilitate the development (Figure 12).

Table 2 indicates the trees that are proposed for removal for the proposed development with qualification of their height, spread and DBH.

TREE NO.	SPECIES	GROWTH FORM (DPE 2023)	HEIGHT (m)	CANOPY SPREAD (m)	DBH (mm)
3	Sydney Red Gum	Tree	15	3	330
5	Forest Oak	Tree	10	3	400
6	Red Bloodwood	Tree	25	8	450
7	Forest Oak	Tree	10	3	300
14	Old Man Banksia	Tree	15	3	300
17	Forest Oak	Tree	15	5	350
19	Forest Oak	Tree	15	3	300
20	Forest Oak	Tree	20	3	300
21	Forest Oak	Tree	10	3	300
22	Christmas Bush	Tree	15	2	180
29	Hard Corkwood	Tree	10	3	200
30	Forest Oak	Tree	15	3	200

Table 2 - Attributes of trees proposed for removal at subject site (courtesy of All Arbor Solutions 2022)

A total of 12 semi-mature and mature individuals of trees, many in declining health with dieback and termite infestation (All Arbor Solutions 2022), would be removed for the building platform (Figures 2 & 12). Most individuals have only a low canopy spread (Table 2). These species are common to the locality and are not components of an endangered ecological community.

There are eighteen (18) remaining trees within the upper and lower sections of the site that would be protected and retained including three large mature individuals of Sydney Red Gum (Figures 3, 5 & 12) (All Arbor Solutions 2022).

Much of the vegetation in the upper northern section, central sections and lower south-eastern sections (below the house footprint) would be retained in the remnant bushland (Figures 2 & 12).

A total of seven individuals of Sydney Red Gums (*Angophora costata*) would be retained, as well as three mature individuals of Red Bloodwood, one individual of Sydney Peppermint, three individuals of Forest Oak (*Allocasuarina torulosa*), an individual of Old Man Banksia, an individual of Hard Corkwood (*Endiandra sieberi*), an individual of Cabbage Palm and an individual of Sweet Pittosporum (*Pittosporum undulatum*) (All Arbor Solutions 2022).

3.3 RESULTS – FAUNA AND HABITAT POTENTIAL

The following fauna assessment has been prepared with particular regard to the BC Act, Section 5A of the current EP&A Act and the EPBC Act.

3.3.1. Location and weather conditions of subject surveyed site

Grid co-ordinates of centre of surveyed area of subject land:

Latitude: -33.647304

Longitude: 151.309873

Weather conditions:

Overcast and wet conditions with intermittent showers.

23 rd January 2023	9am	3pm
Temp	18.8	19.2
Wind	WSW 9km/h	SE 9km/h
Rainfall	20.4mm	

A dedicated ground search was undertaken as well as a census of extant birds. The survey involved different search strategies and protocols and all extant fauna or evidence of fauna was recorded.

3.3.2. Habitats present

The habitats of the subject land include:

- i. Remnant forest with high extent of exposed sandstone rocks and boulders on upper and central sections of subject land with high cover of Grass Tree (*Xanthorrhoea arborea*)(Figures 5, 6, 7 & 8).
- ii. Remnant forest on steep sections of lower level of subject land below sandstone cliffed landform where no development is proposed (Figures 2, 8 & 12)
- iii. Rocky sandstone outcrops (Figures 5, 6, 7 & 8)

Canopy trees may provide sheltering and seasonal food resources for avifauna, arboreal mammal species and the Grey-headed Flying Fox. Large hollows for owl species were not recorded within the study area. No evident hollows were observed in any of the trees proposed for removal.

The rocky outcrops contained within the subject land contained a series of low rock shelves, small overhangs and crevices that may provide safe foraging habitat and potential shelter for small terrestrial fauna species such as skinks.

3.3.3. Site potential to form part of a wildlife habitat corridor

Retained patches of trees across the landscape form continuous distributions of forested canopy elements, including with Bilgola Park to the south (Figure 4), affording connectivity in relation to pollination, seed dispersal and mobility for foraging by avian and arboreal fauna.

3.3.4. Fauna recorded

The current survey undertaken in cool, moist conditions was not ideal for bird or reptile activity. Among the birds recorded utilizing resources within the forest were the Brush Turkey (*Lectura lathami*), whose mounded nests were observed, Laughing Kookaburra (*Dacelo novaeguineae*) and Butcher Bird (Table 3).

Swamp Wallaby (*Wallabia bicolor*) diggings were observed in adjacent allotments. The preferred habitat of the Swamp Wallaby is thick forest undergrowth or sandstone heath.

The Common Brushtail Possum (*Trichosurus vulpecula*) is expected to occur within the open-structured forest habitat of the upper sections of the subject site.

The Powerful Owl (*Ninox strenua*) may occasionally forage within the area if suitable prey species are in abundance. They usually occur along creek lines and waterways, and because they are nocturnal they roost during the day in densely vegetated trees often above a creek. However during the survey period, prey for this large owl did not appear to occur in sufficient in number to attract it to the area at that time. No large hollows were observed in any trees onsite and in any case, the largest, mature trees occurring at the subject site, will be retained.

Tree trunks did not show any activity of arboreal fauna markings, and no tree hollows or spouts were noted in the individuals of Sydney Red Gum, Red Bloodwood and Sydney Peppermint occurring in the subject area.

The larger megabat, Grey-headed Flying Fox (*Pteropus poliocephalus*) was not sighted during the survey but may be attracted to flowering Eucalyptus or Angophora trees on occasion.

Reptilian habitat was rated as relatively good within the subject land. Rocky outcrops, crevices and small overhangs, as well as leaf litter, was rated good for sheltering and foraging. The Dark-flecked skink (*Lampropholis delicata*) was recorded at this location.

There is no habitat for amphibian species and no frogs were calling at the time of survey.

The pest species Black Rat and House Mouse may be expected to occur occasionally at and in the vicinity of the subject site in association with a long history of human occupation in the locality (Table 3).

All species recorded in the current survey as well as those expected to occur are listed in Table 3.

Class/Family	Common name	Scientific name	Forested vegetation on the upper and central sections of the subject land
REPTILIA Scincidae	Dark-flecked Garden Sunskink	<i>Lampropholis delicata</i>	x
AVES Alcedinidae	Laughing Kookaburra	<i>Dacelo novaeguineae</i>	x
Cacatuidae	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	x
	Grey Butcherbird	<i>Cracticus torquatus</i>	x
Psittacidae	Crimson Rosella	<i>Platycercus elegans</i>	e
	Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	x
Meliphagidae	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	e
	Noisy Miner	<i>Manorina flavigula</i>	x
	Little Wattle Bird	<i>Anthochaera chrysoptera</i>	x
Megapodiidae	Australian Brush Turkey	<i>Alectra lathami</i>	x
Corvidae	Australian Raven	<i>Corvus coronoides</i>	e
Hirundinidae	Welcome Swallow	<i>Hirundo neoxena</i>	e
MAMMALIA Pseudocheiridae	Common Ringtail possum	<i>Pseudocheirus peregrinus</i>	e
Phalangeridae	Common Brushtail Possum	<i>Trichosurus vulpecula</i>	e
Peramelidae	Long-nosed Bandicoot	<i>Perameles nasuta</i>	e
Pteropodidae	Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	e
Vespertilionidae	Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	e
Muridae	Black Rat*	<i>Rattus rattus</i>	e
Macropodidae	Swamp wallaby	<i>Wallabia bicolor</i>	x (diggings)

Legend:

x - observed either onsite or overhead or heard in vicinity;

e - expected to occur onsite and in vicinity

Table 3 - Indicates the fauna recorded or expected to occur within the area of survey at 61 Loombah Street, Bilgola Plateau.

3.3.5. Fauna species of conservation significance

3.3.5.1 Threatened species

The criteria used to assess the likelihood of threatened species occurring in the Study Area included the specificity of habitat features such as tree canopy cover, relative soil moisture regime, relative soil nutrient regimes, historical disturbance and degradation of vegetation and known occurrences of threatened species in the immediate locality.

If all or most of these collective criteria deemed optimal for the occurrence of a particular threatened species occur in relation to the habitat of the Study Area, then the likelihood of its potential occurrence in the habitat of the Study Area could be assessed as being relatively high. If only some of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then its potential occurrence in the area of study may be deemed moderate at best. If few of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then the likelihood of its occurrence would be assessed as being low to very unlikely.

The DPE Bionet Atlas of NSW Wildlife database (2023) listed thirty seven (37) species of terrestrial and avifauna considered threatened under the BC Act recorded as occurring within a 5 km radius of the site (Table 3).

Scientific Name	Common Name	NSW status	Comm. status	Records
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V,P		51
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V,P	V	10
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V,P		21
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V,P		3
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V,P		3
<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	5
<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		7
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		37
<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		3
<i>^Lophoictinia isura</i>	Square-tailed Kite	V,P,3		5
<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		43
<i>^Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3	E	2
<i>^Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2		57
<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		7
<i>^Lathamus discolor</i>	Swift Parrot	E1,P,3	CE	17
<i>^Neophema pulchella</i>	Turquoise Parrot	V,P,3		1

Scientific Name	Common Name	NSW status	Comm. status	Records
<i>Ninox connivens</i>	Barking Owl	V,P,3		21
<i>Ninox strenua</i>	Powerful Owl	V,P,3		475
<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		2
<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	33
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	V,P		1
<i>Daphoenositta chrysoptera</i>	Varies Sitella	V,P		3
<i>Petroica boodang</i>	Scarlet Robin	V,P		2
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1,P	E	5
<i>Phascolarctos cinereus</i>	Koala	E1,P	E	1
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		396
<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		4
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	120
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P		17
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	19
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		1
<i>Myotis macropus</i>	Southern Myotis	V,P		29
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		5
<i>Vespadelus troungtoni</i>	Eastern Cave Bat	V,P		2
<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P		59
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		81
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	2

Legend to Table 4 - BC Act, EPBC Act, Migratory Bird Agreements

Key	
Environmental Protection and Biodiversity Conservation Act (EPBC Act) 1999	Biodiversity Conservation Act (BC Act) 2016
	E1 - Endangered
CE - Critically Endangered	E4 - critically endangered
E - Endangered	V - Vulnerable
V - Vulnerable	C CAMBA Migratory bird agreement between Australia and China

Table 4 - List of 37 threatened fauna species recorded previously within 5km of the study site over the last 20 years (Source: DPE Bionet Atlas of NSW Wildlife 2023).

3.3.5.2 Threatened species with potential to occur at the subject land

All threatened species listed require specific habitat for foraging, nesting or roosting. The subject land was assessed for these habitat requirements (refer to Appendix 3).

Few threatened fauna species are considered likely to regularly occur in the dense cover of Grass Tree and Cabbage Gum ground canopies of the upper and central sections of the subject land as indicated by the recorded sightings of threatened fauna species in

the locality. Figures 13 and 14 indicate the most recorded threatened fauna species that occur within a 5km radius of the subject site.

Figures 13 and 14 indicate the locations of the 10 threatened fauna species having the most recorded sightings in the locality.

Three threatened species occurring closest to, or in the vicinity, of the site include the following (Figures 13 & 14) (see Appendix 3 for habitat assessment):

1. **Powerful Owl (*Ninox strenua*)** The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation, often along creek banks, comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species (DPE 2023).

The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet, including Brush Turkeys, depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl (DPE 2023).

Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400ha can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha (DPIE 2020).

The Powerful Owl may forage in the area of the subject land from time to time but the removal of a few semi-mature individuals of Sydney Red Gum and some individuals of Forest Oak in declining condition (All Arbor Solutions 2022) is not expected to affect the life-cycle or viability of populations of the Powerful Owl in the locality, particularly as many trees will be retained including the three large mature individuals of Sydney Red Gum (Figures 2, 5 & 12).

2. **Grey-headed Flying Fox (*Pteropus poliocephalus*)**. This species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca swamps, wet and dry sclerophyll forests and also cultivated areas. The species feeds on the blossoms of more than 80 plant species, especially eucalyptus

blossom and the fruits of a number of palm species. Flowering species of eucalypts such as Swamp Mahogany (*Eucalyptus robusta*) and Forest Red Gum (*Eucalyptus tereticornis*) and Paperbarks (*Melaleuca quinquenervia*), are particularly important. Distances of up to 30km from the camp are often travelled, with 60-70km sometimes covered per night to reach a particular food source.

The Grey-headed Flying Fox (*Pteropus poliocephalus*) was not sighted during the survey, which occurred during mid-morning when the bats would be roosting in camps, but may be attracted to flowering Eucalypt or Angophora trees on occasion during the warmer months.

The habitat for this species may occur at the subject site as it forages for nectar. It is considered that as the area that is proposed to be impacted is relatively small, with the removal of only 12 individuals of Eucalyptus, Forest Oak, Old Man Banksia and Angophora from a total of 30 trees of these species, compared to its large foraging range in the locality, this species will not be compromised by the proposed development for the subject site (DPE 2023).

3. **Eastern Pygmy Possum** (*Cercartetus nanus*)

The Eastern Pygmy-possum (*Cercartetus nanus*) is a tiny (15 to 43 grams) active climber, with almost bare, prehensile (capable of curling and gripping) tails, and big, forward-pointing ears. They are light-brown above and white below. They appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares (DPE Bionet Atlas 2023).

The Eastern Pygmy-possum (*Cercartetus nanus*) is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities. They are found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes (OEH Bionet Atlas 2022).

They feed largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this

feed source may be more important in habitats where flowers are less abundant such as wet forests (DPE Bionet Atlas 2023).

Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks (DPE Bionet Atlas 2023).

The close-structured ground habitat potential for this species at the subject site with few nectiferous shrub species would appear to be unsuitable foraging habitat, however the high cover of Grass Tree thickets may provide suitable sheltering and roosting opportunities, which are necessary habitat attributes for this species. Many Grass Tree skirt were examined for the presence of this species but none was observed.

In any case, about 75% of the Grass Tree population at the subject site in the upper and central sections of the allotment will be retained, so maintaining habitat for sheltering for these Pygmy Possums.

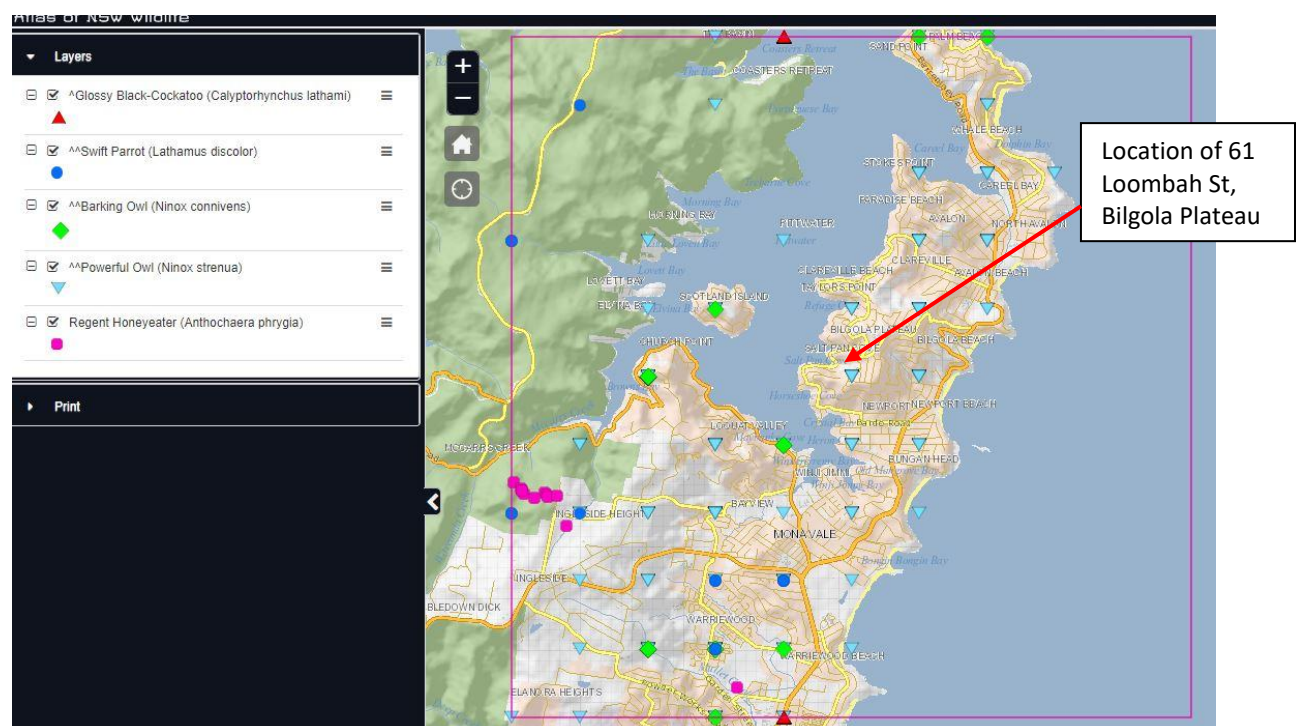


Figure 13 - Recorded sightings of 5 species of threatened fauna in the locality within the last 20 years, including for the Glossy Black Cockatoo, Regent Honeyeater and Powerful Owl (1km grid pattern of sightings or calls in locality) (DPE 2023)

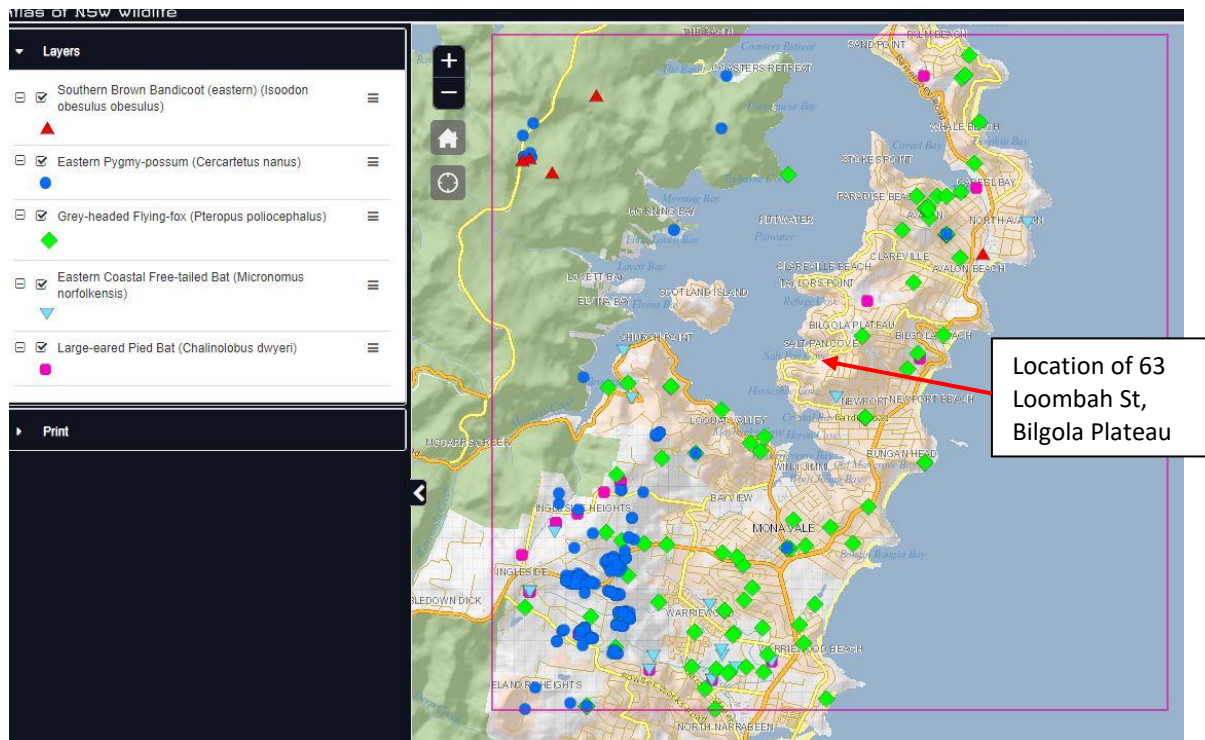


Figure 14 - Recorded sightings of 5 species of threatened fauna in the locality within the last 20 years, including for the Eastern Pygmy Possum (mostly to the south-west of the subject site) and Grey-headed Flying Fox (DPE 2023)

4. Compliance with Rural-Residential Development in the Northern Beaches Council LGA

4.1. INTRODUCTION

Residential development must comply with Pittwater Council LEP (2014) and Pittwater Council 21 DCP (2014). This plan applies to all land within the Pittwater Council LGA to which LEP 2014 applies.

4.2. PITTWATER COUNCIL LEP (2014)

Clause 7.6 refers to the following:

(1) The objective of this clause is to maintain terrestrial, riparian and aquatic biodiversity by: (a) protecting native fauna and flora, and (b) protecting the ecological processes necessary for their continued existence, and (c) encouraging the conservation and recovery of native fauna and flora and their habitats.

(2) This clause applies to land identified as “Biodiversity” on the Biodiversity Map. The land at 61 Loombah Street, Bilgola Plateau, is included in the overall marking of Biodiversity on the Council Biodiversity LEP (2014) Map (current at 2023)

(3) The consent authority must consider: (a) whether the development is likely to have: (i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land,

Comment: The proposal to remove 12 individual trees including one individual of Sydney Red Gum, one of Red Bloodwood, one of Old Man Banksia, one of Christmas Bush, one of Hard Corkwood and 7 individuals of Forest Oak in poor to fair condition (All Arbor Solutions 2022) to construct the dwelling house and car port, with the retention of 18 trees of the same species, would be considered to reasonably maintain the condition, ecological value and habitat for flora and fauna at the subject land.

(ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna,

The proposal to remove 12 immature to semi-mature individual trees, many in poor condition (All Arbor Solutions 2022), and the retention of 18 trees, including 3 large, mature individuals of Sydney Red Gum, as well as a dense population of Grass Trees, would be considered to reasonably maintain the condition, ecological value and potential habitat for native fauna at the subject land.

(iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land,

Comment: The proposal to remove 12 individual trees from a population of 30 individuals, with the preservation of a dense ground cover of Grass Trees (All Arbor Solutions 2022) would be considered to reasonably maintain the current biodiversity structure, floristic composition and functionality of the ecological community occurring at the subject land.

(iv) any adverse impact on the habitat elements providing connectivity on the land,

Comment: The proposal to remove 12 individual trees from a population of 30 individuals, with the preservation of a dense ground cover of Grass Trees (All Arbor Solutions 2022) would be considered to reasonably maintain the habitat elements providing connectivity of the ecological community occurring at the subject land with surrounding natural patches of forest.

(3) The consent authority must consider whether (b) there any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Comment: The extent of removal of 12 individuals of tree species from a total population of 30 trees occurring at, and in close proximity to the site, including the retention of the largest, mature individuals, would be considered to reasonably mitigate the impacts of the proposed development.

(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or (b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

Comment: It is considered that the removal of 12 individuals of immature and semi-mature canopy trees of a variety of tree species, some in poor or only fair condition (All Arbor Solutions 2022) from a total population of 30 trees for the siting of the proposed dwelling at the lower section of the subject land (Figures 2, 8 & 12) would be considered to reasonably mitigate the impacts of the proposed development.

4.3. PITTWATER COUNCIL 21 DCP (2014)

One of the aims of this DCP is to ensure that controls relating to biodiversity conservation and vegetation and wildlife management are undertaken when any development is proposed in areas containing natural bushland. The objective to maintain terrestrial biodiversity aims to ensure the following (Pittwater 21 DCP):

- protection of native fauna and flora,
- protection of ecological processes necessary to maintain their continued existence, and
- the encouragement of the conservation and recovery of native fauna and flora and their habitats.

This aim serves to protect and conserve the biodiversity of the local area through the retention of natural vegetation where applicable and to maintain, enhance and/or establish wildlife corridors that enable existing plant and animal communities to survive and potentially expand their range where possible (Pittwater Council 21 DCP 2014).

Comment: In regard to the proposed development, the location or positioning of the proposed dwelling house has taken account of the environmental constraints of the subject area and, as such the building envelope has been located such that there is limited clearing and modification of natural bushland with the retention of 3 large, mature individuals of Sydney Red Gum (All Arbor Solutions 2022). The retention of elements of natural bushland should be encouraged wherever possible. The building layout would also take into account effluent and water run-off disposal etc.

4.4. PROPOSED IMPACTS TO FLORISTIC DIVERSITY

4.4.1 Potential Impacts of Development

The arboricultural impact assessment report by All Arbor Solutions (2022) lists a total of 30 naturally occurring indigenous canopy trees within the property and in close proximity, including 8 individuals of Sydney Red Gum, of which 7 would be retained, 5 individuals of Red Bloodwood and Sydney Peppermint, 4 of which would be retained, and 10 individuals of Forest Oak (all in declining condition, All Arbor Solutions 2022) with 7 to be removed and 3 to be retained.

The retention of 18 trees, some of which are large mature individuals of Sydney Red Gum and the removal of many immature to semi-mature individuals in poor condition (All Arbor Solutions 2022) is not considered to substantially alter the floristics, structure or

functionality of the Sydney Enriched Sandstone Forest ecological community in the locality (Figure 5).

Little impact will occur to any native species on the land that occur between the car port location at the upper section of the land and the building platform located in the lower sections of the subject site (Figures 2, 5 & 12).

4.4.2. Recommended mitigation measures

The habitat of the remnant Sydney Enriched Sandstone Forest community is expected to be maintained by the retention of 18 trees, including several large, mature individuals of Sydney Red Gum as well as a variety of associated tree species, shrub species and ground cover species at the subject location.

The extent of tree canopy would largely be maintained enabling continued foraging and sheltering resources for native resident and occasional visiting fauna.

4.5 COMPLIANCE WITH THREATENED SPECIES LEGISLATION

4.5.1 Threatened species

No individuals of threatened flora or fauna were recorded at, or expected to occur within, the subject site. Only 12 native canopy trees (DPE 2023) are proposed for removal and the status of the ecological community will largely be maintained by the retention of 18 individuals of the same impacted species comprising this assemblage of Sydney Enriched Sandstone Forest (PCT 3592).

Any bush rock, hollow logs or dead trees should be left intact where possible as these provide safe refuge and shelter for many fauna species.

4.5.2 Threatened Ecological Community

An area of about 750m² component of Sydney Coastal Enriched Sandstone Forest comprising the remnant elements of natural bushland would be retained within the upper, middle and lower sections of the subject site (Figures 2 & 12).

This ecological community is not listed as threatened on registers of the BC Act (2016) or EPBC Act (1999) with about 40% of its distribution remaining within the Sydney Basin region.

4.6 COMPLIANCE WITH EFFLUENT AND STORMWATER DISPOSAL

The site would be serviced by sewage infrastructure.

In regard to stormwater, the collected flows from the proposed dwelling are to be stored in a series of storage rainwater and detention tanks and to be discharged at regular determined flows via a level spreader (Taylor Consulting 2022).

The rate of discharge for the developed area has been restricted to the 5 year state-of-nature level, in accordance with Council's Water Management for Development Policy for low level properties. The level spreader discharges collected runoff as uniform sheet flow across the rear boundary observing the natural fall of the land (see Stormwater Plans from Taylor Consulting 2022).

The new parking hardstand discharges to the kerb and gutter in Loombah Street.

It is proposed to provide an inter-connected 5000 litre on-site detention tank and 2000 litre rainwater storage tank for non-potable domestic reuse beneath the dwelling in accordance with Council and BASIX requirements. This is to certify that the Stormwater Management Plan layout as shown on STORM-1/A and STORM-2/A by Taylor Consulting Civil & Structural Engineers (2022) has been designed in accordance with section 3.1.2, 'Drainage', of the Building Code of Australia Housing Provision and AS/NZS 3500.3.2 – Stormwater Drainage & Northern Beaches Council's Water Management for Development Policy (Taylor Consulting 2022).

4.7 CONCLUSIONS

With appropriate management of potential environmental constraints and the undertaking of effective mitigation measures as outlined in this report, the proposed development is considered to comply with the desired criteria in relation to Pittwater Council 21 DCP (2014).

5. Addressing the Proposed Development in Relation to the BAM (Biodiversity Assessment Method) as Required by the BC Act (2016)

5.1. OFFSET SCHEME THRESHOLDS

5.1.1 Area Criteria

The threshold for clearing above which the BAM and offsets apply is 0.4ha (BAM 2016). Of this 0.4ha area, if the area to be developed is >0.25ha then offsets apply (BAM 2016).

If the area of the property is >1ha, then up to 0.5ha of vegetation can be cleared before offsets apply (BC Act 2016).

The property described as 61 Loombah St, Bilgola Plateau comprises an area of about 979m² or 0.098ha (Figure 1).

The extent of development equates to about 250m² or (0.025ha) (Figures 2 & 12).

The development does not meet the offset criteria in relation to potential area to be impacted.

5.1.2 Biodiversity Values Map

The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. The Biodiversity Offsets Scheme applies to all local developments, major projects or the clearing of native vegetation where the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* applies. Any of these will require entry into the Biodiversity Offsets Scheme if they occur on land mapped on the Biodiversity Values Map (DPE 2022).

The location of the subject property on the Biodiversity Values Map as reconciled by DPE (2022) is indicated in Figure 15.

It is assessed that the floristics of the section of land marked as having Biodiversity Value (Figure 15), particularly at the sections of the land below the cliffed landform at the very lower section of the property (Figures 2, 12 & 15), represents Coastal Enriched Sandstone Moist Forest, an ecological community that is not threatened, and as such, biodiversity value does not appear to apply to this development anywhere on the subject land.

The species complement recorded within the area on the map shown as shaded in purple in Figure 15 was analysed by the Plant Community Type Analysis program (DPE 2023), including the species Spotted Gum (*Corymbia maculata*) which occurs in neighbouring allotments, and the PCT indicated by the program was PCT 3176 'Coastal Enriched Sandstone Moist Forest' a community not dissimilar to that recorded for the assemblage occurring above the cliff.

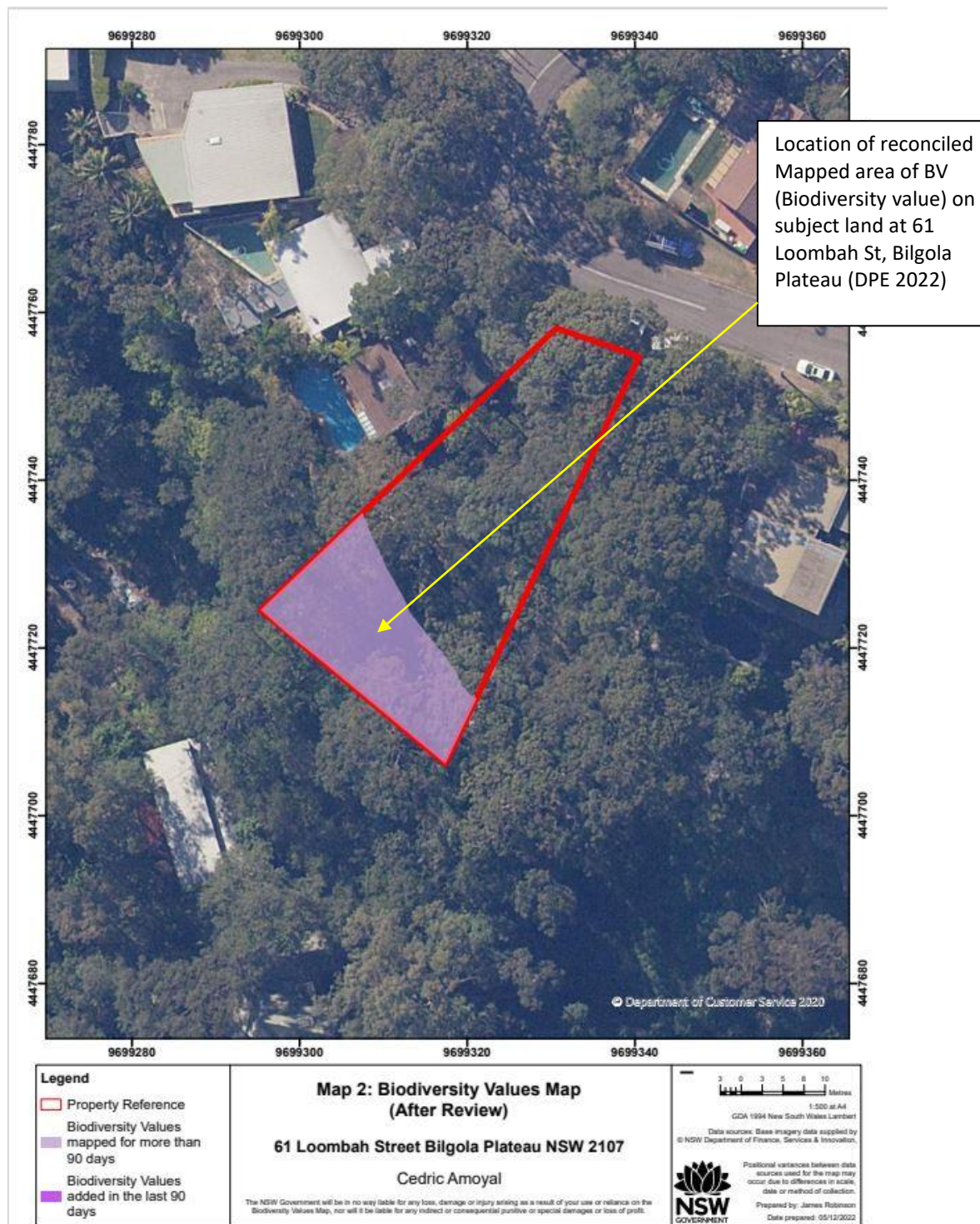


Figure 15 - Reconciled Biodiversity Values Mapping of subject site at 61 Loombah St, Bilgola Plateau showing biodiversity values (shaded in purple) associated with vegetation occurring below the cliffline

5.1.3 Threatened species, populations and/or ecological communities.

No threatened species of flora or fauna were recorded at the subject site and none would be impacted by the development proposal.

The vegetation occurring in the subject area where development is proposed (Figures 2, 5 & 12) is best described as **PCT 3592: Sydney Coastal Enriched Sandstone Forest**, which is not a listed threatened ecological community on registers of the BC Act (2016) or EPBC Act (1999).

6. Literature Reviewed

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- Tozer, M.G., Turner, K., Keith, D.A., Tindall, D., Pennay, C., Simpson, C., MacKenzie, B., Beukers, P. and Co, S. (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. *Cunninghamia* **11** (3): 359-406

Appendix 1 - Floristic species assemblage recorded at 61 Loombah St, Bilgola Plateau

KEY
Status
* - Exotic
HTW - High Threat Weed (DPE 2022)
nat - naturalised in area
Vegetation
Sydney Coastal Enriched Sandstone Forest (PCT 3592)
Cover (% in 400m² plot; Figure 9)

STATUS	SCIENTIFIC NAME	COMMON NAME	QUADRAT (400m ²)
	FILICOPSIDA		
	Davalliaceae		
*	<i>Nephrolepis cordifolia</i>	Fishbone Fern	1
	Dennstaedtiaceae		
	<i>Pteridium esculentum</i>	Bracken	3
	GYMNOSPERMAE: CONIFERALES		
	Zamiaceae		
	<i>Macrozamia communis</i>	Burrawang	5
	MAGNOLIOPSIDA: MAGNOLIDAE		
	Apocynaceae		
	<i>Tylophora barbata</i>	Bearded Tylophora	0.5
	Araliaceae		
*	<i>Hedera helix</i>	English Ivy	1
	<i>Polyscias sambucifolia</i>	Elderberry Panax	2
	Bignoniaceae		
	<i>Pandorea pandorana</i>	Wonga Wonga Vine	3

STATUS	SCIENTIFIC NAME	COMMON NAME	QUADRAT (400m ²)
	Casuarinaceae <i>Allocasuarina torulosa</i>	Forest Oak	5
	Elaeocarpaceae <i>Elaeocarpus reticulatus</i>	Blueberry Ash	5
	Fabaceae: Faboideae <i>Hardenbergia violacea</i>	False Sarsaparilla	1
	<i>Platylobium formosum</i> subsp. <i>formosum</i>	Handsome Flat-pea	1
	Lauraceae		
*	<i>Cinnamomum camphora</i>	Camphor Laurel	3
	<i>Endiandra sieberi</i>	Hard Corkwood	5
	Myrtaceae		
	<i>Angophora costata</i>	Sydney Red Gum	30
	<i>Corymbia gummifera</i>	Red Bloodwood	10
	<i>Eucalyptus piperita</i>	Sydney Peppermint	10
	Oleaceae		
*	<i>Ligustrum lucidum</i>	Large-leaved Privet	1
*	<i>Ligustrum sinense</i>	Small-leaved Privet	1
	<i>Notelaea longifolia</i> f. <i>longifolia</i>	Mock Olive	3
	Pittosporaceae		
	<i>Pittosporum undulatum</i>	Sweet Pittosporum	5
	Proteaceae		
	<i>Banksia serrata</i>	Old Man Banksia	5
	Verbenaceae		
HTW	<i>Lantana camara</i>	Lantana	2
	MAGNOLOPSIDA: LILIDAE		
	Arecaceae		
	<i>Livistona australis</i>	Cabbage Tree Palm	5

STATUS	SCIENTIFIC NAME	COMMON NAME	QUADRAT (400m ²)
HTW *nat	Asphodeliaceae <i>Dianella caerulea</i> var. <i>producta</i> <i>Xanthorrhoea arborea</i>	Blue Flax Lily	2 50
	Asparagaceae <i>Asparagus aethiopicus</i> <i>Lomandra longifolia</i>	Asparagus Fern Spiky-headed Mat-rush	3 1
	Bromeliaceae <i>Neoregelia carolinae</i>	Neoregelia	0.5
	Commelinaceae <i>Commelina cyanea</i>	Scurvy Weed	0.5
	Dorythaceae <i>Doryanthes excelsa</i>	Gynea Lily	2
	Luzuriagaceae <i>Eustrephus latifolius</i>	Wombat Berry	1
	Poaceae <i>Oplismenus aemulus</i>	Basket Grass	1
	Smilacaceae <i>Smilax glyciophylla</i>	Sweet Sarsaparilla	1

Appendix 2 - Plant species of conservation significance recorded within a 5km radius of the subject area since 2003 where potential habitat may occur (Bionet Atlas of NSW Wildlife 2023^α) or where potential habitat is deemed to potentially occur (Commonwealth DCCEW Environmental Reporting Tool 2023^β)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in subject area	Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below:
<i>Tetratheca glandulosa</i> ^{α β}	V*	V	2VC-	Small erect shrub to 50cm high, branching close to the woody rootstock, found in sandy and rocky heath, scrub and woodland north of Sydney Harbour.	Highly unlikely – habitat not occurring at subject site. Nearest records about 5.5km to the south-west at Ingleside. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	Bionet Atlas of NSW Wildlife (2023), Fairley & Moore (2004), Robinson (2000), Fairley (2004).
<i>Chamaesyce psammogeton</i> (Sand Spurge)				A herb that grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (<i>Spinifex sericeus</i>) and Prickly Couch (<i>Zoysia macrantha</i>). Found sparsely along the coast from south of Jervis Bay to Queensland.	Highly unlikely – habitat not occurring at subject site. No further assessment required	NSW Environment, Energy and Science (2023) (https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10160)
<i>Lasiopetalum joyceae</i> ^{α β}	V*	V	2RC-	Erect shrub to 1 to 2m tall, occurring on lateritic to shaley ridgetops on the Hornsby Plateau.	Unlikely – Habitat unsuitable. Occurs in heath on sandstone. One record occurs. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	Bionet Atlas of NSW Wildlife (2023); Robinson (2000); Fairley (2004)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in subject area	Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below:
<i>Callistemon linearifolius</i> ^{α β} (Netted bottle brush)		V	2RCi	Erect shrub to 2.5m tall. Occurs in damp situations in woodland or scrub on sandstone substrates.	Low – Habitat unsuitable. There are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. One record occurs about 5.5km to the south-west at Ingleside. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	Bionet Atlas of NSW Wildlife (2023) Robinson (2000), James <i>et al</i> (1999)
<i>Eucalyptus camfieldii</i> ^{α β} (Camfields Stringybark)	V	V		Mallee or small tree 1 – 4m tall. Occurs on shallow sandstone soils bordering coastal heath in association with other mallee eucalypts.	Low – Habitat unsuitable. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	Bionet Atlas of NSW Wildlife (2023) Robinson (2000), James <i>et al</i> (1999)
<i>Kunzea rupestris</i> ^α	V*	V	2VCa	Clonal shrub to 1.5m tall, occurring in heath on rock platforms	None: Habitat not occurring in study area, present in Marramarra National Park, more common in the Colo and Macdonald River systems to north-west of area. One record occurs about 5.5km to the south-west at Ingleside. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	Bionet Atlas of NSW Wildlife (2023); Robinson (2000)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in subject area	Reference material derived from 'Final Determinations ' (NSW Scientific Committee) and others listed below:
<i>Rhodamnia rubescens</i> ^{α β} (Scrub turpentine)	E*	E1		Shrub or small tree to 25 m high with reddish/brown, fissured bark. Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of <i>R. rubescens</i> typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Low. The habitat for Scrub Turpentine is mostly littoral, warm temperate and subtropical rainforest (Fairley & Moore 2010) and wet sclerophyll forest usually on volcanic and sedimentary soils. The upper sections of the subject site appear unsuitable for this species which is characterised as highly to extremely susceptible to infection by Myrtle Rust (DPE 2022). Nearest record some 830m to the east. Habitat at upper sections of site, unsuitable for this species. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	OEH Bionet Atlas (2023)
<i>Syzygium paniculatum</i> ^α (Magenta Lilly Pilly)	V*	V	3VCI	Shrub or small tree to 8m tall, occurs in or near rainforest from littoral sands to sheltered gullies, especially near watercourses on sandy soils	Unlikely – Most individuals of this species have been planted in landscape plans in the locality. Habitat unsuitable. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	Bionet Atlas of NSW Wildlife (2023); Robinson (2000), Fairley & Moore (2004), Harden (2002)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in subject area	Reference material derived from 'Final Determinations ' (NSW Scientific Committee) and others listed below:
<i>Genoplesium baueri</i> ^α (Bauer's Midge Orchid)	E*	V	3RC-	Terrestrial orchid to 15cm tall, occurs in sparse sandy dry sclerophyll forest habitat and moss outcrops over sandstone.	Highly unlikely: Habitat of subject site unsuitable. Nearest record about 5.3km to the south at North Narrabeen. Isolated populations flowering mainly after fires. No further assessment required	Bionet Atlas of NSW Wildlife (2023), Robinson (2000), Fairley (2004).
<i>Microtis angusii</i> ^{α β} (Angus's Onion Orchid)	E*	E1	2E	Terrestrial orchid to 60cm tall, flowering between May and October. Habitat of recorded site in vicinity of subject site is heavily disturbed. Natural habitat unknown but may have been introduced from nearby Duffys Forest Ecological Community	Highly unlikely - Habitat of subject site unsuitable. Nearest record about 5.3km to the south at North Narrabeen. No further assessment required	Bionet Atlas of NSW Wildlife (2023)
<i>Grevillea caleyi</i> ^α (Caleys Grevillea)	CE*	E4A	2ECi	Large bushy shrub to 3m tall, occurs in sandy soils in open forest.	Highly unlikely - Habitat of subject site unsuitable. No further assessment required	Bionet Atlas of NSW Wildlife (2023)
<i>Persoonia hirsuta</i> <i>ssp hirsuta</i> ^{α β} (Hairy Geebung)	E*	E1	3KCi	Spreading to decumbent shrub to 1m found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Unlikely – occurs widely but not commonly along the coastal zone between Gosford and Royal National Park. All records in the vicinity occur west from the subject site in Ku-ring- gai Chase National Park. Absence of relatively distinct life-form individuals in defined area of study deemed to indicate non-occurrence. No further assessment required	Bionet Atlas Of NSW Wildlife (2023); James et al (1999); Fairley & Moore (2000); Fairley (2004).

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in subject area	Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below:
<i>Pimelea curviflora</i> <i>var curviflora</i> ^{α β}	V*	V		Much-branched subshrub or shrub 20 to 100cm. Occurs in woodlands of the northern area of Sydney on shale-sandstone transition areas and laterite soils.	Not likely – Habitat unsuitable. Nearest record occurs about 5km to the south-west at Ingleside. Absence of otherwise distinct life-form individuals in small area of study deemed to indicate non-occurrence. No further assessment required.	Bionet Atlas of NSW Wildlife (2023); James et al (1999)

Key:

DCCEEW Threatened species status^β

EX – Presumed extinct

E* - Endangered

V* - Vulnerable

DPE Threatened species status^α

E4A – presumed extinct, recently recorded

E1 - Endangered

V - Vulnerable

Key to Conservation Status:**Commonwealth legislation**

Environmental Protection and Biodiversity Conservation Act, 1999

EX – Presumed extinct

E* - Endangered

V* - Vulnerable

NSW legislation

Biodiversity Conservation Act, 2016

E4A – Schedule 1 Part 1 – Presumed extinct, recently recorded

E1 Schedule 1 Part 1 – Endangered

V Schedule 2 - Vulnerable

RoTAPConservation code

2 - geographic range <100km

3 - geographic range >100km

Conservation status

E - endangered to point of extinction if current land use and other threats continue to operate

V - vulnerable, at risk of depletion over 20-50- years if land use that threatens survival is maintained

C - at least one population conserved in a national park or proclaimed conservation area

Size class of reserved populations

a - >1000 plants in conservation reserve

i - < 1000 plants in conservation reserve

- reserved population size not accurately known

Appendix 3 - Fauna species of conservation significance recorded within a 5km radius of the surveyed area since 2003 where potential habitat may occur (DPE Bionet Atlas of NSW Wildlife 2023)

<i>Amphibians</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Red-crowned Toadlet <i>Pseudophryne australis</i>	V		Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones at the sandstone-shale interface. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.	51 DPE Bionet Atlas (2023)	Unlikely. Nearest record occurs some 2.5km to the west at Church Point. Habitat unsuitable	No
Giant Burrowing Frog <i>Heleioporus australiacus</i>	V	V*	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. A distinct northern population is largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla. Breeding habitat is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Breeds from August to March and the eggs are laid in a white foam-mass under vegetation in creeks or in yabby holes. Diet includes ground-dwelling invertebrates such as ants, beetles and spiders.	10 DPE Bionet Atlas (2023)	Unlikely. Habitat unsuitable. Site does not contain appropriate water sources required for species habitat. There have been no species sightings in the near vicinity in the past 20 years.	No

<i>Reptiles</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Rosenberg's Goanna <i>Varanus rosenbergi</i>	V		Found in heath, open forest and woodland. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Runs along the ground when pursued (as opposed to the Lace Monitor, which climbs trees (Cogger 2000).	21 DPIE Bionet Atlas (2023)	Highly unlikely - no suitable habitat on the subject land. All records to the west in Ku-ring-gai Chase National Park.	No
<i>Birds</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Rose-crowned Fruit Dove <i>Ptilinopus regina</i>	V		Occurs mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits.	3 DPE Bionet Atlas (2023)	Highly unlikely – no suitable habitat present on subject land. Nearby sightings have been in modified environments such as planted rainforest gardens and golf course grounds.	No
Superb Fruit-Dove <i>Ptilinopus superbus</i>	V		Occurs principally from north-eastern in Queensland to north-eastern NSW. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic. The nest is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species.	3 OEH Bionet Atlas (2022)	Highly unlikely – habitat not suitable.	No

Birds	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
White-throated Needletail <i>Hirundapus caudacutus</i>		V*	Migratory and usually seen in eastern Australia from October to April. Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm (eg termites and ants) or tend to lift insects away from the surface which favours sighting of White-throated Needletails as they feed. More common in coastal areas, less so inland. <i>May overfly the area as part of a wider foraging range but will not be affected by the development.</i>	5 DPE Bionet Atlas (2023)	Low – Moderate. May overfly the area as part of a wider foraging range.	No
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>	V	C	Low potential for habitat to occur at site. Occurs in wooded areas near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland and forest. May overfly site on occasion.	37 DPE Bionet Atlas (2023)	Low – Moderate. May overfly the area as part of a wider foraging range	No
Little Eagle <i>Hieraetus morphnoides</i>	V		The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest. The Little Eagle searches for prey on the wing or from a high exposed perch, taking prey from the ground, the shrub layer or the canopy. Prey includes rabbits, other live mammals and insects.	3 DPE Bionet Atlas (2023)	Low – Habitat sub-optimal. May overfly the area as part of a wider foraging range but will not be affected by the development.	No

Birds	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Square-tailed Kite <i>Lophoictinia isura</i>	V		In NSW the Square-tailed Kite is often associated with ridge and Gully forests dominated by Woollybutt <i>Eucalyptus longifolia</i> , Spotted Gum <i>Eucalyptus maculata</i> , or Peppermint Gum <i>Eucalyptus elata</i> . It has also been sighted in forests containing <i>Angophora spp.</i> and <i>Callitris spp.</i> with a shrubby understorey and Box-Ironbark woodland. It feeds on honeyeating birds and insects in the tree canopy. They have a large foraging range and hunt prey early morning and evening. Nesting sites are along or close to watercourses in a fork or large horizontal limb of a <i>Eucalyptus</i> or <i>Angophora</i> species (Pizzey and Knight 2003).	5 DPE Bionet Atlas (2023)	Low – Moderate - No breeding habitat available and only marginal foraging and roosting habitat available. Therefore, the subject site is not regarded as core habitat for this species.	No
Bush Stone-curlew <i>Burhinus grallarius</i>	V		The Bush Stone Curlew is 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 ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	43 DPE Bionet Atlas (2023)	Low - Habitat sub-optimal. Sightings centred around Careel Bay, Avalon and Newport. Nearest record approx. 1.2km north-east of subject site. Small extent of clearing of Sydney Coastal Enriched Sandstone Forest not considered to impact on habitat of this species.	No

Birds	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	V	E*	Has a preference for wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger in eucalypts.	2 DPE Bionet Atlas (2023)	Unlikely – No suitable nesting habitat found on subject site. Has been only one sighting in the near vicinity (approx. 3km south) in the past 20 years.	No
Glossy Black Cockatoo <i>Calyptorhynchus lathami</i>	V		Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of sheoak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur. Forest She-oak is the preferred foraging resource. Roosts in the canopy of tall trees, occasionally in tree hollows. Nests in deep hollows in eucalypts <i>Individuals of Allocasuarina litorulosa occur at the subject land and some will be removed for the development. However no Glossy Black-cockatoos were recorded and no chewed cones or evidence of feeding was noted, the</i>	57 DPE Bionet Atlas (2023)	Low - No suitable habitat on the subject land. Individuals of Sheoak in very poor condition so limited foraging opportunity. Records further south at North Narrabeen	No

likelihood of this species being impacted by the development is unlikely.

Birds	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Little Lorikeet <i>Glossopsitta pusilla</i>	V		Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. Little lorikeets are considered to be nomadic, likely in a response to food availability. These lorikeets usually forage in small flocks, feeding mainly on nectar and pollen, but also fruit of eucalypts, melaleucas and mistletoes. The little lorikeet breeds from May to September, nesting in tree hollows, with small diameter entrance holes. Most breeding records are located on the western slopes. <i>May forage in the subject site with other species of lorikeets during peak flowering events.</i>	7 DPE Atlas of NSW Wildlife (2023)	Low- – Habitat unsuitable. Sightings in this area are rare (only 3 in the past 20 years).	No
Swift Parrot <i>Lathamus discolor</i>	E1	CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between March and October. 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 Swamp Mahogany <i>Eucalyptus robusta</i> ,	17 DPE Bionet Atlas (2023)	Low - habitat unsuitable. Nearest record some 3.6km to the south-east at Mona Vale.	No

Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.

Birds	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Turquoise Parrot <i>Neophema pulchella</i>	V		Range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	1 DPE Atlas of NSW Wildlife (2023)	Low - Habitat unsuitable, proposed development considered not to impact on habitat of this species.	No
Barking Owl <i>Ninox connivens</i>	V		Found throughout continental Australia except for the central arid regions. Although still common in parts of northern Australia, the species has declined greatly in southern Australia as a result of land clearing and bushfires and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Inhabits woodland and open forest,	21 DPE Bionet Atlas (2023)	Low. No suitable nesting habitat on subject property. May forage at site. Nearby sightings are from Scotland Island and Palm Beach. Calls heard or sightings recorded on a 1km grid across the locality (Figure 13)	No

		including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species. Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats.			
Powerful Owl <i>Ninox strenua</i>	V	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. It roosts by day in dense vegetation comprising species such as Turpentine <i>Syncarpia glomulifera</i> , Black She-oak <i>Allocasuarina littoralis</i> , Blackwood <i>Acacia melanoxylon</i> , Rough-barked Apple <i>Angorophora floribunda</i> , Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of other eucalypt species.	475 DPE Bionet Atlas (2023)	Low- Moderate – May forage at subject site, but no suitable nesting habitat present. No evidence of (presence of pellets or whitewash droppings at base of trees or on tree trunks) of this species using the subject site for roosting. The subject site is not regarded as core habitat for Powerful Owl. More likely to occur in nearby Ku-ring-gai Chase NP where there are large areas of undisturbed bushland. Calls heard or sightings recorded on a 1km grid across the locality (Figure 13)	No
Masked Owl <i>Tyto novaehollandiae</i>	V	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals. Extends from the coast where it is most	2 DPE Bionet Atlas (2023)	Low - Sub-optimal habitat occurs at subject site due to and proximity to urban development.	No

Black-chinned Honeyeater <i>Melithreptus gularis</i> <i>gularis</i>	V	abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. 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. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, though it is very rare in the latter. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Forest Red Gum (<i>E. tereticornis</i>). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. A gregarious species usually seen in pairs and	1 DPE Bionet Atlas (2023)	Low - Habitat unsuitable	No
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small groups of up to 12 birds.
Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage.

Scarlet Robin <i>Petroica boodang</i>	V		Foraging habitat at site surrounded by urbanisation has a low potential, the species inhabiting dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. Low suitability for roosting at site surrounded by urbanisation. Prefers abundant logs and fallen timber which do not occur at the subject site. Low suitability for breeding, prefers ridges in dry eucalypt forest and woodland which do not occur at the site which is surrounded by urbanisation. Not optimal habitat for the Scarlet Robin.	2 DPE Atlas of NSW Wildlife (2023)	Low - Habitat unsuitable.	No
Regent Honeyeater <i>Anthochaera phyrgia</i>	E4A	CE	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen	33 DPE Atlas of NSW Wildlife (2023)	Low - Habitat unsuitable. Most records in Ku-ring-gai Chase National Park to the south-west	No

		foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Flowering of associated species such as Thin-leaved Stringybark <i>Eucalyptus eugenioides</i> and other Stringybark species, and Broad-leaved Ironbark <i>E. fibrosa</i> can also contribute important nectar flows at times. Nectar and fruit from the mistletoes <i>Amyema miquelii</i>, <i>A. pendula</i> and <i>A. cabbagei</i> are also utilised. When nectar is scarce lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings.			
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and <i>Acacia</i> woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decortivating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy.	3 DPE Atlas of NSW Wildlife (2023)	Possible - Habitat suboptimal, development not expected to impact on this species life-cycle or habitat	No

Mammals	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Koala <i>Phascolarctus cinereus</i>	V	V	Occurs in natural eucalypt forests and woodlands. Koala feed trees listed under Schedule 2 of SEPP 44 legislation include: Forest red gum <i>Eucalyptus tereticornis</i> ; Tallowwood, <i>Eucalyptus microcorys</i> ; Grey Gum, <i>Eucalyptus punctata</i> ; Manna Gum, <i>Eucalyptus viminalis</i> ; River Red Gum, <i>Eucalyptus camaldulensis</i> ; Broad leaved scribbly gum, <i>Eucalyptus haemastoma</i> ; Scribbly gum, <i>Eucalyptus signata</i> ; White box, <i>Eucalyptus albens</i> ; Bimble box, <i>Eucalyptus populnea</i> and Swamp mahogany, <i>Eucalyptus robusta</i> . <i>On the subject land there are no primary food trees, so the land does not represent optimal Koala habitat.</i>	1 DPE Atlas of NSW Wildlife (2023)	Highly unlikely -. No evidence of species on subject site. Single record from 2006 ~1.8km north in Avalon.	No
Eastern Pygmy Possum <i>Cercartetus nanus</i>	V		The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria (Menkhorst & Knight 2001). It inhabits forests and woodlands with an overstorey of winter-flowering eucalypts (<i>Corymbia maculata</i> , <i>Eucalyptus robusta</i> , <i>Eucalyptus tereticornis</i>) or an understorey of winter-flowering Banksia (<i>Banksia spinulosa</i>) or pinnate-leaved Acacias (<i>Acacia irrorata</i>). The highest estimated numbers occur in association with Scribbly Gum (<i>Eucalyptus haemastoma</i>), Smooth-barked Apple (<i>Angophora costata</i>) Red Bloodwood (<i>Corymbia gummifera</i>) with an understorey of Banksia spp. and Xanthorrhoea spp. (Smith & Murray 2003) Squirrel Gliders require abundant tree	396 DPE Atlas of NSW Wildlife (2023)	Unlikely – Nearest records about 2.5km to the south-east at Bayview (Figure 14). Grass Trees present ideal sheltering habitat though foraging resources are scarce. Habitat sub-optimal. Grass Trees mostly retained.	No

hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein (Menkhorst & Collier 1987, Gibbons & Lindenmayer 2002).

<i>Mammals</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Squirrel Glider <i>Petaurus norfolcensis</i>	V		Distribution; The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Within Sydney the species is only known on the Barrenjoey Peninsula and in the Kurrajong-Wilberforce area Habitat; Inhabits dry sclerophyll forests and woodlands but is generally absent from rainforests and closed forests (Menkhorst and Collier 1988). Their coastal habitats range from low, scrubby eucalypt woodlands and banksia thickets to tall, wet eucalypt forests bordering on rainforest (Lindenmayer 2002). In coastal New South Wales they typically inhabit areas with a diversity of tree and shrub species, including high nectar-producing species and winter-flowering Species. Breeding; Births may occur throughout the year, usually with peak in winter. Most females exhibit the capacity to raise two litters per year. Young gliders disperse at a mean age of 12.5 months. Feeding; Diet consists of sap from wattle and eucalypt trees, invertebrates, nectar and pollen. (Lindenmayer 2002). During winter when other food sources are scarce the	4 DPIE Bionet Atlas (2023)	Low - No suitable mature trees on development site for breeding with hollows. Nearest record to the south-west at Avalon. Retention of many mature trees onsite will not impact potential foraging resources.	No

Squirrel Glider may obtain its energy from winter flowers of a number of plant species. Favoured within the Pittwater area is Coastal Banksia, Old Man Banksia, Grey Ironbark, Red bloodwood, Spotted Gum and Sydney Red Gum.

<i>Mammals</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Southern Brown Bandicoot <i>Isoodon obesulus obesulus</i>	E	E	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruited) fungi. Their searches for food often create distinctive conical holes in the soil. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea</i> spp., blackberry bushes and other shrubs, or in rabbit burrows. The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland.	5 DPE Bionet Atlas (2023)	Low – Low habitat suitability on subject site. Sightings in area tend to be in nearby Ku-ring-gai Chase National Park. One sighting roughly 2km north at Avalon beach.	No

<i>Mammals</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V	V	Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>). This species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca swamps, wet and dry sclerophyll forests and also cultivated areas. The species feeds on the blossoms of more than 80 plant species, especially eucalyptus blossom and the fruits of a number of palm species. Flowering species of eucalypts such as Swamp Mahogany (<i>Eucalyptus robusta</i>) and Forest Red Gum (<i>Eucalyptus tereticornis</i>) and Paperbarks (<i>Melaleuca quinquenervia</i>), are particularly important. Distances of up to 30km from the camp are often travelled, with 60-70km sometimes covered per night to reach a particular food source. The Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>) was not sighted during the survey, which occurred during mid-morning when the bats would be roosting in camps, but may be attracted to flowering Eucalyptus trees on occasion.	120 DPIE Bionet Atlas (2023)	Moderate - May on occasion forage in the area as part of a wider foraging range in the locality when eucalypts and Angophora in flower. Species is commonly recorded in the area (Figure 14). The proposed development will not impact on the Grey-headed Flying Fox.	No
Eastern Coastal Freetail Bat <i>Mormopterus norfolkensis</i>	V		Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Insectivorous. They fly quickly over the tops of trees in forests or along the edges of forests to hunt their prey. Are vulnerable to	17 DPIE Bionet Atlas (2023) and Australian Museum Animal Factsheets	Low - May on occasion forage above the tree canopy for insects. Property does not have appropriate roosting or breeding habitat. Development will not impact on this species.	No

loss of tree hollows and loss of feeding grounds by forestry activities, clearing for agriculture and housing. (2023)

<i>Mammals</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Large-eared Pied Bat <i>Chalinobus dwyeri</i>	V	V	These bats roost in shallow caves in escarpments, particularly in sandstone and forage in remnant native dry and wet open forests, woodlands and rainforests.	19 DPE Bionet Atlas (2023)	Moderate - May on occasion forage in the area as part of a wider foraging range. Property does contain very shallow sandstone crevices that may be potential habitat, however no evidence of nesting (bat faeces) was observed. The nearest sighting is 1.3km in Angophora Reserve at Avalon. It is considered that species will not be compromised by the relatively small area of proposed development at the subject site.	No
Southern Myotis <i>Myotis macropus</i>	V		Prefers permanent and/or flowing water. The Southern Myotis is commonly a cave dwelling microchiropteran, but will utilise tree hollows, mines, stormwater drains, bridges and dense vegetation (Churchill 1998). Roosting sites can be located within a wide variety of habitats, usually located in close proximity to permanent, slow flowing water. Breeding occurs between November and December, with young being weaned after three to four weeks (Churchill 1998). The Southern Myotis commonly forages over water bodies for insects and small fish (Churchill 1998).	29 DPE Bionet Atlas (2023)	Low-no foraging habitat on the subject land	No

Mammals	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Greater Broadnose Bat <i>Scoteanax ruepellii</i>	V		The preferred foraging habitat of this species appears to be tree-lined creeks and the interface between forested land and cleared areas. This species usually roosts in tree hollows, with large live or dead emergent hollow bearing trees preferred. The roof spaces of old buildings are also used as roost sites. The Greater Broad-nosed Bat has been observed to travel from a forested foraging area, several kilometres to a roost tree hollow adjacent to the edge of a town. A colony of up to 80 individuals was using the roost. Large, individual paddock trees have also been found to be used by this species. This indicates that an individual tree may be extremely important, at least on a seasonal basis.	5 DPE Atlas of NSW Wildlife (2023)	Low -- Habitat of site unsuitable. May on occasion forage at the subject site as part of a wider foraging range. It is not expected that the Greater Broadnose Bat will be impacted upon by the proposed development.	No
Eastern Cave Bat <i>Vespadelus troughtoni</i>	V		This bat species is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its	2 DPE Bionet Atlas (2023)	Low - Appears to occur mainly in upper North Coast of NSW, habitat appears sub-optimal. Proposed development will not impact on this species. Only one record of this species in the area over the past 20 years, south of the subject property at Church Point, approx. 2km away.	No

feeding or breeding requirements or
behaviour

Mammals	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	V		It occupies sclerophyll forests, particularly where the habitats are wet and where the tree heights are greater than 20 metres (Strahan 1995; Churchill 1998). The Eastern Falsistrelle roosts in tree hollows, and has also been recorded occupying caves in the Jenolan area (NSW). Known home ranges of 12 km have been recorded.	17 DPE Bionet Atlas (2023)	Low - Habitat unsuitable.	No
Little Bentwing Bat <i>Miniopterus australis</i>	V		Habitat in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Large Bentwing-bats (<i>Miniopterus orianae</i>) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	59 DPE Bionet Atlas (2023)	Moderate. May use subject sight for foraging. No evidence of roosting was observed at the site. Has been recorded in the area 59 times over the previous 20 years, with the nearest being at Angophora reserve, approx. 1.3km to the north.	No
Large Bentwing Bat <i>Miniopterus orianae oceanensis</i>	V		This sub species of Bentwing Bat occurs from Cape York to central Vic. Occurs in wet and dry sclerophyll forests and rainforests. Roost within man-made structures. Known roost	81 DPE Bionet Atlas (2023)	Moderate. May use subject sight for foraging above the canopy. No evidence of roosting was observed at the	No

sites include caves, disused mines, storm-water drains, culverts and buildings. However maternity roosts occur in sandstone or limestone cave systems. Will form scattered smaller colonies, mostly within 300km of the larger maternity cave (Churchill 1998). Active all year round, foraging mostly on moths above the tree canopy. Feeds over large areas of land and has been reported to travel up to 70 km in one night (Dwyer 1995).

site. Has been recorded in the area 81 times within the previous 20 years, with the nearest being at Angophora reserve, approx. 1.3km north. Development would not impact species distributions, foraging behaviour or life cycles.

<i>Mammals</i>	BC Act	EPBC Act	Habitat	Record (source)	Likelihood of Occurrence	Assessment of Significance required
<i>New Holland Mouse</i> <i>Pseudomys novaehollandiae</i>		V	A small native rodent similar in size and appearance to the introduced House Mouse. Has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Genetic evidence indicates that the New Holland Mouse once formed a single continuous population on mainland Australia and the distribution of recent subfossils further suggest that the species has undergone a large range contraction since European settlement. Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals. Population densities are often highest in heath vegetation regenerating 2-3 years after fire or in areas with large floral diversity.	2 DPE Bionet Atlas (2023) and Australian Museum Animal Fact Sheets (2023)	Unlikely - Habitat unsuitable. More likely to occur in nearby areas of undisturbed native heath and woodland vegetation such as Ku-ring-gai Chase National Park to the west.	No