Biodiversity Development Assessment Report

Proposed Carport and Driveway at
81 Riverview Road, Avalon Beach
NSW 2107

13 February 2025

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Final 1.0	Proposed Carport and Driveway At 81 Riverview Road, Avalon Beach NSW 2107	13/2/2025

Executive Summary

Land Eco Consulting (Land Eco) was commissioned by Mrs Birgit Bessey ('the proponent'), to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed carport and driveway at 81 Riverview Road, Avalon Beach NSW 2107 (Lot 22/-/DP18005) (the 'Subject Property'). The extent of the development is referred to as the 'Subject Land' (**Figure 1**).

The Subject Property is a residential property in the Northern Beaches local Government Area in Sydney. The Subject Property includes an existing residential dwelling with a driveway, and associated landscaping. The proposed development application is for the construction of a new carport, driveway, a stair, a turning bay, a cross over area and a small garden bed (**Figure 4**). The proposed works also include the demolition of the existing driveway and entrance path within the Subject Land. The native vegetation within the Subject Land is disturbed by historical clearing, infill plantings and garden management.

The proposed development is a local development application and is subject to approval under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The proponent has commissioned this Biodiversity Development Assessment Report (BDAR) to accompany the proposal and address the requirements of the NSW Biodiversity Offset Scheme (BOS) and requires submission of a streamlined 'Small Areas' BDAR as stipulated under the *Biodiversity Conservation Act 2016* and in accordance with the Biodiversity Assessment Method (BAM), owing to the removal of less than 1ha of native vegetation. The BDAR is required to be undertaken by an accredited assessor to assess the impacts of the proposal.

The proposed development has been designed to avoid and minimise impacts on biodiversity values in keeping with the purposeful use of the Subject Land. This has been accomplished by utilising the existing entrance and positioning the Subject Land on the existing driveway and car space minimising additional excavation works and vegetation removal.

One plant community type (PCT) occurs on the Subject Land:

- PCT 3234: Hunter Coast Lowland Spotted Gum Moist Forest which is associated with 'Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion' (PWSG) which is an Endangered Ecological Community (EEC) listed under in Part 3 of Schedule 1 of the Biodiversity Conservation Act 2016 (BC Act)

A total of one (1) Ecosystem Credit is required to be retired to offset the residual biodiversity impacts of the proposed development (**Table 1**).

Four threatened species were recorded on the Subject Property by Land Eco:

- Large-eared Pied Bat (*Chalinolobus dwyeri*): Species credits species. Recorded via acoustic survey (**Appendix E**). Offset accordingly.
- Little Bent-winged Bat (*Miniopeterus australis*): Ecosystem credit species only. Recorded via acoustic survey (**Appendix E**). Low calling activity and absence of suitable breeding habitat confirms no breeding behaviour in or near the Subject Land.
- Eastern Coastal Freetail Bat (*Micronomus norfolkensis*): Ecosystem credit species only. Recorded via acoustic survey (**Appendix E**).
- Greater Broad-nosed Bat (*Scoteanax rueppellii*): Ecosystem credit species only. Possibly recorded via acoustic survey (**Appendix E**).
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*): Ecosystem credit species only. Possibly recorded via acoustic survey (**Appendix E**).

One 'Species Credit' Species was identified and offset accordingly (**Table 2**).

Impacts will be limited to the removal of approximately 182m^2 (0.02 ha) of disturbed native and exotic vegetation. Minor indirect impacts may influence the vegetation to be retained within the Subject Property, however these are unlikely to degrade the habitat further than the status quo.

In addition to offsetting, the *Biodiversity Conservation Act 2016* and its regulations requires that an applicant takes all reasonable effort to avoid and minimise potential impacts of the proposal on local biodiversity values. A series of mitigation and management measures have been identified, which are to be implemented as part of any construction environmental management plan produced for the site. These include measures to:

- Ensure all contractors employed to work within the Subject Land are suitably qualified, experienced and informed of the sensitive ecological features and potentially occurring threatened species;
- Assign a Project Ecologist to conduct and oversee all ecological compliance requirements associated with conducting a proposed development in line with all relevant state and commonwealth legislation and guidelines;

- Have an ecologist present during the clearing of threatened species habitat required for the proposed development;
- Incorporate locally indigenous flora species representative of Pittwater and Wagstaffe Spotted Gum Forest in soft landscaping associated with the development;
- Implement all relevant biological hygiene protocols and requirements as per NSW Government guidelines;
- Implement ongoing management of priority weeds according to statutory requirements; and
- Implement appropriate vegetation protection fencing, stockpiling and sediment control during construction.

Table 1. Impacts that require an offset- ecosystem credits

Vegetation zone	PCT	TEC/EC	Impact area (ha)	Number of ecosystem credits required
Infill Planted	3234 – Hunter Coast Lowland Spotted Gum Moist Forest	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	0.02	1

Table 2. Impacts that require an offset - species credits

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
Large-eared Pied Bat	*Chalinolobus dwyeri*	0.02	1

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Acronym/ Term	Definition
BAM	New South Wales Biodiversity Assessment Method
BC Act	New South Wales Biodiversity Conservation Act 2016
BCS	Biodiversity, Conservation and Science Group
BDAR	Biodiversity Development Assessment Report
BOS	New South Wales Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
DA	Development Application pursuant to section 4 of the NSW Environmental Planning and Assessment Act 1979
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
Development	The use of land, and the subdivision of land, and the carrying out of a work, and the demolition of a building or work, and the erection of a building, and any other act, matter or thing referred to in section 26 that is controlled by an environmental planning instrument but does not include any development of a class or description prescribed by the regulations for the purposes of this definition (Environmental Planning and Assessment Act 1979).
DPI	Department of Primary Industries
DPIE	Department of Planning Industry and Environment
EEC	Endangered Ecological Community
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EP&A Act	NSW Environmental Planning and Assessment Act 1979
ha	Hectares
km	Kilometre
KTP	Key Threatening Process (as listed in the BC Act)
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The area within a 10km radius of the Subject site. The same meaning when describing a local population of a species or local occurrence of an ecological community.
m	Metres
mm	Millimetres
MNES	Matters of National Environmental Significance
NPWS	NSW National Parks and Wildlife Services
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	Plant Community Type
PWSGF	Pittwater Wagstaffe Spotted Gum Forest
Proposal	The development, activity or action proposed.
SEPP	State Environmental Planning Policy
Subject Land	The proposed development footprint within the Subject Property in addition to all vegetation clearing, landscaping and the extent of earthworks.
Subject Property	81 Riverview Road, Avalon Beach NSW 2107 (Lot 22/-/DP18005)
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1, 1A and 2 and *threatened species, population or ecological community* means a species, population or ecological community specified in any of those Schedules.

Declarations

i. Certification under clause 6.15 Biodiversity Conservation Act 2016

I, Kurtis Lindsay, certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the Biodiversity Conservation Act 2016 (BC Act).

Signature: 

Date: 13/2/25

BAM Assessor Accreditation no: #BAAS18059

This BDAR has been prepared to meet the requirements of BAM 2020.

ii. Details and experience of author/s and contributors

Authors and Contributors

Name	BAM Assessor Accreditation no.	Position/Role	Tasks Performed	Relevant Qualifications
Kurtis Lindsay	#BAAS18059	Principal Ecologist	Report Review	*BSc (Hons)*
Semonn Oleksyn		Senior Ecologist (Project Manager)	Field Survey BAM VIS Plot Report Review	*BAdvSci* *MRes*
Chantelle de Kock		Ecologist	Field Survey BAM VIS Plot	*BSc (Hons)*
Juliette Hennessy		Ecologist	Report Preparation Figure Preparation	*BSc (Hons)*

Stage 1: Biodiversity Assessment

1. Introduction

1.1 Proposed Development

1.1.1 Development Overview

Land Eco Consulting (Land Eco) was engaged by Brigit Bessey ('the proponent'), to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed development application for the construction of a new carport and driveway at 81 Riverview Road, Avalon Beach NSW 2107 (Lot 22/-/DP18005) (the 'Subject Property') (**Figure 1**). This BDAR assesses the proposed works which include; the construction of a new carport, driveway, a stair, a turning bay, a cross over area and a small garden bed in addition to the demolition of the existing driveway and entrance path/car space within the Subject Property (**Figure 4**).

The requirements of the *Biodiversity Assessment Method* (BAM) *2020*, *Biodiversity Conservation Act 2016* (BC Act) and *Biodiversity Conservation Regulation 2017* are assessed in this BDAR pursuant to Part 4 of the EP&A Act.

The proposed development is subject to approval under the *Pittwater 21 Development Control Plan* (DCP) and the *Pittwater Local Environmental Plan 2014* (LEP).

Land Eco have produced this report to assess any potential impacts associated with the development application (DA) and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority, Pittwater Council.

1.1.2 Location

The Subject Property, 81 Riverview Road, Avalon Beach NSW 2107 (Lot 22/-/DP18005) occurs in the Northern Beaches Sydney suburb of Avalon Beach within the Northern Beaches Council Local Government Area. This BDAR relates solely to the development footprint and vegetation removal, hereafter referred to as the 'Subject Land'. The Subject Land occupies a portion of the Subject Property (**Figure 1**).

1.1.3 Proposed development and the Subject Land

The proposed development application is for the construction of a new carport and driveway. The works will also include the construction of a stair, turning bay, crossover area and a small garden bed. The existing driveway and entrance path/car space are proposed to be demolished (Actions Plans 2024) (**Figure 4**).

The Subject Land incorporates the full extent of the proposed development and includes the removal of weed-infested, infill-planted native vegetation. Ten (10) native trees are proposed for removal for the proposed development. These include one *Corymbia maculata*, one *Allocasuarina torulosa* and eight *Archontophoenix cunninghamiana* (Hugh The Arborist 2024) (**Figure 5**).

The Subject Land was defined by tracing the development footprint using the Design Plans (Action Plans 2024) along with the maximum canopy extent of the trees to be removed (Hugh The Arborist 2024) to get the maximum area of impact. As delimiting tree canopy proposed for removal through aerial imagery was unfeasible, the precautionary principle was adopted and the 'Tree Protection Zone' Arboricultural Impact Assessment (Hugh The Arborist 2024) was used to outline trees proposed for removal and create the Subject Land.

1.1.4 Biodiversity Impact Summary

The proposed development will require the removal of 0.02 ha of vegetation which has been assigned to Plant Community Type (PCT) 3234: *Hunter Coast Lowland Spotted Gum Moist Forest* which forms part of '*Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion,*' an Endangered Ecological Community (EEC) listed under Part 3 of Schedule 1 of the NSW Biodiversity Conservation Act 2016 (BC Act) (hereafter referred to as 'PWSGF EEC').

1.1.5 Other documentation

Other documentation relevant to biodiversity to be submitted with the proposed development include:

- Arboricultural Impact Assessment (Hugh The Arborist 2024)
- Design Plans (Action Plans 2024)

Figure 1. Aerial Imagery of the Subject Land and Subject Property

1.2 Biodiversity Offset Scheme Entry

The proposed development is a local development application and is subject to approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proponent has commissioned this BDAR to accompany the proposal and address the requirements of the NSW Biodiversity Offset Scheme (BOS) and requires submission of a streamlined 'Small Areas' BDAR as stipulated under the Biodiversity Conservation Act 2016 and in accordance with the Biodiversity Assessment Method (BAM), owing to the removal of native vegetation mapped as 'Biodiversity Values' (**Figure 2**) by the Department of Planning and Environment (NSW DCCEEW 2024f). The BDAR is required to be undertaken by an accredited assessor to assess the impacts of the proposal.

1.2.1 Area Clearing Threshold

The BC Act and its regulations stipulate the native vegetation clearing 'area threshold' values that determine whether a development is required to be assessed in accordance with the 'Biodiversity Offset Scheme' (BOS). Minimum entry thresholds for native vegetation clearing depend on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan [LEP]), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP). The term 'vegetation clearing' includes all lopping, felling, slashing, or mowing of native trees, shrubs, or groundcover for the purpose of construction, landscaping, excavation or bushfire Asset Protection Zone (APZ) works.

Developments that trigger the BOS will require a BDAR (this report) that addresses the Biodiversity Assessment Method and the retiring of Biodiversity Offset Credits.

The minimum lot size assigned to the Subject Property by Pittwater Local Environmental Plan (2014) is 700m^2 (0.07 ha). This means the 'native vegetation clearing threshold' trigger for the BOS is 0.25 ha (**Table 3**). The area of vegetation to be removed to facilitate this development is restricted to approximately 0.02 ha of weed-infested/infill planted native vegetation. As such, this is not a trigger for the BOS.

Table 3. Biodiversity Offset Scheme Entry Thresholds

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	**0.25 ha or more**
1 ha to less than 40 ha	0.5 ha or more
40 ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

1.2.2 Biodiversity Value Mapping

At the time of preparing this report, the Subject Land contained land mapped as 'Biodiversity Value' (**Figure 2**) (NSW DCCEEW 2024f). This 'Biodiversity Value' was associated with the *Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion Endangered Ecological Community* (PWSGF EEC). The 'BV' mapped land occurs on the eastern and western portion of the Subject Property. Native vegetation mapped within the 'BV' mapped land on the eastern portion is proposed for removal. As such the proposed development will trigger the Biodiversity Offset Scheme.

Figure 2. Biodiversity Values Mapping (NSW DCCEEW 2024f) in relation to the Subject Property

1.3 Excluded Impacts

1.3.1 Native Vegetation Regulatory Map

The entirety of the Subject Property is mapped as 'Land excluded from the LLS Act' by the Transitional Native Vegetation Regulatory Map (NSW DCCEEW 2024e). Therefore, *Chapter 2 Vegetation in non-rural areas of the State Environmental Planning Policy (Biodiversity and Conservation) 2021* applies to this development.

1.4 Matters of National Environmental Significance

One Matter of National Environmental Significance was recorded present on the Subject Land; the Large-eared Pied Bat (*Chalinolobus dwyeri*), listed as endangered under the EPBC Act. This species is likely to forage within the Subject Land, though is unlikely to breed within the Subject Land or rely heavily upon this habitat with 'Low' calling activity as no suitable breeding caves are present (**Appendix E**). Owing to the small scale of impact and avoidance of breeding habitat, no further assessment under the EPBC Act is considered necessary.

Commonwealth listed threatened species that are MNES have potential to occur in the Subject Land on occasion. This includes, Grey-headed Flying-fox (*Pteropus poliocephalus*), nomadic nectivorous birds such as Swift Parrot *(Lathamus discolor*) and Little Lorikeet (*Glossopsitta pusilla*), microbats and predatory birds that may intermittently forage within the Subject Land, though are unlikely to rely heavily upon the vegetation within the Subject Land owing to its small overall area and occurrence in a disturbed urban matrix. These species will continue to utilise habitat within the Subject Property in the same manner post-development.

No EPBC listed threatened ecological community occurs within the Subject Property.

No referral to the Commonwealth is required for the proposed development.

1.5 Information Sources

A detailed list of all sources utilised in the preparation of this BDAR is presented in the 'References' (**Section 13**) of this report.

Figure 3. The location of the BAM VIS Plot within the Subject Property

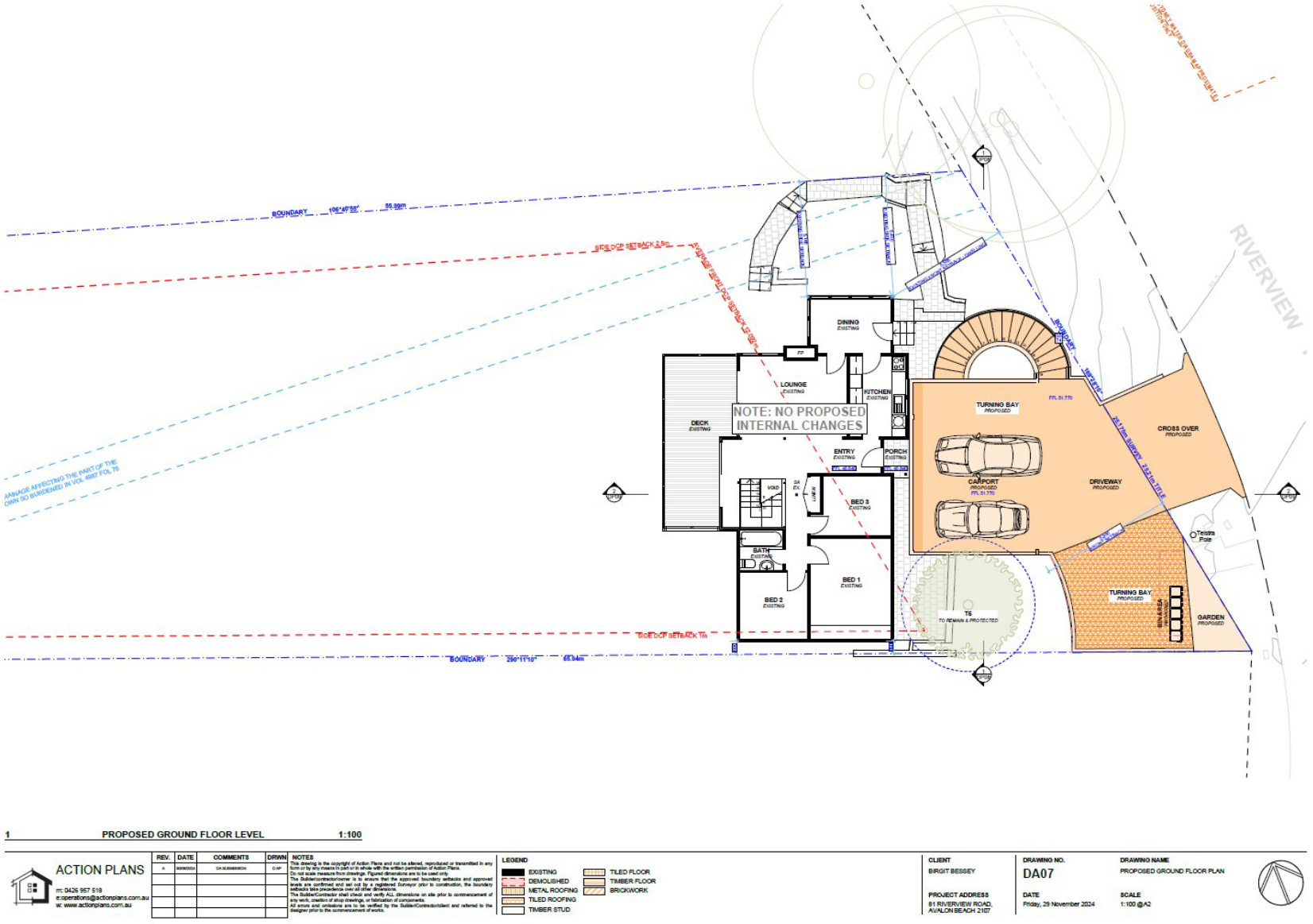

Figure 4. Proposed Ground Floor Plan (Action Plans 2024)

Figure 5. Arborist Plan (Hugh The Arborist 2024)

2. Method

2.1 Site Context Methods

2.1.1 Landscape Features

The native vegetation within the Subject Land includes canopy of mature *Corymbia maculata* and *Syncarpia glomulifera* and several understorey species characteristic of PCT: 3234 in addition to infill planted non-indigenous natives and exotic ornamental species within a managed urban garden on 'Watagan' soil landscape which is characterised by shale-derived soils.

This section details the landscape features and associated habitat values in and around the Subject Land. A table is provided which details the Landscape Features as required by the BAM (**Table 5**).

2.2 Native vegetation, threatened ecological communities and vegetation integrity methods

2.2.1 Existing Information

Broad mapping of vegetation communities (**Figure 11**) have been undertaken as follows:

- The Native Vegetation of the Sydney Metropolitan Area (OEH 2016c)
- NSW State Vegetation Type Map (NSW DCCEEW 2024b)

These resources mapped the remnant vegetation within the Subject Property as:

- The Native Vegetation of the Sydney Metropolitan Area (OEH 2016c) mapped the Subject Property as:
  PCT 1214: Pittwater Spotted Gum which has since been decommissioned and is now known as PCT 3234: Hunter Coast Lowland Spotted Gum Moist Forest

- NSW State Vegetation Type Map (NSW DCCEEW 2024b) mapped a portion of the Subject Property as:
  PCT 3234: Hunter Coast Lowland Spotted Gum Moist Forest

2.2.2 Mapping Native Vegetation Extent

Land Eco mapped the native vegetation extent within the Subject Land by:

- Viewing recent aerial imagery (Nearmap 2024) for differences in texture that would suggest different vegetation zones; followed by;
- conducting a ground-based meandering transect, identifying native vegetation and marking the extent using a Garmin 65S hand-held GPS.

Plant Community Type (PCT) selection was undertaken using information from the BioNet Plant Community Type data (NSW DCCEEW 2024a).

2.2.3 Plot-based Vegetation Survey

One representative Vegetation Integrity Survey (VIS) irregular plot was sampled within the Subject Land. It was allocated to adequately sample the vegetation within the Subject Land using GIS. This style of VIS plot was chosen to best sample the irregular-shaped, and small area of vegetation clearing proposed under the development.

The plots were sampled of floristic composition, structure and function by Land Eco Ecologists in accordance with the BAM.

2.2.4 Vegetation Integrity Survey

One irregularly shaped VIS plot was conducted across the Subject Land (**Figure 3**). It was located to provide a representative assessment of vegetation integrity. As the vegetation within the Subject Property is fragmented by the existing dwelling, hardstand and pathways, the plot was made up of several smaller disjointed sub-plots. These survey plots were established as follows:

- Multiple sub-plots combined to meet the requirement of 400 m^2 plot, to assess all the composition and structure attributes
- Multiple sub-plots combined to cover the entirety of vegetation within the Subject Property to assess the function attributes (number of large trees, stem size classes, tree regeneration and length of logs). These sub-plots combined did not meet the requirement of a 1000m^2, it covered 925m^2. As such a small portion of the adjacent public land was also included to meet the 1000m^2 requirement (**Figure 3**).
- Five 1 m^2 subplots, to assess average litter cover (and other optional ground cover components) for the plot.

The whole VIS plot was 1000 m^2 in area. The following data was collected in accordance with the BAM:

- all vascular plant species, and
- all structure attributes (% foliage cover, and abundance), and
- all function attributes (number of large trees, stem size classes, tree regeneration and length of logs)
- five 1 m^2 subplots, to assess average litter cover (and other optional ground cover components) for the plot.

The presence of hollow-bearing trees, the composition, the vegetation structure, and vegetation function were all assessed according to the protocol outlined in Section 4.3.4 of the BAM (NSW DPIE 2020a).

2.3 Threatened Flora Survey Methods

2.3.1 Review of Existing Information

Land Eco reviewed any existing information on native vegetation relevant to the Subject Land and land within the 1500 m buffer area. This includes:

- individual species records that are held in the NSW Wildlife Atlas BioNet (NSW DCCEEW 2024d);
- existing maps of native vegetation in the area such as those held by the Department, or a local government authority;
- information from publicly accessible ecological reports, soil surveys or previous native vegetation surveys that is relevant to the subject land (where available).

2.3.2 Habitat Constraints Assessment

Land Eco identified potential microhabitats for threatened flora species as well as habitat constraints present on the Subject Land. Relevant habitat features were GPS recorded for mapping and were photographed.

2.3.3 Field Surveys

A suite of Flora Species Credit species was identified within the BAMC (OEH 2024) and NSW Wildlife Atlas (NSW DCCEEW 2024d) as having the potential to occur within the Subject Land.

Targeted surveys were conducted Species Credit species at risk of SAll. These species are listed in **Table 19**.

Regeneration of native flora was limited to cosmopolitan species and plants commonly dispersed by birds.

If any perennial threatened flora species were present, they would have been identified by Land Eco Ecologists during the site vegetation assessment.

2.4 Threatened Fauna Survey Methods

2.4.1 Review of Existing Information

Land Eco reviewed any existing information on threatened fauna relevant to the Subject Land and land within the 1500 m buffer area. This includes:

- survey data or individual species records that are held in NSW Wildlife Atlas BioNet (NSW DCCEEW 2024d);
- information in ecological reports, soil surveys or previous fauna surveys that is relevant to the Subject Land (where available).

2.4.2 Habitat Constraints Assessment

The Land Eco Consulting Ecologists identified potential microhabitats for threatened fauna species as well as habitat constraints present on the Subject Land, including habitat for both Species Credit and Ecosystem Credit threatened fauna species. Relevant habitat features were GPS recorded for mapping and were photographed.

2.4.3 Fauna Surveys

A suite of Fauna Species Credit species was identified within the BAMC (OEH 2024) and NSW Wildlife Atlas (NSW DCCEEW 2024d) as having the potential to occur within the Subject Land.

No other habitat suitable for fauna species at risk of a Serious and Irreversible Impact (SAII) was considered to be present within the Subject Land or to be impacted by the proposed development. As such, no targeted fauna surveys were undertaken (**Table 20**).

Fauna recorded by Land Eco during our survey effort are listed (**Appendix A**).

2.5 Weather Conditions

BAM VIS surveys were conducted on the 20th of November 2024 during fine weather following a period of relatively low rainfall in late spring in 2024. These conditions were suitable growing conditions to detect seasonal flora species (**Table 4**).

Table 4. Environmental conditions during threatened species surveys recorded at the Terrey Hills Weather Station (BOM 2024). Monthly averages and totals are shown in bold.

Survey undertaken (e.g. method / targeted species)	Date	Time	Temperature (°C) (min. & max.)	Wind (light, mod…)	Rainfall (mm)
Lead up to survey (monthly average)	**November 2024**	**N/A**	**16.7-24.7**	**N/A**	**78.8**
BAM VIS Plot Survey Opportunistic Flora Survey Opportunistic Fauna Survey	20/11/2024	10:45-13:15	13.5- 23.6	Moderate	0
Anabat Deployment	13/1/25	16:00 – 17:00	19.1 – 28.9	Moderate	0
Anabat Retrieval	19/1/25	11:00 – 12:00	16.1 – 21.8	High	4.6

3. Site Context

3.1 Assessment Area

The Assessment Area includes a 1500m buffer zone surrounding the Subject Property.

3.2 Landscape Features

Landscape features identified within the Subject Land and assessment are present (**Figure 6-11**). A discussion of relevant landscape features is provided below.

3.2.1 IBRA Bioregions and Subregions

In accordance with BAM Subsection 3.1.3(2) the Subject Land has been mapped to IBRA Bioregion and Subregion. The Subject Land occurs within the 'Sydney Basin' Interim Biogeographic Regionalisation for Australia ver. 7 (IBRA) bioregion, and 'Pittwater' IBRA subregion (DEE 2016; **Figure 7**).

3.2.2 Rivers, Streams, Estuaries and Wetlands

This subsection details wetlands, rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E).

There are no mapped watercourses within the Subject Property. The Subject Land occurs approximately 300m away from a first-order unnamed tributary. The proposed development does not include works within 40m of a mapped watercourse, waterbody or shoreline therefore is not considered a Controlled Action under the *Water Management Act 2000* (**Figure 8**).

3.2.3 Habitat Connectivity

In accordance with connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6)), the assessor must identify the connectivity of different areas of habitat that may facilitate the movement of threatened species across their range and identify these on the Location Map (**Figure 9**).

Significant biodiversity links are those that connect different areas of habitat, facilitating movement of threatened species across their distribution. The presence of significant biodiversity links on a site contributes to the biodiversity value of that Subject Land at the landscape scale. Connectivity can be identified at different scales depending on the target species and can include recognised biodiversity corridors in a plan approved by DCCEEW (e.g. priority investment areas), a local corridor identified by a local council, flyways for migratory species or a riparian buffer of a stream, wetland or estuary.

Land Eco has identified routes of habitat connectivity between the Subject Land and adjoining landscape and has classified them into two categories:

- Habitat Link – a local-scale habitat connection consisting of a narrow or disturbed vegetation corridor (i.e. canopy connectivity); and
- Significant Habitat Corridor – a locally significant habitat connection consisting of remnant vegetation, reserves, densely vegetation riparian corridors or wetlands.

Despite occurring in a suburban landscape, the prioritisation of the retention of large canopy trees across the Northern Beaches Council Local Government Area ensures that habitat corridors are maintained at a landscape scale. The Subject Property forms part of a network of terrestrial habitat connections associated with the Subject Property's native remnant canopy of *Corymbia maculata* and *Syncarpia glomulifera* (**Figure 9**). This habitat forms a fly-way corridor for locally common threatened species such as the Grey-headed Flying-fox (*Pteropus poliocephalus*), threatened nomadic nectivorous birds such as the Swift Parrot (*Lathamus discolor*) and Little Lorikeet (*Glossopsitta pusilla*), threatened microbats and threatened predatory birds. The Subject Property has been mapped as containing 'Biodiversity' in the Pittwater LEP (2014) (Northern Beaches Mapping 2024).

Impacts of development on the connectivity of different forms of habitat have been considered by the assessor (see **section 8**). Connectivity corridor values present at the time of survey will continue to remain across the Subject Property during and post development.

3.2.4 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance

In accordance with BAM Subsections 3.1.3(7.) and 3.1.3(12.) the assessor must detail karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (**Table 5**).

The Subject Land is steeply sloped with some remnant vegetation characteristic of a shale-rich soil geology with minor sandstone outcropping. The size and nature of the sandstone outcropping were not considered substantial enough to support a roosting or breeding colony of any of the cave-dwelling microbats.

The Subject Property is mapped on one soil landscape of 'Watagan (9130wn)' soil landscape (NSW DCCEEW 2024c). This soil landscape is described as rolling to very steep hills on fine-grained Narrabeen Group sediments. Local relief 60–120 m, slopes >25%. Narrow, convex crests and ridges, steep colluvial sideslopes, occasional sandstone boulders and benches. Tall eucalypt open-forest with closed-forest (rainforest) in sheltered positions. The soils are described as –shallow to deep (30–200 cm) Lithosols/Siliceous Sands (Uc1.24) and Yellow Podzolic Soils (Dy3.21, Dy3.41, Dy4.11) on sandstones; moderately deep (100–200 cm) Brown Podzolic Soils (Db1.11), Red {Podzolic Soils (Dr2.21) and Gleyed Podzolic Soils (Dg2.21) on shales (NSW DCCEEW 2024c).

Table 5. Summary of Landscape features identified within the Subject Land and surrounding 1500m buffer.

Landscape Feature	Identification of Landscape Feature on Site
Rivers and Streams (classified according to stream order)	There are no mapped watercourses within the Subject Property. The Subject Land occurs approximately within 300m of a first-order unnamed watercourse. The proposed development does not include works within 40m of a mapped watercourse, waterbody or shoreline therefore is not considered a Controlled Action under the *Water Management Act 2000*. No impacts to rivers or streams are expected from the proposed development.
Wetlands (within, adjacent to and downstream of site)	The western portion of the Subject Property is mapped within 'Coastal Use Area and Coastal Environment Area' (NSW DCCEEW 2024g) as per the *State Environmental Planning Policy (Resilience and Hazards) 2021*. No works are proposed in this area. The Subject Land lies >40m from mapped 'Coastal Use Area' and 'Coastal Environment Areas'. The Subject Property does not contain land mapped within the Coastal Wetlands and Littoral Rainforest Area Map (NSW DCCEEW 2024g) as per the *State Environmental Planning Policy (Resilience and Hazards) 2021*. While Coastal Wetlands and Littoral Rainforest occur within a 1500m buffer of the Subject Land, the Subject Property is not within the 'Proximity Areas' of either of these ecosystems (NSW DCCEEW 2024g). Given the nature and the extent of works of the proposed development, the development is unlikely to impact these areas.
Connectivity features	Despite occurring in a suburban landscape, the prioritisation of the retention of large canopy trees across the Northern Beaches Council Local Government Area ensures that habitat corridors are maintained at a landscape scale. The Subject Property forms part of a network of terrestrial habitat connections associated with the Subject Property's native remnant canopy of *Corymbia maculata* and *Syncarpia glomulifera* (**Figure 9**). This habitat forms a fly-way corridor for locally common threatened species such as the Grey-headed Flying-fox (*Pteropus poliocephalus*), threatened nomadic nectivorous birds such as the Swift Parrot (*Lathamus discolor*) and Little Lorikeet (*Glossopsitta pusilla*), threatened microbats and threatened predatory birds. The Subject Property has been mapped as containing 'Biodiversity' in the Pittwater LEP (2014) (Northern Beaches Mapping 2024).
Areas of geological significance and soil hazard features	The Subject Land is steeply sloped with remnant vegetation characteristic of a shale-rich soil geology with minor sandstone outcropping. The size and nature of the sandstone outcropping were not considered substantial enough to support a roosting or breeding colony of any of the cave-dwelling microbats.

3.2.5 Areas of Outstanding Biodiversity Value

No areas of Outstanding Biodiversity Value occur within the Subject Land or Assessment Area.

3.2.6 Mitchell Landscapes

NSW Landscapes Mapping: Background and Methodology (Mitchell 2002; OEH 2016a) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided location information and a meaningful descriptive landscape term. The Subject Land occurs over the 'Belrose Coastal Slopes' Mitchell Landscape (**Figure 10**).

3.2.6.1 Landscape Ecosystem – Belrose Coastal Slopes

Benched hill slopes and deep valleys of the coastal fall on horizontal Triassic quartz sandstone, lithic sandstone and shales. High proportion of rock outcrop with discontinuous cliffs to 5m high. General elevation 0 to 180m, local relief 80m. Shallow uniform or gradational sands and earthy sands on ridges, deeper sands, loamy sands and organic sands on wet benches and in hanging swamps, grey or yellow texture-contrast soils on shale benches. Accumulations of deeper sand and occasional podsols in depositional sites and along streams. Low woodland of scribbly gum (*Eucalyptyus haeomostoma*), red bloodwood (*Corymbia gummifera*), yellow-top ash (*Eucalyptus leuhmanniana*), and narrow-leaved apple (*Angophora bakeri*) in deeper soils on ridges. Scrub and heath of she-oak (*Allocasuarina distyla*) and heath banksia (*Banksia ericifolia*), with other *Hakea, Grevillea*, and *Baeckea* sp., on ridges and upper benches. Wet heath and swamps with *Gahnia* sp. and swamp banksia (*Banksia robur*) in hanging valleys. Coastal forest in sheltered areas on better quality shale soil with; Sydney blue gum *(Eucalyptus saligna*), blackbutt *(Eucalyptus pilularis*), turpentine (*Syncarpia glomulifera*), grey ironbark *(Eucalyptus paniculata*), spotted gum *(Corymbia maculata*), southern mahogany *(Eucalyptus botryoides*), cabbage-tree palm (*Livistona australis*) and burrawang (*Macrozamia* sp.). Coastal headlands with scrub of *Allocasuarina distyla*, coast rosemary (*Westringea fruticosa*), and dwarf kangaroo grass (*Themeda triandra*) (Mitchell 2002; OEH 2016a).

3.2.7 Additional Landscape Features Identified

No additional landscape features are identified in the Subject Land for the proposed development.

3.2.8 Soil Hazard Features

The proposed development does not require approval from the Native Vegetation Panel under Part 5A of the LLS Act or the Vegetation SEPP as is mapped 'Category 1 – Exempt Land', therefore the soil hazard features are not relevant to this development.

3.3 Native Vegetation Cover

A 1500m 'assessment circle' surrounding the outside boundary of the Subject Land was prepared in order to determine the extent of native vegetation within the surrounding locality of the Subject Land. Native vegetation was determined from public aerial imagery, historical vegetation mapping (OEH 2016c) and local knowledge of the locality. The results are presented in **Table 6**.

Table 6. Native vegetation cover in the Assessment Area

Assessment area (ha)	715
Total area of native vegetation cover (ha)	212.55 (rounded to 213 in the BAMC)
Percentage of native vegetation cover	29.72 (rounded to 30% in the BAMC)
Class (0-10, >10-30, >30-70 or >70%)	>30 - 70%

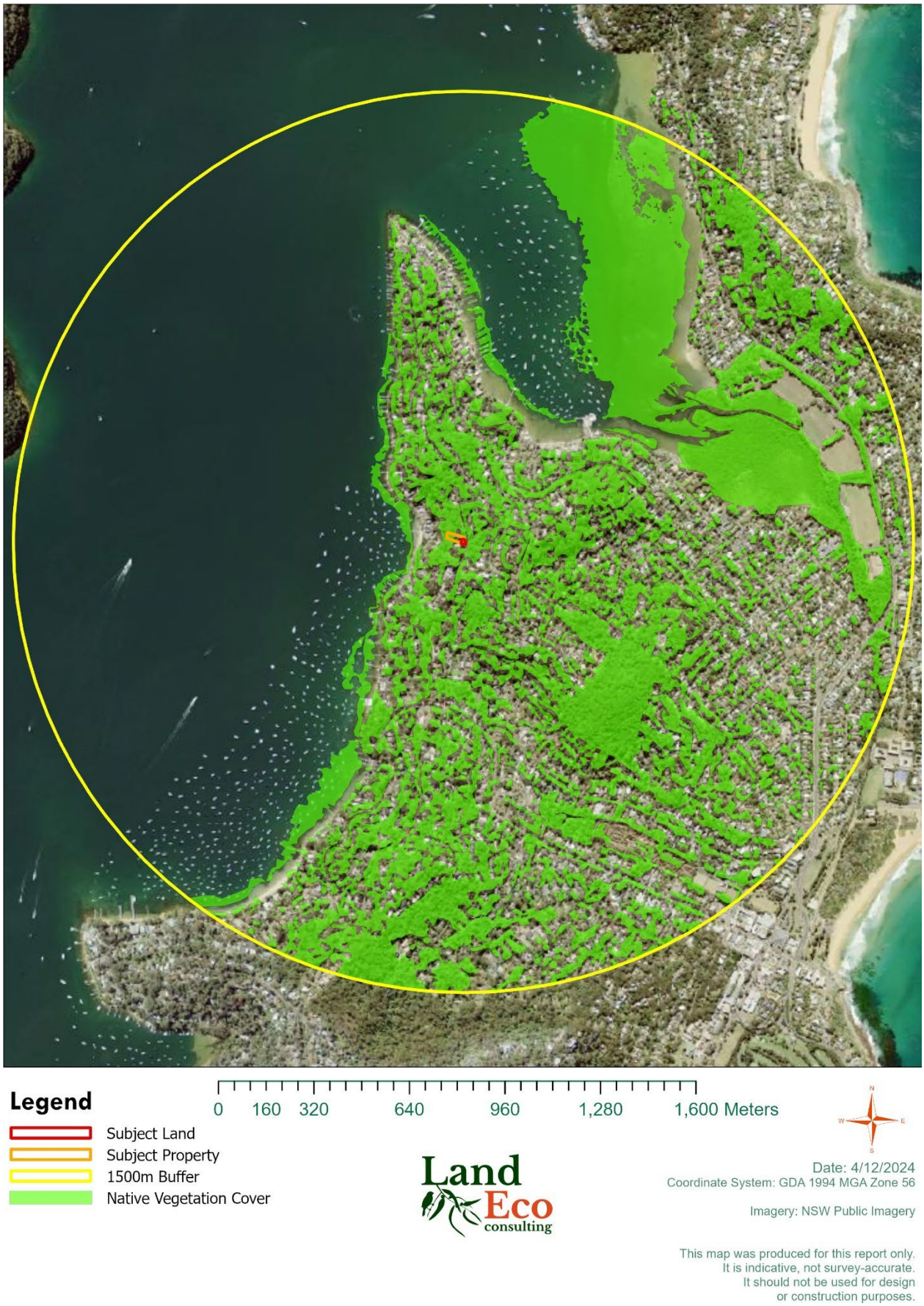

Figure 6. Native vegetation patches within the area surrounding the Subject Property (1500m buffer)

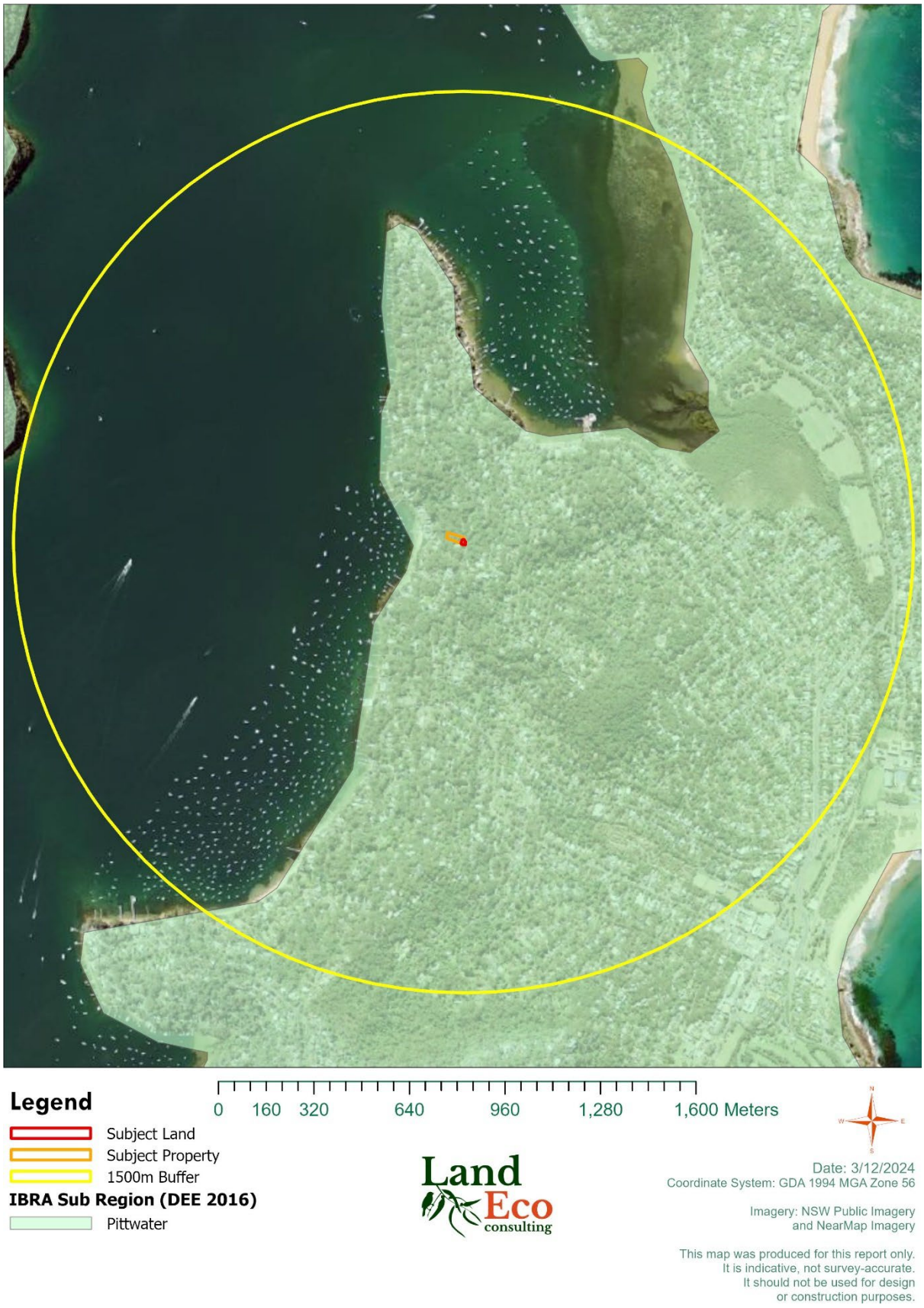

Figure 7. The assessment buffer surrounding the Subject Property lies entirely within the Pittwater IBRA 7 Subregion of the Sydney Basin IBRA7 Bioregion (1500m buffer)

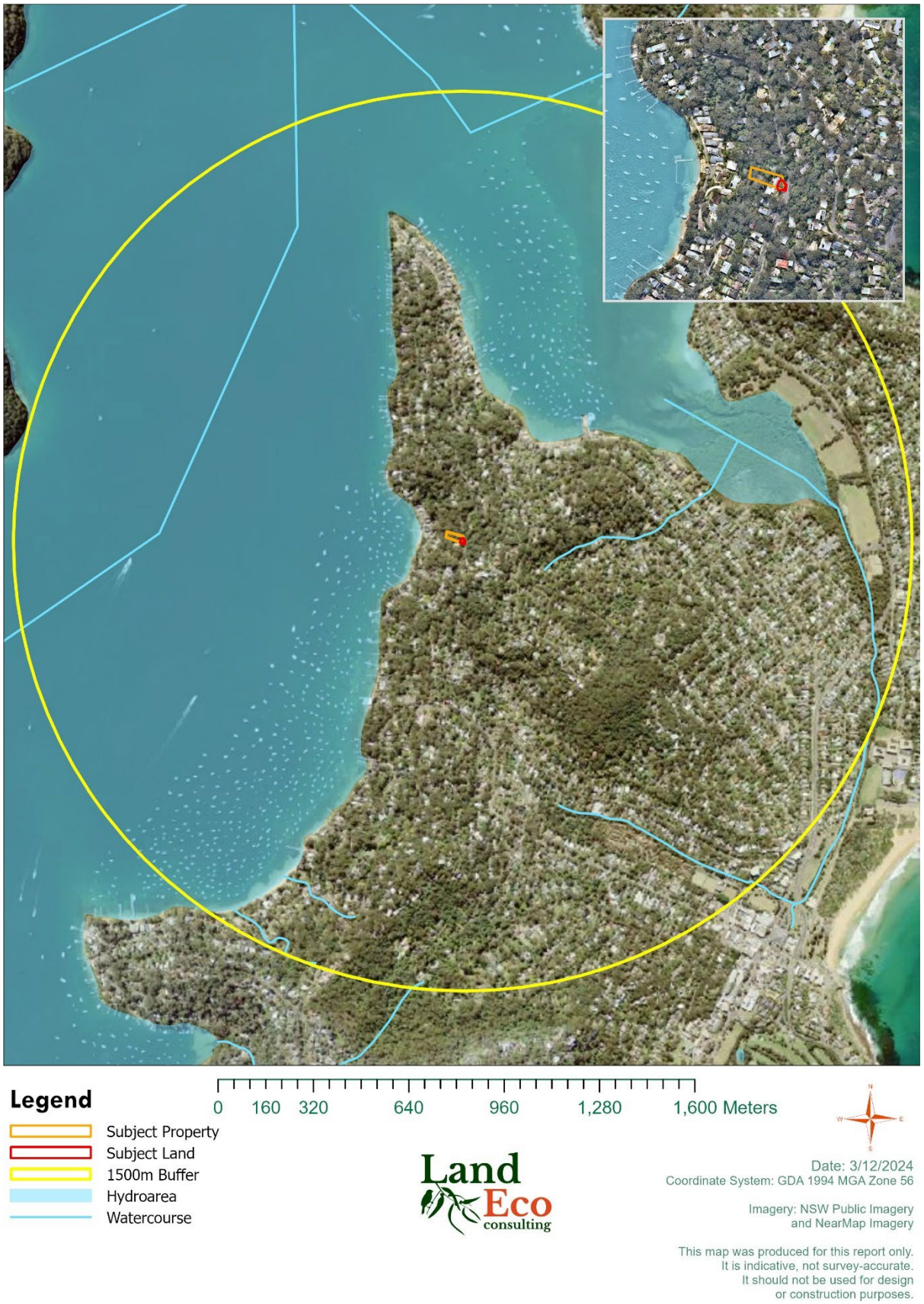

Figure 8. Watercourses (streams and waterbodies) within the vicinity of the Subject Property (1500m buffer)

Figure 9. Terrestrial habitat connectivity links within the Subject Property and surrounding area (1500m buffer)

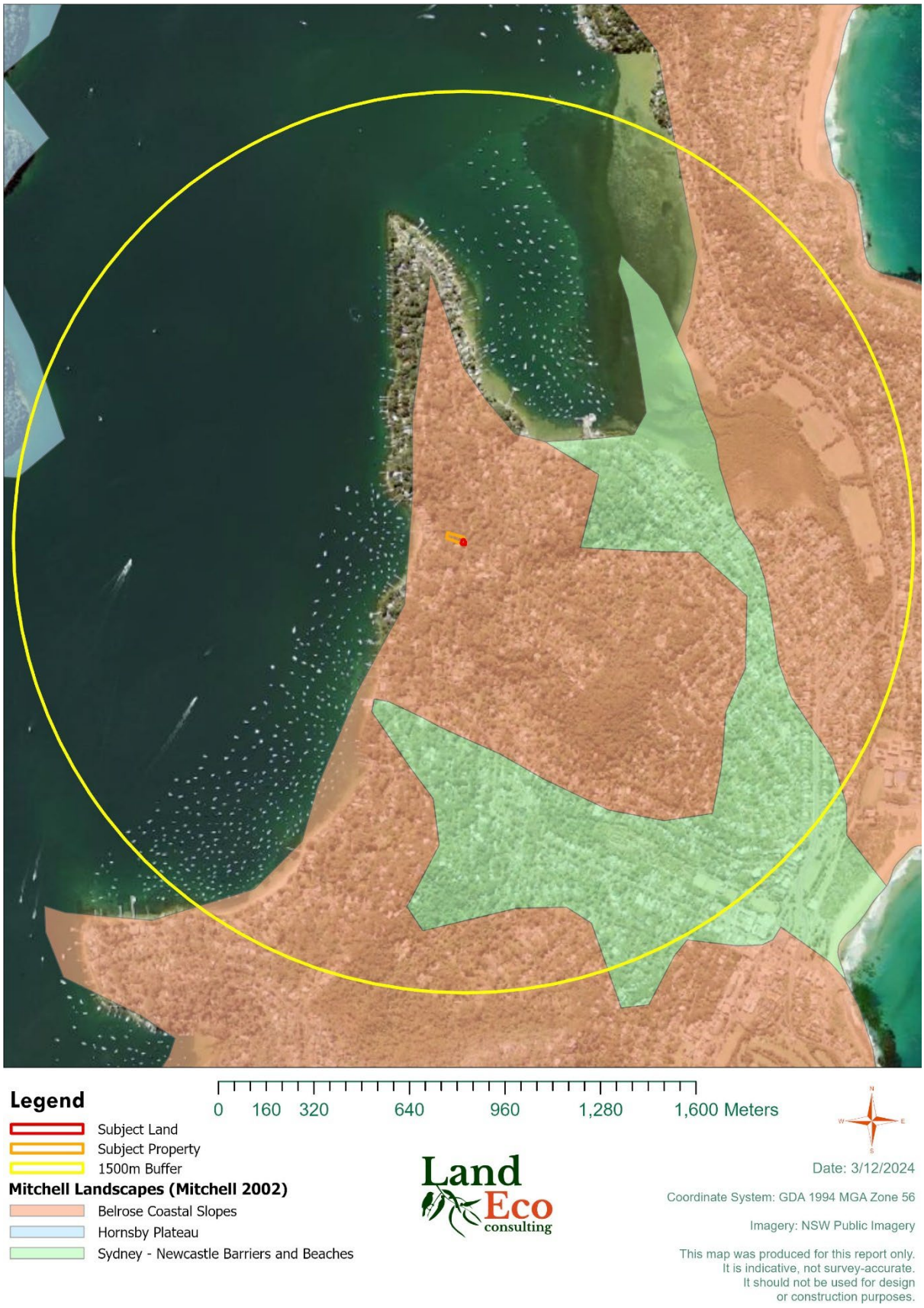

Figure 10. The Mitchell Landscapes that comprise the Subject Property and the surrounding assessment area (1500m buffer)

4. Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

4.1 Native Vegetation Extent

Land Eco mapped the native vegetation extent within the Subject Land (as described in BAM Section 4.1(1–3.) and BAM Subsection 4.1.1). Impacts to vegetation required to facilitate the proposed development are presented in **Table 7**.

Table 7. Impacts to vegetation to facilitate development

Vegetation type	Area to be removed (ha) for Development
Native vegetation	0.02
Total Vegetation	0.02
Total Assessable Under BAM	0.02

4.1.1 Changes to the Mapped Native Vegetation Extent

The actual native vegetation extent does match that shown on the aerial imagery used in the figures of this report.

4.1.2 Non-native Vegetation

All parts of the Subject Land that supported vegetation have been mapped (**Figure 12**). PCT 3234 that has been mapped in the Subject Land is weed-infested. Areas that have not been mapped consisted of bare soil or artificial structures/ hardstand. Overhanging vegetation from the neighbouring properties have also been included.

4.2 Plant Community Types

4.2.1 Overview

Vegetation within the Subject Land has been assessed as aligning with the BioNet Vegetation Classification PCTs identified within **Table 8** and their extent is shown in **Figure 12**. Detailed descriptions of each PCT are provided in the following subsections.

Table 8. PCTs identified within the Subject Land

PCT ID	PCT name	Zone	Subject Land Area (ha)	Total area assessable under BAM (ha)
3234	Hunter Coast Lowland Spotted Gum Moist Forest	Infill Planted	0.02	0.02

Land Eco confirmed that 'PCT 3234' occurs across the vegetation areas of the Subject Land. Only one vegetation condition class/ zone exists in the Subject Land, '*Infill Planted*'.

4.2.2 PCT 3234: Hunter Coast Lowland Spotted Gum Moist Forest

The native canopy within the Subject Property and surrounds is dominated by *Corymbia maculata, Syncarpia glomulifera* and *Glochidion ferdinandi*. Several historically planted, native trees such as *Archontophoenix cunninghamiana* and exotic trees such as *Jacaranda mimosifolia* are also present in the Subject Property. Characteristic species of PCT 3234: Hunter Coast Lowland Spotted Gum Moist Forest were observed in the canopy, mid, and ground strata within the Subject Property. Consequently, the presence of remnant characteristic trees, along with several other species representative of PCT 3234, has led to the assignment of the Subject Property to Plant Community Type (PCT) 3234: Hunter Coast Lowland Spotted Gum Moist Forest. The vegetation within the Subject Land has been infill planted with non-indigenous native and ornamental exotic species and has been managed long-term as an urban garden. The native fragments within the Subject Property are degraded through clearing, infill planting, weed infestation and routine garden maintenance (**Table 9**).

Table 9. PCT 3234: Hunter Coast Lowland Spotted Gum Moist Forest

PCT ID	3234
PCT name	Hunter Coast Lowland Spotted Gum Moist Forest
Vegetation formation	Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	27.64 %
Extent within subject land (ha)	0.02 ha of PCT 3234 will be impacted within the Subject Land.
Condition State	Infill Planted
Justification of PCT Selection	Historical vegetation mapping NSW State Vegetation Type Map (NSW DCCEEW 2024b) and The Native Vegetation of the Sydney Metropolitan Area (OEH 2016c) both identifies PCT 3234 to occur on the Subject Property. The canopy within the Subject Property is dominated by *Corymbia maculata* on shale-derived soils. Characteristic species of PCT 3234 were observed in the canopy, mid, and ground strata within the Subject Property e.g. Canopy stratum: *Corymbia maculata, Allocasuarina torulosa, Glochidion ferdinandi,* Mid-stratum: *Elaeocarpus reticulatus, Breynia oblongifolia,* Ground-Stratum: *Oplismenus imbecillis, Cayratia clematidea*. The presence of remnant characteristic trees in addition to the presence of several other characteristic species of PCT 3234 supports the mapping of PCT 3234 on the Subject Land. Historical clearing, infill planting and weed infestation has degraded this ecosystem, increasing the significance of the remnant canopy trees and characteristic species of this PCT.

Alignment with TECs	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (see **section 4.3**)
Photo	**Plate 1**

4.3 Threatened Ecological Communities (TECs)

The vegetation within the Subject Land is a TEC (**Table 10**).

Table 10. TECs within the Subject Land

TEC name	Profile ID (from TBDC)	BC Act status	Associated vegetation zones within the Subject Land	Area within Subject Land (ha)
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	10634	Endangered Ecological Community	PCT:3234 Hunter Coast Lowland Spotted Gum Moist Forest	0.02

All of the PCT 3234 on the Subject Property corresponds to '*Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion*' (PWSGF) which is listed as an Endangered Ecological Community (EEC) under Schedule 1 of the BC Act in accordance with the Final Determination for this community (NSW TSSC 2013) (**Table 11**).

Table 11. Characteristics of Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion within the Subject Land (NSW TSSC 2013).

Key Diagnostic Characteristic (NSW TSSC 2013)	Vegetation within the Subject Land
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion is known to occur on shale-derived soils from Narrabeen series geology.	Shale-derived soils of Narrabeen Group sediments.
The ecological community has been recorded from the local government areas of Pittwater and Gosford, within the Sydney Basin Bioregion, and may occur elsewhere in the Bioregion.	Occurs in the Northern Beaches LGA in the Pittwater Council.
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion is characterised by the following assemblage of species: *Acacia ulicifolia, Adiantum aethiopicum, Allocasuarina littoralis, Allocasuarina torulosa, Angophora costata, Billardiera scandens, Breynia oblongifolia, Caesia parviflora, Calochlaena dubia, Cissus hypoglauca, Clematis aristate, Corymbia gummifera, Corymbia maculata, Desmodium rhytidophyllum, Desmodium varians, Dianella caerulea, Digitaria parviflora, Dodonaea triquetra, Elaeocarpus reticulatus, Entolasia marginata, Entolasia stricta, Eucalyptus botryoides, Eucalyptus paniculata, Eucalyptus umbra, Eustrephus latifolius, Geitonoplesium cymosum, Glochidion ferdinandi, Glycine clandestine, Hardenbergia violacea, Hibbertia dentata, Hibbertia empetrifolia subsp. empetrifolia, Imperata cylindrica, Lepidosperma laterale, Livistona australis, Lomandra confertifolia, Lomandra filiformis, Lomandra longifolia, Lomandra multiflora subsp. multiflora, Macrozamia communis, Marsdenia rostrata, Microlaena stipoides, Morinda jasminoides, Myrsine variabilis, Notelaea longifolia, Oplismenus imbecillis, Pandorea pandorana, Panicum simile, Persoonia levis, Persoonia linearis, Phyllanthus hirtellus, Pittosporum revolutum, Pittosporum undulatum, Platylobium formosum, Poa affinis, Podolobium ilicifolium, Polyscias sambucifolia, Pomax umbellate, Pratia purpurascens, Pseuderanthemum variabile, Pteridium esculentum, Pultenaea flexilis, Schelhammera undulata, Smilax glyciphylla, Themeda australis, Xanthorrhoea macronema.*	The following characteristic species were identified within the Subject Property: - *Allocasuarina torulosa* - *Breynia oblongifolia* - *Cayratia clematidea* - *Corymbia maculata* - *Elaeocarpus reticulatus* - *Glochidion ferdinandi* - *Livistona australis* - *Lomandra longifolia* - *Oplismenus imbecillis*

4.4 Vegetation Zones

One vegetation zone was identified within the Subject Land (**Table 12**):

- PCT: 3234: Infill Planted

Patch size is defined by the BAM as an area of native vegetation that:

- occurs on the development site or biodiversity stewardship site, and
- includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site (OEH 2020a). Patch size was calculated according to the above guidelines. Despite occurring in an urbanised locality, the retention of canopy trees across the Northern Beaches LGA ensures that the patch extends across the locality with no gaps between native woody vegetation greater than 100m. The 213ha patch size of native vegetation cover within the 1500m bigger connects to substantial remnant vegetation in nearby reserves which is the vegetation cover in the 1500m buffer area. As such, Land Eco confirmed the Subject Land must be assessed under the >100 ha patch size category (**Figure 6**).

Table 12. Vegetation Zones and Patch Sizes

Vegetation zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
Infill Planted	PCT 3234	Remnant canopy, disturbed understorey and ground layer due to infill plantings and weed infestation.	0.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	Plot 1

Plate 1. Representative photograph of PCT 3234 within the Subject Land. Photo taken within BAM VIS Plot 1

4.5 Vegetation Integrity (Vegetation Condition)

4.5.1 Vegetation Integrity Survey Plots

A total of one (1) BAM Vegetation Integrity Score (VIS) Plot was sampled within the 'Infill Planted' vegetation zone which includes all vegetation within the Subject Land (**Figure 12**). The plot was irregular in shape and measured to cover at least 400m^2 excluding the hardstand driveway and buildings. Composition, structural and function data was collected across the entire plot. Plot data gathered for each attribute used to assess the function of the Subject Land vegetation is detailed in **Appendix B.** Vegetation Integrity Survey Scores, represented by existing vegetation within each vegetation zone, are detailed in **Table 13.**

The future VI score post development has been assigned to 3.8. This equates to total clearing of the understorey vegetation and select tree removal within the Subject Land, while retaining one native tree (classified as 'other') (*Livistona australis*) (hence the retention of one 'other' specie and 3% 'other' cover in the future VIS).

Figure 12 depicts the location of specific vegetation impacts including limited impacts to native canopy overhanging the existing dwelling and car space, however given the small area, it was not feasible to divide the impacts into separate management zone. As such, for clarity and to ensure that all impacts have been adequately offset, all impacts to vegetation have been assessed assuming complete loss of understorey vegetation including vegetation which may be retained under the proposed suspended carport and driveway (i.e. a future VI score of 3.8).

In accordance with section 9.2. of the BAM (DPIE 2020a) if, during the assessment of biodiversity values for any type of development, clearing or biodiversity certification proposal, the assessor determines that:

> (a) an area of land does not contain native vegetation, or
>
> (b) a vegetation zone has a vegetation integrity score <15 where the PCT is representative of an endangered or critically endangered ecological community, or
>
> (c) a vegetation zone has a vegetation integrity score <17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
>
> (d) a vegetation zone has a vegetation integrity score <20 where the PCT is not representative of a TEC or associated with threatened species habitat then for that vegetation zone:
>
> (e) assessment of native vegetation is not required beyond Section 5.4, and

An offset is not needed for impacts on native vegetation if the vegetation integrity score is below those listed in subsection 9.2.1(1.) of the BAM (see above); however, if the entity is at risk of an SAII the assessor will need to address the relevant criteria in Section 9.1 of the BAM and include this in the BDAR. In the case of the Subject Land, the vegetation integrity score is over 15 (<15) and is associated with an endangered ecological community, therefore, offset credits must be retired to offset residual impacts from the development.

4.5.2 Vegetation Integrity Scores

The Condition and VIS scores for the Subject Land are presented (**Table 13**).

Table 13. Vegetation Integrity Scores

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
PCT:3234 Infill Planted	68.8	20.3	77	47.6	No

4.5.3 Use of Benchmark Data

This development assessment used the BAM-C Version 1.2 benchmarks (OEH 2024).

Figure 11. Historically Mapped Vegetation within the Subject Property (NSW DCCEEW 2024b)

Figure 12. Field validated vegetation mapping of vegetation to be removed within the Subject Land

5. Habitat Suitability for Threatened Species

5.1 Identification Of Threatened Species for Assessment

5.1.1 Ecosystem Credit Species

This section provides a summary of the candidate Ecosystem Credit Species for the Subject Land derived from BAMC (OEH 2024) and a 10km BioNet Atlas Search (NSW DCCEEW 2024d). Ecosystem credit species associated with the Subject Land are listed below in **Table 14**.

Table 14. Predicted ecosystem credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Regent Honeyeater (Foraging)	*Anthochaera phrygia*	Critically Endangered	Critically Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Gang-gang Cockatoo (Foraging)	*Callocephalon fimbriatum*	Endangered	Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Glossy Black-Cockatoo (Foraging)	*Calyptorhynchus lathami*	Vulnerable	Vulnerable	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	Vulnerable	Vulnerable	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Spotted-tailed Quoll	*Dasyurus maculatus*	Vulnerable	Endangered	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Beach Stone Curlew (Foraging)	*Esacus magnirostris*	Critically Endangered	-	Yes	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
White-bellied Sea-Eagle (Foraging)	*Haliaeetus leucogaster*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Little Eagle (Foraging)	*Hieraaetus morphnoides*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
White-throated Needletail	*Hirundapus caudacutus*	Vulnerable	Vulnerable	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Black Bittern	*Ixobrychus flavicolis*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	No waterbodies within Subject Land. No land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation.	N/A
Swift Parrot (Foraging)	*Lathamus discolor*	Endangered	Critically Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Square-tailed Kite (Foraging)	*Lophoictinia isura*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Black-chinned Honeyeater (Eastern Subspecies)	*Melithreptus gularis gularis*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Eastern Coastal Free-tailed Bat	*Micronomous norfolkensis*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Little Bent-winged Bat (Foraging)	*Miniopterus australis*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Large Bent-winged Bat (Foraging)	*Miniopterus orianae oceanensis*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Turquoise Parrot	*Neophema pulchella*	Vulnerable	-	No	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Eastern Curlew (Foraging)	*Numenius madagascariensis*	-	Critically Endangered	Yes	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Eastern Osprey (Foraging)	*Pandion cristatus*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Scarlet Robin	*Petroica boodang*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Flame Robin	*Petroica phoenicea*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
New Holland Mouse	*Pseudomys novaehollandiae*	-	Vulnerable	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Grey-headed Flying-fox (Foraging)	*Pteropus poliocephalus*	Vulnerable	Vulnerable	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Rose-crowned Fruit-Dove	*Ptilinopus regina*	Vulnerable	-	No	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Superb Fruit-Dove	*Ptilinopus superbus*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Greater Broad-nosed Bat	*Scoteanax rueppellii*	Vulnerable	-	No	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Rosenberg's Goanna	*Varanus rosenbergi*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted

5.1.2 Species Credit Species

This section provides a summary of the candidate Species Credit flora (**Table 15**) and fauna species (**Table 16**) for the Subject Land derived from BAMC (OEH 2024) and a 10km BioNet Atlas Search (NSW DCCEEW 2024d). A summary of the targeted survey effort applied to each species is provided along with the results of the survey effort, specifically whether or not the Species Credit needs to be offset through retiring of Biodiversity Offset Credits (**Table 17; Table 18**). As this assessment is a Streamlined assessment module – Small area, '*Candidate species credit species that are not at risk of an SAII and are not incidentally recorded on the subject land do not require further assessment*' (DPIE 2020b). As such species not at risk of an SAII that were not recorded on the Subject Land were not further assessed.

Where a species is assumed to be present on the Subject Land, the species polygon must encompass the entire vegetation zone/s within which the candidate species is predicted to use/occur.

The assessor must determine an offset for the impacts of proposals on the habitat of threatened species assessed for ecosystem credits and associated with a PCT in a vegetation zone with a vegetation integrity score of ≥17. The assessor must determine an offset for the impacts of proposals on threatened species that require species credits, identified in accordance with Chapter 5 of the BAM (DPIE 2020a).

Table 15. Predicted flora species credit species

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Bauer's Midge Orchid	*Genoplesium baueri*	Endangered	Endangered	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	This species is not associated with any of the PCTs occurring within the Subject Land. Only one record returned by Bionet. This record is highly desensitised and unlikely to be in close proximity to the Subject Land. This species is only known from sandstone and enriched sandstone soils, not the shale and clay soils of the Avalon area. The Subject Land is degraded and no evidence of orchids was observed by Land Eco.	N/A
Angus's Onion Orchid	*Microtis angusii*	Endangered	Endangered	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	This species is not associated with any of the PCTs occurring within the Subject Land. Fourteen records returned by Bionet. These records are highly desensitised and unlikely to be in close proximity to the Subject Land. This species is only known from laterite soils which are absent from the Subject Land.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
						The Subject Land is degraded and no evidence of orchids was observed by Land Eco.	
Hairy Geebung	*Persoonia hirsuta*	Endangered	Endangered	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Eastern Australia Underground Orchid	*Rhizanthella slateri*	Vulnerable	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Scrub Turpentine	*Rhodamnia rubescens*	Critically Endangered	Critically Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Native Guava	*Rhodomyrtus psidioides*	Critically Endangered	Critically Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted

Table 16. Predicted fauna species credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Regent Honeyeater (Breeding)	*Anthochaera phrygia*	Critically Endangered	Critically Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not in an important mapped area.	N/A
Loggerhead Turtle	*Caretta caretta*	Endangered	Endangered	No	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	No suitable habitat: No 'Dunes; Elevated sand dune above watertable and high tide' within the Subject Land.	N/A
Large-eared Pied Bat	*Chalinolobus dwyeri*	Endangered	Endangered	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Leatherback Turtle	*Dermochelys coriacea*	Endangered	Endangered	No	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	No suitable habitat: No 'Dunes; Elevated sand dune above watertable and high tide'	N/A

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Beach Stone-curlew (Breeding)	*Esacus magnirostris*	Critically Endangered	-	Yes	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	No suitable breeding habitat within the Subject Land which is open and disturbed.	N/A
Swift Parrot (Breeding)	*Lathamus discolor*	Endangered	Critically Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not in an important mapped area. Does not breed on mainland Australia.	N/A
Little Bent-winged Bat (Breeding)	*Miniopterus australis*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Large Bent-winged Bat (Breeding)	*Miniopterus orianae oceanensis*	Vulnerable	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted
Sooty Owl	*Tyto tenebricosa*	Vulnerable	-	No	☐ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	No suitable habitat within the Subject Land no: Caves, Cliffs; including clifflines/ledges Escarpments; including clifflines/ledges Hollow bearing trees; a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground	N/A
Eastern Cave Bat	*Vespadelus troughtoni*	Vulnerable	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	PCT 3234 Infill Planted

5.2 Presence of Candidate Species Credit Species

The presence or absence of candidate species credit species are presented below (**Table 17;Table 18**).

Table 17. Determine the presence of candidate flora species credit species on the Subject Land

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Hairy Geebung	*Persoonia hirsuta*	Endangered	Endangered	Targeted threatened species survey	No	No
Eastern Australia Underground Orchid	*Rhizanthella slateri*	Vulnerable	Endangered	Targeted threatened species survey	No	No
Scrub Turpentine	*Rhodamnia rubescens*	Critically Endangered	Critically Endangered	Targeted threatened species survey	No	No
Native Guava	*Rhodomyrtus psidioides*	Critically Endangered	Critically Endangered	Targeted threatened species survey	No	No

Table 18. Determine the presence of candidate fauna species credit species on the Subject Land

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Large-eared Pied Bat	*Chalinolobus dwyeri*	Endangered	Endangered	Targeted threatened species survey	Yes	No
Little Bent-winged Bat (Breeding)	*Miniopterus australis*	Vulnerable	-	Targeted threatened species survey	Yes	No (Ecosystem Credit only as no suitable breeding habitat available. This species relies on large limestone cave systems. Therefore does not require further assessment.)
Large Bent-winged Bat (Breeding)	*Miniopterus orianae oceanensis*	Vulnerable	-	Targeted threatened species survey	No	No
Eastern Cave Bat	*Vespadelus troughtoni*	Vulnerable	-	Targeted threatened species survey	No	No

5.3 Candidate Species Credit Species

Targeted surveys were conducted in tandem during the BAM VIS survey which covered all of the vegetation within the Subject Land (**Table 19; Table 20**).

Table 19. Threatened species surveys for candidate flora species credit species on the Subject Land

Common name	Scientific name	Threatened flora species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Hairy Geebung	*Persoonia hirsuta*	Meandering transect	Yes: 20/11/24	No:	2.5 hours, 2 people	No	No

Eastern Australia Underground Orchid	*Rhizanthella slateri*	Meandering transect	Yes: 20/11/24	No:	2.5 hours, 2 people	No	No
Scrub Turpentine	*Rhodamnia rubescens*	Meandering transect	Yes: 20/11/24	No:	2.5 hours, 2 people	No	No
Native Guava	*Rhodomyrtus psidioides*	Meandering transect	Yes: 20/11/24	No:	2.5 hours, 2 people	No	No

Table 20. Threatened species surveys for candidate fauna species credit species on the Subject Land

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period?** (BAM-C / TBDC)	**Effort** (hours & no. people)		
Large-eared Pied Bat	*Chalinolobus dwyeri*	Bioacoustics	Yes: January 2025	Four devices deployed for six nights, with the four nights with the most call activity analysed; 13/01/2025-19/01/2025) (Lachlan McRae Fauna Services 2025).	Yes	Yes. This species was identified as occurring within the Subject Property using Anabats (Acoustic detection recorders) and analysed by Lachlan McRae Fauna Services (2025).

5.4 Expert Reports

No Expert Reports were relied upon to produce this report.

5.5 More Appropriate Local Data

No additional local data has been used to assess habitat suitability.

5.6 Area or Count, and Location of Suitable Habitat for a Species Credit Species (A Species Polygon)

Where a Species credit species is confirmed present or assumed to be present within the Subject Land, the assessor must assign species polygon that encompasses the entire vegetation zone(s) within which the candidate species is predicted to occur based on the correct application of the BAM (DPIE 2020a). The species polygons for the Subject Land are presented **Appendix D.**

One Species Credit Species is present within the Subject Land (**Table 21;Table 22**).

Table 21. Results for present species (recorded within the Subject Land)

Common name	Scientific name	Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Habitat condition (vegetation integrity score for each vegetation zone in the polygon – area species only)
Large-eared Pied Bat	*Chalinolobus dwyeri*	3	Yes	All habitat on the subject land where the subject land is within 2km of	N/A	0.02	-	47.6

				caves, scarps, cliffs, rock overhangs and disused mines.				

Table 22. Results for EPBC Act listed species present (recorded within the Subject Land)

Common name	**Scientific name**	**Abundance – No. individual plants present on subject land** (flora with unit of measure as count)	**Extent (ha) of suitable habitat present on site** (flora or fauna with unit of measure as area)
Large-eared Pied Bat	*Chalinolobus dwyeri*	N/A	0.02

6. Identifying Prescribed Impacts

This chapter of the report details the type and extent of impacts to biodiversity that will occur as a result of the proposed development (**Table 23**). Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the BOS, as per clause 6.1 of the BC Regulation. Such prescribed impacts (including direct and indirect impacts) are impacts:

a. on the habitat of threatened entities including:

i. karst, caves, crevices, cliffs, rocks and other geological features of significance, or

ii. human-made structures, or

iii. non-native vegetation

b. on areas connecting threatened species habitat, such as movement corridors

c. that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)

d. on threatened and protected animals from turbine strikes from a wind farm

e. on threatened species or fauna that are part of a TEC from vehicle strikes.

If relevant, these features must be identified on a map.

Table 23. Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.	Describe how these features provide habitat for, or are used by, each threatened entity
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☒Yes / ☐No	The Subject Property and the surrounds are steeply sloped with remnant vegetation characteristic of shale-rich geology with minor sandstone outcropping. No overhangs or outcropping were found however within the Subject Land.	Ecosystem Credit Microbats	The size and nature of the sandstone outcropping at the rear of the Subject Property (western portion) were not considered substantial enough to support a roosting or breeding colony of any of the cave-dwelling microbats.
Human-made structures	☒Yes / ☐No	Although human-made structures (which were in poor condition) exist within the Subject Property, no structures were considered highly suitable for breeding habitat for microbats species. The only structures to be directly impacted (ie. Demolished) are the existing carport and entrance path which are not considered likely to contribute to a prescribed impact on any species.	N/A	N/A
Non-native vegetation	☒Yes / ☐No	The Subject Land is infill planted by exotic ornamental species and	All Ecosystem Credit Species	Threatened species may forage within and around this non-native vegetation.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.	Describe how these features provide habitat for, or are used by, each threatened entity
		infested with invasive weed species.		
Habitat connectivity	☒Yes / ☐No	The Subject Property occurs in an urban landscape characterised by residential dwellings. Despite its urban situation, the Subject Property and surrounding locality contains a network of terrestrial habitat connections associated with the native remnant canopy of the locality. A habitat corridor runs through the Subject Property.	All Ecosystem Species Credits PWSGF EEC Large-eared Pied Bat	This corridor contributes foraging habitat and a fly-way corridor, providing resource and genetic connectivity between bushland fragments across the landscape. PWSGF EEC benefits from species diversity and propagules.
Waterbodies, water quality and hydrological processes	☐Yes / ☒No	No waterbodies occur within the Subject Land. The Subject Land occurs approximately 150m away from a waterbody (Pittwater) which may provide habitat to threatened species.	N/A	Threatened species may forage within and around the nearby waterbody. No waterbody is expected to be impacted by the proposed development.
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	N/A	N/A	N/A
Vehicle strikes	☐Yes / ☒No	The proposed works include a driveway and a turning bay. The Subject Land currently has an existing driveway therefore the land use will not significantly change and is therefore unlikely to adversely impact any threatened species as the Subject Land is in a residential area with an existing residential dwelling and surrounded by roads.	N/A	N/A

Stage 2: Impact Assessment (Biodiversity Values and Prescribed Impacts)

7. Avoid and Minimise Impacts

7.1 Avoid and Minimise Direct and Indirect Impacts

7.1.1 Project Location

The proposed development has been located to avoid and minimise indirect impacts on biodiversity values of the property in keeping with the purposeful use of the Subject Land. A carport and driveway are being proposed for an existing dwelling within an urbanised residential area surrounded by roads. No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. No important breeding habitat for any SAII species will be removed for the proposed development.

7.1.2 Project Design

The proposed development proposes to utilise the existing residential entrance to minimise vegetation removal. Additionally, the proposed development will minimise vegetation clearing by positioning the Subject Land on the existing driveway and car space. Two trees are proposed for retention within the Subject Land and '*trees located on adjoining land and will not be subject to encroachment*' (Hugh The Arborist 2024). No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. This retained vegetation, including native remnant *Corymbia maculata* and *Syncarpia glomulifera*, will maintain the integrity of the habitat corridor which runs through Subject Property. 'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure. The proponent has stated that a detailed landscape design/plan will be provided prior to the commencement of construction, upon DA approval. 80% of new plantings in the landscaping planting scheme, will consist of native vegetation belonging to the PWSGF EEC. Furthermore, trees will be replaced at a 1:1 ratio, with one tree planted for every tree removed. New tree plantings will also be representative of Pittwater Spotted Gum Endangered Ecological Community.

7.2 Avoid and Minimise Prescribed Impacts

7.2.1 Project Location

Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas as detailed (**Table 24**). When selecting the proposal's location, all of the following have been analysed.

Table 24. Measures to locate the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat

How has the proposal has been located in areas lacking biodiversity values?	The proposed development proposes to utilise the existing entrance to minimise vegetation removal. Additionally, the proposed development will minimise vegetation clearing by positioning the Subject Land on the existing driveway and car space. The Subject Land is located on a weed-infested urbanised patch of PWSGF EEC. No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. This retained vegetation at the rear of the property, including native remnant *Corymbia maculata* and *Syncarpia glomulifera*, will maintain the integrity of the habitat corridor which runs through Subject Property. The habitat corridor will continue to allow natural regeneration, seed dispersal and genetic diversity to continue to occur across the landscape. No hollow-bearing tree and no important breeding habitat for any SAII species will be directly impacted by the proposed development.

How has the proposal has been located in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low vegetation integrity score)?	The understorey vegetation across the Subject Property is disturbed by historical management including infill plantings with exotic ornamental species. The proposed development will remove 10 native trees while retaining two trees within the Subject Land. A large portion of vegetation will remain within the Subject Property particularly at the rear of the property (western portion) (Hugh The Arborist 2024).
How does the proposal avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.	The entirely of the Subject Property is mapped as containing Terrestrial Biodiversity (Pittwater LEP 2014) and portions of the Subject Land are mapped as containing 'Biodiversity Values' (NSW DCCEEW 2024f). No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. This retained vegetation at the rear of the property, including native remnant *Corymbia maculata* and *Syncarpia glomulifera*, will maintain the integrity of the habitat corridor which runs through Subject Property. The habitat corridor will continue to allow natural regeneration, seed dispersal and genetic diversity to continue to occur across the landscape. The Subject Land has been located to retain two trees. Retained trees will be protected in accordance with Hugh The Arborist (2024). No important breeding habitat to any species with a high biodiversity risk weighting is likely to be significantly impacted by the proposed development.
Has the proposal been located outside of the buffer area around breeding habitat features such as nest trees or caves?	No important breeding habitat (hollow bearing trees, nests or caves) for any SAII species will be directly impacted by the proposed development.
Has the proposal sought alternative:	
• **modes or technologies that would avoid or minimise impacts on biodiversity values**	'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure.
• **routes that would avoid or minimise impacts on biodiversity values**	A carport and driveway are being proposed for an existing dwelling within an urbanised residential area surrounded by roads. The proposed development proposes to utilise the existing entrance to minimise vegetation removal. Additionally, the proposed development will minimise vegetation clearing by positioning the Subject Land on the existing driveway and car space.
• **locations that would avoid or minimise impacts on biodiversity values**	The understorey vegetation across the Subject Property is disturbed by historical vegetation management including infill plantings with exotic ornamental species. The proposed development will remove 10 native trees while retaining two trees within the Subject Land and a large portion of vegetation will remain within the Subject Property particularly at the rear of the property (western portion) (Hugh The Arborist 2024). No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. This retained vegetation, which includes native remnant *Corymbia maculata* and *Syncarpia glomulifera*, will maintain the integrity of the habitat corridor which runs through Subject Property.
• **sites within a property on which the proposal is located that would avoid or minimise impacts**	The Subject Land has been located to retain two trees. Retained trees will be protected in accordance with Hugh The Arborist (2024). No important breeding habitat to any species with a high biodiversity risk weighting is likely to be significantly impacted by the proposed development. 'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By

on biodiversity values.	utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure.
Detail the site constraints that have contributed to selecting this location	
• **bushfire protection requirements, including clearing for asset protection zones**	The Subject Property does not contain 'Bushfire Prone Land' (NSW DCCEEW 2024g).
• **flood planning levels**	The Subject Property does not contain any land mapped on the Flood Planning Map.
• **servicing constraints.**	The proposed development has been located adjacent to existing residential dwellings. The proposed development will utilise the existing roads, and council services (e.g. rubbish collection).

7.2.2 Project Design

This BDAR documents the reasonable measures taken by the proponent to avoid or minimise clearing of native vegetation and threatened species habitat during proposal design, including placement of temporary and permanent ancillary construction and maintenance facilities (**Table 25**).

The proposed development has been designed to avoid and minimise avoid significant prescribed impacts on any threatened entities.

Table 25. Design the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat

Efforts to reduce the proposal's clearing footprint by minimising the number and type of facilities	The proposed development has been designed to limit the vegetation disturbance by utilising the existing entrance and positioning the Subject Land on where an existing driveway and car space currently exists.
Efforts to locate ancillary facilities in areas that have no biodiversity values	The Subject Land is located on a weed-infested urbanised patch of PWSGF EEC. The understorey vegetation across the Subject Land is disturbed by historical vegetation management including infill plantings with exotic ornamental species. The Subject Land has been located to retain two trees. Retained trees will be protected in accordance with Hugh The Arborist (2024). No important breeding habitat to any species with a high biodiversity risk weighting is likely to be significantly impacted by the proposed development. No works are proposed at the rear (western portion) of Subject Property. This retained vegetation which includes native remnant *Corymbia maculata* and *Syncarpia glomulifera*, will maintain the integrity of the habitat corridor which runs through Subject Property. This vegetation is likely of greatest vegetation integrity on the property.

Efforts to locate ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores)	The Subject Land is located on a weed-infested urbanised patch of PWSGF EEC. The understorey vegetation across the Subject Land is disturbed by historical vegetation management including infill plantings with exotic ornamental species. Vegetation clearing will be limited to 0.02 ha. The Subject Land has been located to retain two trees. Retained trees will be protected in accordance with Hugh The Arborist (2024). No important breeding habitat to any species with a high biodiversity risk weighting is likely to be significantly impacted by the proposed development. No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. This retained vegetation which includes native remnant *Corymbia maculata* and *Syncarpia glomulifera*, will maintain the integrity of the habitat corridor which runs through Subject Property. This vegetation is likely of greatest vegetation integrity on the property.
Efforts to locate ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII)	The clearing of PWSGF EEC which is an SAII entity within the Subject Land will be limited to the removal approximately 0.02 ha of vegetation including 10 native trees. The vegetation to be removed occurs as a disturbed, weed infested form of this EEC. 'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation belonging to PWSGF EEC may be retained below the structure. No important habitat for threatened species at risk of SAII occurs within the Subject Land or will be significantly impacted by the proposed development.
Actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation belonging to PWSGF EEC may be retained below the structure. The proponent has stated that a detailed landscape design/plan will be provided prior to the commencement of construction, upon DA approval. 80% of new plantings will consist of native vegetation belonging to Pittwater Spotted Gum Endangered Ecological Community. Furthermore, trees will be replaced at a 1:1 ratio, with one tree planted for every tree removed. New tree plantings will also belong to PWSGF EEC. Retained trees will be protected in accordance with Hugh The Arborist (2024). These actions will aid ecological restoration of this TEC, provide additional habitat to species and further provide habitat corridor linkage for fauna.

8. Impact Assessment

8.1 Direct Impacts

Residual direct impacts from the proposed development are presented in **Table 26.** Changes in vegetation integrity scores as a result of the proposed development presented in **Table 27.**

8.1.1 Residual Direct Impacts

An assessment of residual direct impacts is detailed in **Table 26.**

Table 26. Summary of residual direct impacts

Direct impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha, number of individuals)
PCT:3234 Hunter Coast Lowland Spotted Gum Moist Forest	Endangered Ecological Community	-	Yes	Construction, Operation	0.02 ha
Ecosystem Credit Species	Vulnerable, Endangered, Critically Endangered	Vulnerable, Endangered, Critically Endangered	No	Construction, Operation	0.02 ha of foraging habitat
Large-eared Pied Bat/*Chalinolobus dwyeri*	Endangered	Endangered	Yes	Construction, Operation	0.02 ha of foraging habitat

8.1.2 Change in Vegetation Integrity Scores

The change in VIS caused by the development in summarised in **Table 27**.

Figure 12 depicts the location of specific vegetation impacts including limited impacts to native canopy overhanging the existing dwelling and car space, however given the small area, it was not feasible to divide the impacts into separate management zone. As such, for clarity and to ensure that all impacts have been adequately offset, all impacts to vegetation have been assessed assuming complete loss of understorey vegetation and the complete removal of 10 native trees (i.e. a future VI score of 3.8).

Table 27. Impacts to vegetation integrity

Vegetation zone	PCT ID	Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
Infill Planted	3234	N/A	0.02	68.8	20.3	77	47.6	0.3	1.5	36.3	3.8	-43.8

8.2 Indirect Impacts

This section of the report details the Indirect Impacts of the development that require address (**Table 28**).

Table 28. Summary of residual indirect impacts

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
(a) inadvertent impacts on adjacent habitat or vegetation	PWSGF EEC All Ecosystem Credit species Large-eared Pied Bat	Vegetation adjacent to Subject Land	During Construction	Long-term	Construction, Operation	Tree protection zones and protective fencing will minimise the potential for clearing of adjacent vegetation and vegetation to be retained in the Subject Land (Hugh The Arborist 2024). In the unlikely event retained vegetation is cleared it is unlikely that this would cause significant impacts to threatened ecological communities or threatened species.
(b) reduced viability of adjacent habitat due to edge effects	PWSGF EEC All Ecosystem Credit species Large-eared Pied Bat	Vegetation adjacent to Subject Land	During Construction	Long-term	Construction, Operation	The Subject Land and the surrounding vegetation is already edge-effected including weed-infestation due to its situation in an urbanised locality surrounded by roads. The proposed development is unlikely to introduce novel edge effects. As the use of the land will remain the same (residential dwelling) it is unlikely that edge effects would significantly increase beyond the status quo.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	PWSGF EEC All Ecosystem Credit species Large-eared Pied Bat	Vegetation retained within the Subject Land and adjacent vegetation	During Construction and Ongoing	Long-term	Construction, Operation	The proposed development may result in the increase of noise, dust or light spill associated with the construction activities and operation of the residential dwelling. However, the Subject Property is already impacted in these ways by existing residential dwellings in the suburb of Avalon Beach. The proposed development is unlikely to exacerbate this reality beyond the current condition.
(d) transport of weeds and pathogens from the site to adjacent vegetation	PWSGF EEC All Ecosystem Credit species	Vegetation retained within the Subject Land and adjacent vegetation	During Construction and Ongoing	Long-term	Construction, Operation	The proposed development will result in soil disturbance on the Subject Land which may result in the propagation and spread of weed seeds from the soil bank to adjacent native vegetation. The Subject Property and adjacent vegetation outside the property is already weed infested. The proposed development is unlikely to significantly alter this reality.

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
(e) increased risk of starvation, exposure and loss of shade or shelter	PWSGF EEC All Ecosystem Credit species	Vegetation retained within the Subject Land and adjacent vegetation	During construction and Ongoing	Short-term, Possible long-term	Construction, Operation	The proposed development will remove vegetation that may reduce shelter and increase the risk of exposure. This is unlikely to have a significant impact on any fauna. No hollow bearing trees or stick nests were identified within the Subject Land. Shade and shelter will continue to occur in surrounding vegetation.
(f) loss of breeding habitats	Threatened Microbats All Ecosystem Credit species	The habitat within the Subject Land including the artificial structures is unlikely to provide suitable breeding habitat to threatened microbats.	During construction and Ongoing	Long term	Construction, Operation	No habitat within the Subject Land is considered likely to form suitable breeding habitat for threatened microbats. No hollow bearing trees or stick nests were identified within the Subject Land. As such the proposed development is unlikely to significantly reduce availably of suitable breeding habitats.
(g) trampling of threatened flora species	N/A	N/A	N/A	N/A	N/A	No threatened flora is known or considered likely to occur within the Subject Land.
(h) inhibition of nitrogen fixation and increased soil salinity	PWSGF EEC	Vegetation retained within the Subject Land and adjacent vegetation	During construction and Ongoing	Long-term	Construction, Operation	The proposed development will remove a small area of nitrogen fixing vegetation however this is unlikely to substantially exacerbate the status quo in this urbanised locality. Soil salinity is not a significant issue in this part of Sydney and is unlikely to be adversely impacted by the proposed development.
(i) fertiliser drift	PWSGF EEC	Vegetation retained within the Subject Land and adjacent vegetation	During construction and Ongoing	Long-term	Construction, Operation	The use of fertiliser within residential gardens is likely to negligibly increase as a result of the proposed development. The Subject Property is already impacted by fertiliser drift from surrounding urban gardens. The proposed development is unlikely to significantly alter this reality.
(j) rubbish dumping	PWSGF EEC All Ecosystem Credit species	Vegetation retained within the Subject Land and adjacent vegetation	During construction and Ongoing	Short-term, Possible long-term	Construction, Operation	The Subject Land is in a disturbed, urbanised setting with an existing residential dwelling. The proposed development may result in the temporary stockpiling of construction material/waste on adjacent land. The proposed development is unlikely to disturb the adjacent habitat significantly in this way.
(k) wood collection	N/A	N/A	N/A	N/A	N/A	The proposed development is unlikely to increase the prevalence of wood collection.

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
(l) bush rock removal and disturbance	N/A	N/A	N/A	N/A	N/A	The proposed development is unlikely to increase the prevalence of bush rock removal or disturbance.
(m) increase in predatory species populations	N/A	N/A	N/A	N/A	N/A	The Subject Property is already likely to support a population of predatory species. The proposed development is unlikely to increase the prevalence of predatory species population.
(n) increase in pest animal populations	N/A	N/A	N/A	N/A	N/A	The Subject Property is already likely to be visited by feral predatory pests such as foxes and cats. The proposed development is unlikely to increase the prevalence of pest species population.
(o) increased risk of fire	N/A	N/A	N/A	N/A	N/A	The Subject Land is in a highly disturbed, urbanised setting. The proposed development will remove vegetation from the Subject Land and reduce the risk of fire.
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	N/A	N/A	N/A	N/A	N/A	No specialist breeding habitat occurs in or near the Subject Land and will be impacted by the proposed development.

8.3 Prescribed Impacts

This section of the report addresses impact mitigation measures for prescribed impacts.

8.3.1 Karst, caves, crevices, cliffs, rocks or other geological features of significance

Not applicable.

8.3.2 Human-made structures

Not applicable.

8.3.3 Non-native vegetation

Impacts from the development upon threatened species or fauna habitat associated with non-native vegetation are detailed in **Table 29**.

Table 29. Residual prescribed impacts – impacts to non-native vegetation

Nature	Threatened fauna or flora protected fauna that are at risk	SAII entities at risk	Likelihood	Extent	Duration	Consequences
The Subject Land is infill planted by exotic ornamental species and infested with invasive weed species.	PWSGF EEC All Ecosystem Credit Species	PWSGF EEC	High	A total of 0.02 ha of mixed native/exotic vegetation will be removed for the proposed development.	This impact will be permanent.	Threatened species may forage within and around this non-native vegetation. This foraging habitat will be impacted by the proposed development. Other suitable foraging habitat will continue to occur within the Subject Property and within the locality.

8.3.4 Habitat connectivity

Impacts from the development upon habitat connectivity are detailed in **Table 30**.

Table 30. Residual prescribed impacts – impacts to habitat connectivity

Nature	Threatened fauna or flora protected fauna that are at risk	SAII entities at risk	Likelihood	Extent	Duration	Consequences
The Subject Property occurs in an urban landscape characterised by residential dwellings. Despite its urban situation, the Subject Property and surrounding locality contains a network of terrestrial habitat connections. Mature canopy within the Subject Property acts as connectivity between remnant canopy trees within the locality and habitat for fauna as they travel between significant vegetation corridors and throughout Avalon Beach.	PWSGF EEC All Ecosystem Credit Species	PWSGF EEC	Low	A total of 0.02 ha of infill planted, weed-infested vegetation will be removed including ten trees from the Subject Land. The loss of these trees will impact upon habitat connectivity.	This impact will be permanent.	The proposed development will not substantially alter habitat connectivity across the Subject Property or landscape. While some habitat will be removed, this will not prevent access to surrounding habitat owing to the small development footprint and the retention of mature native canopy trees at the rear (western portion) of the Subject Property (**Figure 9**). This portion of remnant canopy and the retained vegetation within the Subject Property will continue to provide a habitat corridor post development.

8.3.5 Waterbodies, water quality and hydrological processes

Not applicable.

8.3.6 Wind turbine strikes

Not applicable.

8.3.7 Vehicle strikes

Not applicable.

8.4 Mitigating residual impacts – management measures and implementation

This section of the report provides mitigation measures for residual impacts (**Table 31**) and detail regarding monitoring, performance and adaptive management of those measures (**Table 32**).

Table 31. Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)
Project Location	The development footprint has been designed for the purposeful use of the Subject Land within an urbanised locality. A carport and driveway are being proposed for an existing dwelling within an urbanised residential area surrounded by roads. The proposed development proposes to utilise the existing entrance to minimise vegetation removal. Additionally, the proposed development will minimise vegetation clearing by positioning the Subject Land on the existing driveway and car space.	Pre-construction phase	Once	Proponent	High
Project Design	No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. This retained vegetation, will maintain the integrity of the habitat corridor which runs through Subject Property. 'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure.	Pre-construction phase	Once	Proponent	High
Project Planning	The proponent will prepare a Construction Environmental Management Plan (CEMP) to manage construction activity.	Pre-construction phase	Once	Proponent Engineer Ecologist	High

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)
Assigning a Project Ecologist	Prior to construction, the proponent will commission the services of a qualified and experienced Ecologist Consultant (>3 years of experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management. The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act. The Ecologist must be a member of the NSW Ecological Consultants Association. The Ecologist will be commissioned to: • Assist the proponent in identifying and assigning an appropriate skilled bushland restoration professional to implement vegetation planting/restoration; • Help the proponent undertake any Threatened species habitat augmentation or translocation. • Provide staff training and site briefing to communicate environmental features to be protected and measures to be implemented. • Ecologist to conduct a pre-clearing survey of vegetation and structures to be demolished and supervise the clearing of all native vegetation and assist within the translocation of any protected fauna	Prior and during vegetation clearance works	Once	Proponent	Moderate
Erosion and Sedimentation	Appropriate erosion and sediment controls must always be erected and maintained during construction in order to avoid the potential of incurring impacts on biodiversity values. At a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Construction phase	Ongoing	Proponent Construction Contractor	Moderate

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)
Tree Protection	All trees to be retained must be protected in accordance with *Australian Standard - Protection of Trees on Development Sites (AS-4970-2009)*, which outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. It is an area isolated from construction disturbance so that the tree remains viable. Works will be avoided within the TPZ of any trees located outside of the development site that require retention. This includes trees on neighbouring properties. TPZs and tree protection measures are detailed in Hugh The Arborist (2024) *Arboricultural Impact Assessment Report* and must be enforced accordingly.	Prior to vegetation clearance works	During Construction	Project Arborist	Moderate
Storage and Stockpiling (Soil and Materials)	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	During construction	Construction Contractors	Moderate
Mitigating effects of Light Spill	Lighting will be minimised to wherever it is required. Lighting will be turned off at designated times in the evening to reduce impacts of light spill on biodiversity and the environment. Diurnal timing of construction and operational activities will reduce impacts of light spill. Lighting will not be utilised at night.	Prior and Post construction.	Ongoing	Proponent Construction Engineer Architect Contractors	Moderate
Mitigating effects of Construction Noise	All noise will be limited to standard daylight working hours 6am-6pm Monday to Friday, 7am-1pm Saturday. No work on Sunday.	Prior and During Construction	During construction	Proponent Construction Engineer Architect Contractors	Moderate
Revegetation works	The proponent has stated that a detailed landscape design/plan will be provided prior to the commencement of construction, upon DA approval. Tree's will be replaced at a 1:1 ratio (one tree planted for every tree removed). New tree plantings will belong to Pittwater Spotted Gum Endangered Ecological Community (as per species found on the site or listed in Pittwater Spotted Gum Endangered Ecological Community). The proponent has stated that details and locations	Pre Construction	Ongoing	Proponent Arborist Landscape contactor	Moderate

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)
	of these tree replacement's will be provided in the landscape plan. Additionally, the landscape planting scheme will ensure 80% of new plantings consist of native vegetation belonging to Pittwater Spotted Gum Endangered Ecological Community (as per species found on the site or listed in Pittwater Spotted Gum Endangered Ecological Community).				

Table 32. Implementation of the mitigation and management measures

Measure/action	Monitoring and evaluation strategy (Data, frequency, timing and reporting)	Performance criteria (linked to monitoring and evaluation strategy)	Adaptive management threshold (trigger for adaptive management plan/actions)	Adaptive management response (when triggered)
Assigning a Project Ecologist	Project Ecologist to be engaged by proponent. Ecologist to conduct a pre-clearing survey for any sensitive fauna, breeding fauna, or threatened species in the Subject Property. No less than 48 hours prior to clearing commencing.	Assigned Project Ecologist to prepare an '*Ecologist Pre-clearing Report*' to detail findings of the pre-clearing survey.	If a tree hollow, microbat, nesting, sensitive, or threatened fauna or flora is found, the Ecologist will prepare a strategy to maximise likelihood of safe relocation.	Relocate sensitive fauna, or threatened entity. If a tree hollow is found, instruct an Arborist to carefully remove the hollow sections of the tree and prepare excised hollows for re-install within the Subject Land or Property.
Tree Protection	Project Arborist (as per Hugh The Arborsit 2024) to be engaged by proponent. Tree protection fencing to be installed around any retained trees and other native vegetation to prevent such trees/vegetation being impacted by the proposed excavation or construction.	Project Arborist to supervise the installation of tree protection fencing. Arborist to provide letter with photographic evidence to confirm appropriate controls have been installed.	If any trees that have not been approved for clearing are accidentally cleared/harmed, or excavation works occur within the 'drip zones' or structural root zones of trees that are to be retained on the Subject Property or neighbours property.	Stop works immediately. Qualified Consulting Arborist must be present to supervise any excavation works and provide advice to ensure such works do not harm trees on adjacent properties. The Project Ecologist will work with the Arborist to restore the vegetation cleared.
Erosion and Sedimentation	Appropriate Erosion and Sedimentation Controls informed by the Blue Book (Landcom 2004) to be included in a Construction Environmental Management Plan (CEMP) commissioned by the proponent.	Minimum industry standards enforced prior to and during earthworks, clearing and construction.	If controls are not properly installed, or fail.	Engage Earthworks Contractor, Civil or Environmental Engineer to install appropriate controls within 24 hours of the breach.
Storage and Stockpiling	All storage and stockpiling of construction resources must be in appropriate laydown areas away from	No inadvertent impacts (harm) to trees, habitat or other vegetation.	Inadvertent impacts (e.g. accidental felling of trees or vegetation not approved for clearing) occur to	Review controls and implement new measures. Restore the vegetation impacted

Measure/action	Monitoring and evaluation strategy (Data, frequency, timing and reporting)	Performance criteria (linked to monitoring and evaluation strategy)	Adaptive management threshold (trigger for adaptive management plan/actions)	Adaptive management response (when triggered)
	the dripline of trees that will be retained. Ensure tree and vegetation protection fencing is installed around trees /vegetation that must be protected on retained vegetation and vegetation outside the development footprint.		adjacent vegetation as a result of improper management of construction materials.	under the guidance of the Project Ecologist.
Management of Light, Noise and Dust from Construction	Restrict construction to daylight hours. Manage dust, erosion and runoff in accordance with the provisions of 'The Blue Book' (Landcom 2004). Limit the unnecessary use of flood lighting.	Control measures implemented.	Control measures ineffective, resulting in disturbance to protected flora or fauna, or disturbance to nearby landholders.	Review controls and implement new measures under guidance of Construction Contractor to adequately mitigate impacts.
Revegetation works	The proponent has stated that a detailed landscape design/plan ensuring council requirements are met, will be provided prior to the commencement of construction, upon DA approval. Tree's will be replaced at a 1:1 ratio and belong to Pittwater Spotted Gum Endangered Ecological Community Additionally, the landscape planting scheme will ensure 80% of new plantings consist of native vegetation belonging to Pittwater Spotted Gum Endangered Ecological Community. Project Ecologist, Project Arborist and Landscape architect to approve the proposed landscape plan prior to implementation.	Greater than 90% of plantings survive. 100% of tree survival rate.	Less than 90% of plantings have survived. Replacement trees have perished.	A watering schedule will need to be implemented. Any replacement tree's which have perished will require subsequent replacement to comply with councils DCP requirement of no 'significant onsite loss of canopy cover' and must belong to belong to Pittwater Spotted Gum Endangered Ecological Community.

8.5 Adaptive management strategy for uncertain impacts

'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure. However, impacts to this vegetation are unpredictable and uncertain both from the short-term excavation works and long-term effects such as lighting, hydrology, nutrient cycling, leaf litter etc. As such the precautionary principle was adopted and all the vegetation under the proposed suspended carport and driveway were assessed as 'removed' under the BAM Calculator (DPIE 2020a) and the effects of its removal on biodiversity was assessed within this report.

No other uncertain impacts are anticipated as a result of the proposed development.

9. Serious and Irreversible Impacts

9.1 Assessment for serious and irreversible impacts on biodiversity values

The determination of a serious and irreversible impact on biodiversity values is to be made by the decision-maker in accordance with the principles set out in the BC Regulation.

To assist the decision-maker, the document Guidance to assist a decision-maker to determine a serious and irreversible impact (SAII) includes criteria that enable the application of the four principles set out in clause 6.7 of the BC Regulation to identify the species, populations and ecological communities that are likely to be at risk of SAIIs.

There are two Serious and Irreversible Impact (SAII) entity that may be impacted by the proposed development (**Table 33**):

- Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (PWSGF) Endangered Ecological Community (EEC)
- *Chalinolobus dwyeri* (Large-eared Pied Bat) Endangered (BC Act) (EPBC Act)

Due to the potential sensitivity of PWSGF EEC and the Large-eared Pied Bat (*Chalinolobus dwyeri)*, a determination of whether or not the proposed impacts are serious and irreversible is to be undertaken in accordance with section 9.1 of the BAM (OEH 2020a). There are no prescribed impact thresholds for these entities. This means that any impact could be considered 'serious and irreversible'. Due to the potential sensitivity of these entities to any impact on habitat, a determination of whether or not the proposed impacts are serious and irreversible is to be undertaken in accordance with section 3.2 of the 'Guidance to assist a decision-maker to determine a serious and irreversible impact' (OEH 2017a) (**Table 33**)

It is considered unlikely that the proposed development will cause a serious and irreversible impact (SAII) to PWSGF EEC and the Large-eared Pied Bat (*Chalinolobus dwyeri)* however the final determination of whether an impact is serious and irreversible lies with the consent authority, Northern Beaches Council.

Table 33. SAII Entities Impacted by the Development

Common name	Scientific name	Reason for inclusion in assessment
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion Ecological Community	*Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal
Large-eared Pied Bat	*Chalinolobus dwyeri*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal

Table 34. Serious and Irreversible Impact Assessment for Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion

Serious and Irreversible Impact (SAII) **Impact assessment provisions for ecological communities:** Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	
BC Act Status: Endangered Ecological Community	
a) the action and measures taken to avoid the direct and indirect impact on	The proposed development will impact vegetation belonging to PWSGF EEC, but it does minimise direct impacts through design and planning. The proposed development proposes to utilise the existing entrance to minimise vegetation removal. Additionally, the proposed

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	
the potential entity for a SAII	development will minimise vegetation clearing by positioning the Subject Land on the existing driveway and car space. Two trees are proposed for retention within the Subject Land and '*tree's located on adjoining land and will not be subject to encroachment*' (Hugh The Arborist 2024). Indirect impacts to adjacent vegetation are unlikely to be significant and will be effectively avoided and minimised through the measures detailed in this BDAR. The vegetation (approximately 0.02 ha) to be removed is not considered of high ecological importance as it is weed-infested and degraded by infill plantings and historical management. No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. This retained vegetation, including native remnant *Corymbia maculata* and *Syncarpia glomulifera*, will maintain the integrity of the habitat corridor which runs through Subject Property. 'Suspended concrete slabs' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure. All plantings and all landscaping works for the proposed development are recommended to include at least 80% of species belonging to Pittwater Spotted Gum Ecological Community.
b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone	A total area of 0.02 ha of PWSGF EEC will be directly impacted/cleared within the Subject Land. This vegetation while occurring in an urbanised locality, is weed-infested and degraded by infill plantings and historical management. This is reflected in the moderate VI score of 47.6.
c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SAII	Thresholds for ecological communities have not yet been determined by DCCEEW. A total area of 0.11 ha of PWSGF EEC occurs on the Subject Property. This vegetation occurs in one zone across the Subject Land (Infill Planted) which has a current VI score of 47.6.
d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint	The NSW Office of Environment and Heritage (OEH 2016c) '*The Native Vegetation of the Sydney Metropolitan Area*' was used to determine the extent of this EEC within the area surrounding the Subject Land. This resource identified 139.97 ha of PWSGF EEC within the 1000 ha area and 380.63 ha of PWSGF EEC within the 10, 000 ha area, though much of this buffer area is covered by water (**Figure 13**). The condition of these remnants is expected to be low to moderate, with the majority of it occurring as remnant trees over a modified understorey.
e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration	The Final Determination for this EEC (NSW Scientific Committee 2013) identifies the total extant area of Pittwater and Wagstaffe Spotted Gum Forest is c. 227 ha, (Bell and Stables 2012). This is equivalent to an area of occupancy of c. 88 km2 based on 2 x 2 km grid cells. Few good quality remnant stands of this vegetation remain, with the majority of this community existing as modified woodland or remnant trees in suburban settings. The proposed development will remove 0.02 ha of this infill planted, weed-infested vegetation including 10 trees belonging to this community (Hugh The Arborist 2024). Two trees are proposed for retention within the Subject Land and '*tree's located on adjoining land and will not be subject to encroachment*' (Hugh The Arborist 2024). Indirect impacts to

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion			
	adjacent vegetation are unlikely to be significant and will be effectively avoided and minimised through the measures detailed in this BDAR. No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists.		
f) an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion	Approximately 33% of the remaining stands of the community are reserved, including approximately 47 ha in Bouddi National Park and approximately 3 ha in Brisbane Water National Park. Within Pittwater LGA (now part of the Northern Beaches Council LGA) approximately 50 ha of the community occurs in Council reserves including Stapleton Park and McKay, Crown of Newport, and Angophora bushland reserve.		
g) the development, clearing or biodiversity certification proposal's impact on:	**i.**	**abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns**	The proposed development may result in an increase in sediment, nutrients and water runoff as a result of excavation and an increase in hard surfaces within the Subject Land. However, it is unlikely that the proposed development will significantly exacerbate abiotic factors given the location of the Subject Land in a disturbed urban matrix with an existing residential dwelling and existing edge effects. The Subject Land has been impacted by historical disturbance and weed-infestation. The Subject Land is also already exposed to high levels of nutrients and runoff from surrounding residential gardens.
	ii.	**characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants**	The area of PWSGF EEC within the Subject Land is already degraded as a result of nutrient runoff, historical disturbance and weed-infestation. The removal of 0.02 ha of vegetation including 10 trees will not disrupt habitat connectivity across the Subject Property. Fire and flood regimes will be negligibly impacted owing to its suburban situation. It is therefore unlikely that the proposed development will significantly exacerbate impacts on characteristic and functionally important species as the area is already altered.
	iii.	**the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or**	The proposed development is unlikely to enhance weed infiltration into adjacent habitat by an increase in edge effects given the surrounding habitat occurs in a suburban setting impacted by garden escapees, nutrient and chemical runoff and garden maintenance activities. The abundance of invasive species within the Subject Land is already apparent.

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion		
	other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC	
h) direct or indirect fragmentation and isolation of an important area of the potential TEC	The removal of approximately 0.02 ha of vegetation including the removal of ten trees, will not directly or indirectly fragment habitat connectivity across landscape. The proposed development has been designed to retain two mature trees within the Subject Land (Hugh The Arborist 2024) and all remaining vegetation within the Subject Property. The large amount of vegetation representative of PWSGF EEC at the rear of the property (western portion), includes mature remnant canopy. This vegetation and canopy will maintain the existing habitat corridor that will allow natural regeneration, seed dispersal and genetic diversity to continue to occur across the landscape in a manner similar to the status quo. Structurally important vegetation will continue to occur across the Subject Property and the surrounding locality The proposed development will not modify this community adversely beyond its current condition in the locality.	
i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.	The proponent will contribute to the recovery of this TEC in the IBRA subregion through retiring of biodiversity offset credits. The proponent has stated that a detailed landscape design/plan will be provided prior to the commencement of construction, upon DA approval. 80% of new plantings will consist of native vegetation belonging to the Pittwater Spotted Gum Endangered Ecological Community, as per species found on the site or listed in the Pittwater Spotted Gum Endangered Ecological Community. Furthermore, trees will be replaced at a 1:1 ratio, with one tree planted for every tree removed. New tree plantings will also belong to Pittwater Spotted Gum Endangered Ecological Community. Retained trees will be protected in accordance with Hugh The Arborist (2024). This will improve the condition of this vegetation through weed management and plantings of species representative of the EEC.	

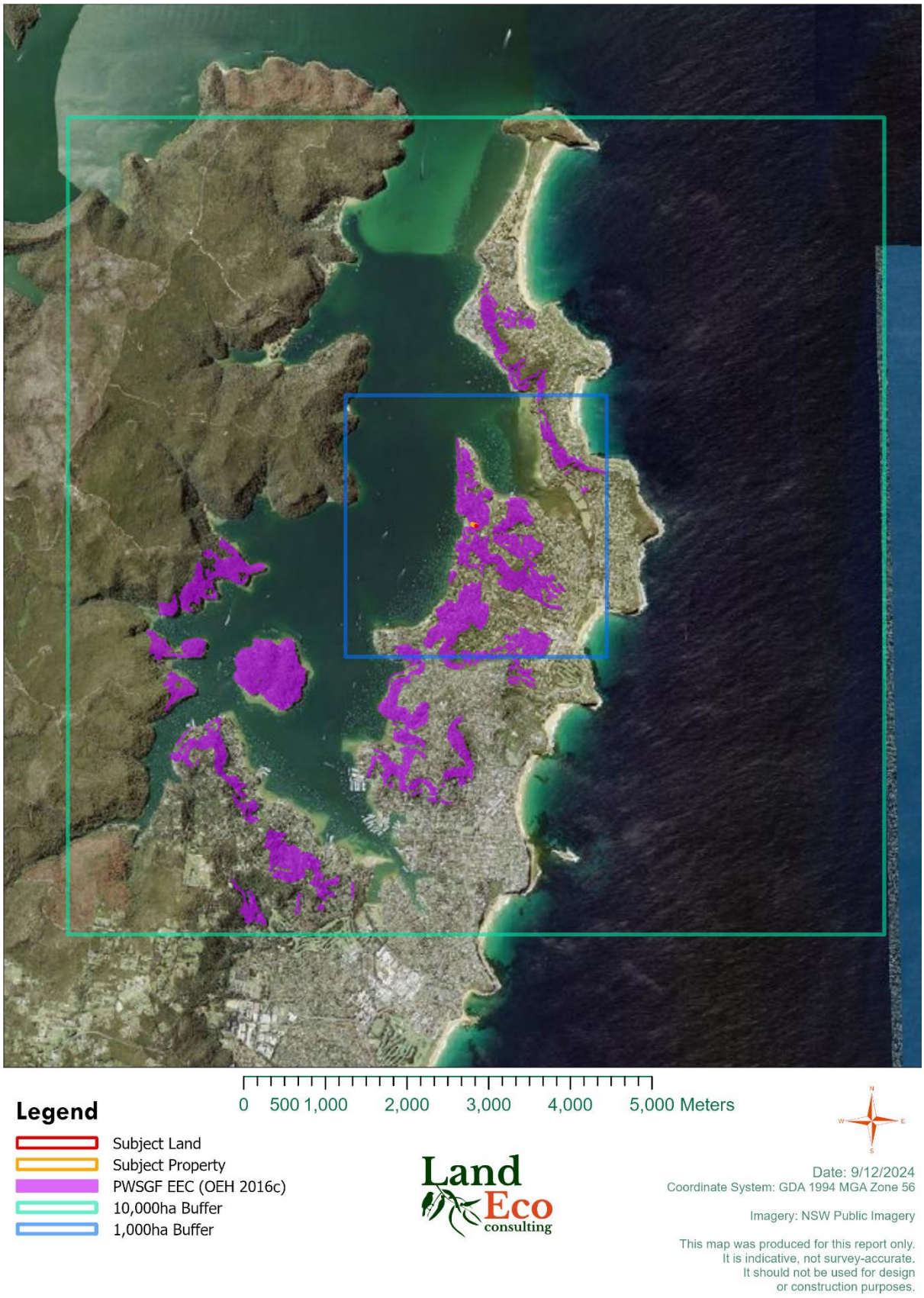

Figure 13. PWSGF within 1, 000 ha and 10, 000 ha surrounding the Subject Land

Table 35. Serious and Irreversible Impact Assessment for The Large-eared Pied Bat (*Chalinolobus dwyeri*)

Serious and Irreversible Impact (SAII) **Impact assessment provisions for Threatened Species:** **The Large-eared Pied Bat (*Chalinolobus dwyeri*)**	
BC Act Status: Endangered	
1.The assessor is required to provide further information in the BDAR or BCAR for any species at risk of an SAII, including the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAII.	
Chalinolobus dwyeri is a medium-sized insectivorous bat. The species' distribution is fragmented, as most individuals occur in small and relatively isolated subpopulations due to specific requirements for foraging and roosting habitat. A total of 0.02 ha of vegetation including 10 trees are proposed for removal/impact for the proposed development. This vegetation forms part of available foraging habitat in the locality for the *Chalinolobus dwyeri*. No suitable breeding habitat features occur within the Subject Property and as such no breeding habitat will be impacted by the proposed development.	
2.The assessor must consult the TBDC and/or other sources to report on the current population of the species including:	
a) evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:	
i)decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or	There is no robust estimate of the *Chalinolobus dwyeri* population sizes and therefore evidence of their decline can be challenging to quantitate. The geographic distribution of the species is highly restricted based on the number of known maternity roosts (AOO <500 km^2) (NSW TSSC 2024). Any impacts on breeding habitat used by this species could be considered potentially serious and irreversible (NSW DCCEEW 2024h). An example of large-scale decline is the flooding of the Copeton Dam in 1976 which destroyed the first known maternity roost of the species, likely leading to mortality and loss of habitat of many individuals in the region (NSW TSSC 2024).
ii)decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites	See above.
b) evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:	

Serious and Irreversible Impact (SAII) Impact assessment provisions for Threatened Species: The Large-eared Pied Bat (*Chalinolobus dwyeri*)	
i)an estimate of the species' current population size in NSW, and	There is no robust estimate of the *Chalinolobus dwyeri* population size, though expert estimations of the overall population have ranged from 10,000 to 20,000 individuals. Notably, the number of mature individuals would be substantially lower. The species is naturally rare, and analyses have found that it accounts for less than 1% of all bats reported across its range (Pennay 2011). In the area with its highest recorded density compared to other species, it only accounted for 6% of observations (NSW TSSC 2024)
ii) where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations	N/A
c) evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:	
i) extent of occurrence	The extent of occurrence (EOO) for the current recorded *Chalinolobus dwyeri* distribution is 276,333 km² (range 276,333–279,734 km²) and the area of occupancy (AOO) is estimated to be<500 km² (range 12–3,092 km²) based on the number of maternity roosts. The EOO and AOO are inferred to be contracting due to ongoing loss of habitat through land clearing and loss of roosting sites. The EOO was calculated using a minimum convex hull, and the AOO calculated using a 2 x 2 km grid cell method, based on the IUCN Red List Guidelines (2022) (NSW TSSC 2024).
ii) area of occupancy	See above.
iii) number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and	*Chalinolobus dwyeri* is considered to occur in 1–2 threat-defined locations based on the threat of drought to maternity roosts. Based on the widespread distribution and frequency of droughts on the eastern coast of Australia in recent times (e.g., the millennium drought), it is likely that drought could affect a large proportion of the species' distribution over a short period. Singular or multiple drought events may impact multiple maternity roosts and lead to rapid decline in both the number of mature individuals and reproductive rate. Only 3–6 of these important roost sites are currently known, and any impact of drought on these sites would have severe impacts on the local population (NSW TSSC 2024).
iv) whether the species' population is likely to undergo extreme fluctuations	There is evidence to suggest extreme fluctuations in area of occupancy for *Chalinolobus dwyeri* (NSW TSSC 2024). This is based on the small number of maternity roosts and that the extent of occurrence and area of occupancy are inferred to be contracting due to ongoing loss of habitat through land clearing and loss of roosting sites. Significant threats include habitat loss and fragmentation, adverse fire regimes, increased temperatures, increased frequency and severity of drought, and habitat disturbance by Feral Goats (*Capra hircus*) (NSW TSSC 2024).

Serious and Irreversible Impact (SAII) Impact assessment provisions for Threatened Species: The Large-eared Pied Bat (*Chalinolobus dwyeri*)	
d) evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:	
i) known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	The structure of maternity roosts appears to be very specific, and the number of known maternity roosts is small (3–6). Caves need to have indentations in the roof and be high and deep enough to allow juvenile bats to learn to fly inside. Roosting bats cluster in the indentations, which most likely allow the capture of heat. These physical characteristics are uncommon in the landscape and their scarcity poses another limiting factor in the distribution of *Chalinolobus dwyeri*. The number of maternity roosts is poorly known, and they likely occur in un-surveyed, inaccessible areas (NSW TSSC 2024).
ii) the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	The removal or impact of certain abiotic habitats particularly in proximity to maternity roosts can be detrimental to populations of this species. For example, the clearing of vegetation which provides foraging habitat, '*is likely to be particularly detrimental in the vicinity of maternity roosts, where pregnant and lactating females require close proximity to sufficient food resources to raise young* (NSW TSSC 2024)'. Additionally, *Chalinolobus dwyeri* is dependent on the presence of diurnal roosts. In areas where caves are uncommon or may not be suitable for roosting this species is known to use disused mine shafts. As such '*energy extraction and mining developments are a key threat to the species*' and the '*reopening of old, disused mine tunnels that are close to the surface would almost certainly lead to loss of roosting habitat for large-eared pied bats*' (NSW TSSC 2024). *Chalinolobus dwyeri* roosts are increasingly inhabited by Feral Goats (*Capra hircus*), which are becoming more common across the distribution. Feral Goats inhabiting roost caves is particularly prevalent in sandstone escarpment areas, where C. *dwyeri* roost for shelter This is another example of an abiotic habitat which cannot be restored or replaced. '*Bats were observed abandoning one of the few known maternity caves after it was disturbed by macropods, and suitable roosting caves in the Pilliga region have been used by Goats and other animals, which not only displaces C. dwyeri but may also prevent the species from roosting there in the future*' (NSW TSSC 2024).
iii) life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Modelling of the distribution suggests that *Chalinolobus dwyeri* requires a combination of appropriate roosting and foraging habitat. It is usually found in areas with cliffs, escarpments or rocky outcrops for roosting (typically sandstone but also rhyolite). Without both foraging and roosting habitat, the species is unlikely to occur. This is a relatively restricted combination of habitat factors, especially as the extent of woodlands on fertile soils within the known range has been greatly diminished by land clearing (NSW TSSC 2024). The structure of maternity roosts appears to be very specific, and the number of known maternity roosts is small (3–6). Caves need to have indentations in the roof and be high and deep enough to allow juvenile bats to learn to fly inside. Roosting bats cluster in the indentations, which most likely allow the capture of heat. These physical characteristics are uncommon in the landscape and their scarcity poses another limiting factor in the distribution of *Chalinolobus dwyer* (NSW TSSC 2024). It is likely that abiotic conditions such as drought could affect a large proportion of the species' distribution over a short period. 'Singular or multiple drought events may impact multiple maternity roosts and lead to rapid decline in both the number of mature individuals and reproductive rate' (NSW TSSC 2024).

Serious and Irreversible Impact (SAII) Impact assessment provisions for Threatened Species: The Large-eared Pied Bat (*Chalinolobus dwyeri*)	
3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.2(2.), the assessor must record this in the BDAR or BCAR.	
N/A	
4. In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:	
a. the impact on the species' population (Principles 1 and 2) presented by:	
i) an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and	There is no robust estimate of the *Chalinolobus dwyeri* population size, though expert estimations of the overall population have ranged from 10,000 to 20,000 individuals (NSW TSSC 2024). Within a 10km locality of the Subject Land, NSW Bionet (NSW DCCEEW 2024d) revealed 9 records. The nearest record was approximately 1 km south-east of the Subject Land. Call activity within the Subject Property was defined as 'low' according the anabat analysis (ie. Less than an average of 10 calls per night (Lachlan McRae Fauna Services 2025))
ii) an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or	The *Chalinolobus dwyeri* was recorded on 2 of the 4 anabats recorders within the Subject Property while recording over a 4 night period. Call activity within the Subject Property was defined as 'low' according the anabat analysis (ie. Less than an average of 10 calls per night (Lachlan McRae Fauna Services 2025)). There is no robust estimate of the *Chalinolobus dwyeri* population size, though expert estimations of the overall population have ranged from 10,000 to 20,000 individuals (NSW TSSC 2024). The highest estimated number of individuals on the site is therefore <0.01% of the estimated population size. Therefore, the highest estimated number of individuals to be impacted by the proposed development is <0.01% of the estimated population size.
iii) if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal	N/A
b. impact on geographic range (Principles 1 and 3) presented by:	

Serious and Irreversible Impact (SAII) **Impact assessment provisions for Threatened Species:** **The Large-eared Pied Bat (*Chalinolobus dwyeri*)**	
i) the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW	The extent of occurrence (EOO) for the current recorded *Chalinolobus dwyeri* distribution is 276,333 km² (27633300 ha). The area to be impacted by the proposed development is 0.02 ha. As such <0.01% of this species geographic range is to be impacted by the proposal.
ii) the impact on the subpopulation as either: **all individuals will be impacted (subpopulation eliminated);** **OR impact will affect some individuals and habitat;** **OR impact will affect some habitat, but no individuals of the species will be directly impacted**	It is unlikely that any individuals of *Chalinolobus dwyeri* will be impacted by the proposal, other than from the loss of 0.02ha of foraging habitat and temporary disturbance caused by noise/ vibration emitted by machinery during the construction phase of the development. As such the proposed development will impact some habitat, but no individuals of the species are expected to be directly impacted.
iii) to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species	The proposed development proposes the removal of 10 trees within the Subject Land. These trees likely provide foraging habitat for this species. However, a large number of trees will remain within the Subject Property post-development and as such no significant impacts to habitat connectivity are expected. *Chalinolobus dwyeri* is a highly mobile species. As such the proposed development will not impact the viability of the persisting subpopulation and the habitat available within the locality is not likely to be adversely impacted beyond the status quo as a result of the proposed development.
iv) to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including: Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.	The proposed development proposes the removal of 10 trees within the Subject Land. These trees likely provide foraging habitat for this species. However, a large number of trees will remain within the Subject Property post-development and as such no significant impacts to habitat connectivity are expected. No suitable breeding habitat features occur within the Subject Property and as such no breeding habitat will be impacted by the proposed development. As such the proposed development will not impact the viability of persisting subpopulations.

Serious and Irreversible Impact (SAII) Impact assessment provisions for Threatened Species: The Large-eared Pied Bat (*Chalinolobus dwyeri*)	
changes to fire regimes (frequency, severity);	The Subject Land is situated in suburban Sydney, with very low frequency fires in the locality. Additionally, the Subject Land is not located in Bushfire Prone Land (NSW DCCEEW 2024g). The fire regime is unlikely change as a result of the development.
hydrology;	No watercourses occur within the Subject Property. The nearest mapped watercourse occurs 300m from the Subject Land (**Figure 8**). No impacts from the proposed development are expected for this watercourse.
pollutants;	Construction works will be managed as outlined in **Section 8.4** avoid any potential pollutants affecting the surrounding habitat.
species interactions (increased competition and effects on pollinators or dispersal);	The proposed development is unlikely to alter species interactions. As the use of the land will remain the same (residential dwelling) it is unlikely that species interactions would significantly alter beyond the status quo and effects are likely to be negligible.
increased edge effects;	The Subject Land and the surrounding vegetation is already edge-effected including weed-infestation due to its situation in an urbanised locality surrounded by roads. The proposed development is unlikely to introduce novel edge effects. As the use of the land will remain the same (residential dwelling) it is unlikely that edge effects would significantly increase beyond the status quo.
likelihood of disturbance;	Ten (10) trees are proposed for removal as a result of the proposed development. As such, the availability of foraging habitat for this species will be moderately reduced within the Subject Property. Noise/ vibration disturbance emitted by machinery during the construction phase of the development are also expected to occur, however these impacts are likely to be only temporary. Trees will be replaced at a 1:1 ratio, with one tree planted for every tree removed. New tree plantings will belong to PWSGF EEC will aim to provide foraging habitat over the long term.
disease, pathogens and parasites.	The proposed development is unlikely to change the transmission of disease, pathogen or parasites within the *Chalinolobus dwyeri* population.

10. Impact Summary

10.1 Determine an offset requirement for impacts

10.1.1 Impacts on Native Vegetation and Threatened Ecological Communities

Table 36. Impacts that do not require offset - ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	TEC association	Entity at risk of an SAII?	Current VI score
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 37. Impacts that require an offset - ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
Infill Planted	PCT 3234 – Hunter Coast Lowland Spotted Gum Moist Forest	*Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion*	0.02	47.6	3.8	-43.8	2	1
							Total credits	1

10.1.2 Impacts on Threatened Species and their Habitat (Species Credits)

Table 38. Impacts that require an offset - species credits

Common name	Scientific name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Large-eared Pied Bat	*Chalinolobus dwyeri*	Endangered	Endangered	0.02	3	1
					Total credits	1

10.1.3 Indirect and prescribed impacts

Table 39. Summary of proposed offsets for residual indirect and prescribed impacts

Residual indirect or prescribed impact (identified after mitigation)	Proposed offset (additional biodiversity credit requirement and/or other conservation measures)
N/A	N/A

10.2 Impacts that do not need further assessment

Table 40. Impacts that do not need further assessment for ecosystem credits

Impact	Location within subject land	Justification why no further assessment is required
N/A	N/A	N/A

11. Biodiversity Credit Report

11.1 Ecosystem credits

In accordance with section 9.2.1 of the BAM (DPIE 2020a) the assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

a. ≥15, where the PCT is representative of an EEC or a CEEC

b. ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community

c. ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

Table 41. Ecosystem credits class and matching credit profile

Credits to Retire	Attributes shared with matching credits						
	PCT name	PCT vegetation class	PCT vegetation formation	Associated TEC or EC	Offset trading group (BAM Section 10.2, Tables 4 & 5)	Hollow bearing trees present?	IBRA subregion (in which proposal is located)
1	N/A	N/A	N/A	N/A	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion This includes PCT's: 3234, 3437	No	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site

11.2 Species credits

In accordance with section 9.2.2 of the BAM (DPIE 2020a):

1. The assessor must determine an offset for the impacts of proposals on the habitat of threatened species assessed for ecosystem credits and associated with a PCT in a vegetation zone with a vegetation integrity score of ≥17.

2. The assessor must determine an offset for the impacts of proposals on threatened species that require species credits, identified in accordance with Chapter 5 of the BAM (DPIE 2020a).

3. The method for determining offset requirements for impacts on threatened species and threatened species habitat is described in Chapter 10 of the BAM (DPIE 2020a).

4. An offset requirement can be proposed for a prescribed impact in accordance with Section 8.6 of the BAM (DPIE 2020a).

No threatened species credits require offsetting for the proposed development (**Table 42**).

Table 42. Species credit class and matching credit profile

Credits to Retire	Attributes shared with matching credits				
	Name of threatened species	Kingdom	BC Act status	EPBC Act status	IBRA region
1	*Chalinolobus dwyeri*/ Large-eared Pied Bat	Fauna	Endangered	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site

12. Other Relevant Legislation, Plans & Policies Requiring Address

12.1 Pittwater Local Environmental Plan 2014

This section details Environmental Controls relevant to the terrestrial biodiversity associated with the Subject Property and surrounds (**Table 43**).

Table 43. Environmental controls relevant to the terrestrial biodiversity associated with the Subject Property and surrounds.

Local Environmental Plan Reference	Application	Suitable Action
Part 2.1 Land Use Zones	The Subject Property is zoned 'C4 - Environmental Living' (NSW DCCEEW 2024g).	The proposed development is permitted with consent. This BDAR report accompanies the DA that seeks consent.
Part 7.2 Earthworks	The proposed development will involve earthworks that will disturb soil and sediment in the Subject Land. Mismanagement of materials may result in impact on native vegetation.	Retained trees within the Subject Land T1 and T5 are to be protected in accordance with Hugh The Arborist (2024). Additionally, as per Hugh The Arborist (2024) '*The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing*'. Stockpiles are not to be situated within the structural root zone of any native trees. Retained vegetation must be protected with best practice methods. At a minimum industry stand guidelines 'the Blue book' must be implemented to control erosion and sedimentation (Landcom 2004).
Part 7.6 Biodiversity	Mapped Terrestrial Biodiversity occurs on the Subject Property (Pittwater Council 2024; NSW DCCEEW 2024g).	The proposed development will involve the removal of 0.02 ha of vegetation belonging to PWSGF EEC including ten native trees, two of which are characteristic species of PWSGF EEC (*Corymbia maculata, Allocasuarina torulosa*) (Hugh The Arborist 2024). This BDAR assesses the impact of the vegetation removal on native vegetation, threatened species, PWSGF EEC, and the habitat connectivity of the locality. The development is designed, sited and will be managed to avoid any significant adverse environmental impact. The proposed development proposes to utilise the existing entrance to minimise vegetation removal. Additionally, the proposed development will minimise vegetation clearing by positioning the Subject Land on the existing driveway and car space. Two trees are proposed for retention within the Subject Land and 'tree's located on adjoining land and will not be subject to encroachment' (Hugh The Arborist 2024). No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists. No hollow-bearing trees, stick nests of other important breeding and nesting habitat will be impacted by the proposed development. Additionally, the retention of mature remnant canopy of *Corymbia maculata and Syncarpia glomulifera's* at the rear of the property (western portion) will ensure the retention of habitat links within and near the Subject Property to facilitate the movement of species through the biodiversity corridors in the locality. Indirect impacts on retained vegetation from the proposed development will be mitigated and managed by the implementation of mitigation measures presented in **Table 32**. '*Suspended concrete slabs*' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure. The proponent has stated that a detailed landscape design/plan will be provided prior to the commencement of construction, upon DA approval. In

Local Environmental Plan Reference	Application	Suitable Action
		accordance with the council's requirements, 80% of new plantings will consist of native vegetation belonging to the Pittwater Spotted Gum Endangered Ecological Community, as per species found on the site or listed in the Pittwater Spotted Gum Endangered Ecological Community. Furthermore, trees will be replaced at a 1:1 ratio, with one tree planted for every tree removed. New tree plantings will also belong to Pittwater Spotted Gum Endangered Ecological Community. Retained trees will be protected in accordance with Hugh The Arborist (2024).

12.2 Pittwater 21 Development Control Plan

This section details Development Controls relevant to the terrestrial biodiversity within the Subject Property and surrounds (**Table 44**).

Table 44. Development controls relevant to the terrestrial biodiversity within the Subject Property and surrounds

Clause Number	Control Name	Does this control apply?	Reason	Suitable Action Proposed
B4.1	Flora and Fauna Conservation Category 1 Land	Yes	The Subject Property is mapped as C01- '*Those areas though disturbed are likely to be of habitat value due to good crown cover and/or understorey*'	The development proposes to remove 0.02 ha of PWSGF EEC including the removal of ten native trees, two of which are characteristic species of PWSGF EEC (*Corymbia maculata, Allocasuarina torulosa*) (Hugh The Arborist 2024). Suitable foraging, roosting and potential breeding habitat for bats, birds and other threatened species will be impacted by the proposed development. A BDAR (this report) has been prepared to thoroughly address the extent of the proposed development on 'Category 1 Land' and the impact of the clearing upon threatened entities. The proponent has stated that a detailed landscape design/plan will be provided prior to the commencement of construction, upon DA approval. In accordance with part B4.1 these landscaping works will ensure that at least 80% of the new plantings are native belonging to Pittwater Spotted Gum Endangered Ecological Community (as per species found on the site or listed in Pittwater Spotted Gum Endangered Ecological Community) and do not include any Weeds of National Significance or Priority Weeds for the Greater Sydney (DPI 2024a). Any future fencing must be passable by wildlife (e.g. not barbed wire or chain wire fencing). Through measures discussed in **Section 7.1 Avoid and Minimise**, the development will result in no 'significant onsite loss of canopy cover'. Tree's will be replaced at a 1:1 ratio (one tree planted for every tree removed). New tree plantings will belong to Pittwater Spotted Gum Endangered Ecological Community (as per species found on the site or listed in Pittwater Spotted Gum Endangered Ecological Community). The proponent has stated that details and locations of these tree replacement's will be provided a landscape design/plan, prior to the commencement of construction, upon DA approval. Retained trees will be protected in accordance with Hugh The Arborsit (2024). '*Suspended concrete slabs*' (Action Plans 2024) will serve as supports for the proposed suspended carport and driveway, which will connect to the existing street frontage. By utilising this design mechanism, shrub and ground cover vegetation may be retained below the structure. No hollow-bearing trees, stick nests of other important breeding and nesting habitat will be impacted by the proposed development. Additionally, the retention of mature remnant canopy of *Corymbia maculata and Syncarpia glomulifera's* at the rear of the property (western portion) will ensure the retention of habitat links within and near the Subject

Clause Number	Control Name	Does this control apply?	Reason	Suitable Action Proposed
				Property to facilitate the movement of species through the biodiversity corridors in the locality. Indirect impacts on retained vegetation from the proposed development will be mitigated and managed by the implementation of mitigation measures presented in **Table 32**.
B4.7	Pittwater Spotted Gum Forest - Endangered Ecological Community	Yes	The Subject Property contains vegetation belonging to Pittwater Spotted Gum EEC	Habitat for PWSGF EEC and locally common threatened fauna species will be removed for the proposed development. The proposed development has been sensitively designed and sited. Two trees are proposed for retention within the Subject Land and 'tree's located on adjoining land and will not be subject to encroachment' (Hugh The Arborist 2024). No works are proposed at the rear of the property (western portion) where a large portion of remnant indigenous canopy representative of PWSGF EEC exists and as such maintaining the habitat corridor which runs through the Subject Property (**Figure 9**). The proponent has stated that a detailed landscape design/plan will be provided prior to the commencement of construction, upon DA approval. In accordance with part B4.7 these landscaping works will ensure that at least 80% of the new plantings are native belonging to Pittwater Spotted Gum Endangered Ecological Community (as per species found on the site or listed in Pittwater Spotted Gum Endangered Ecological Community) and do not include any Weeds of National Significance or Priority Weeds for the Greater Sydney (DPI 2024a). Through measures discussed in **Section 7.1 Avoid and Minimise**, the development will result in no 'significant onsite loss of canopy cover'. Tree's will be replaced at a 1:1 ratio (one tree planted for every tree removed). New tree plantings will belong to Pittwater Spotted Gum Endangered Ecological Community (as per species found on the site or listed in Pittwater Spotted Gum Endangered Ecological Community). The proponent has stated that details and locations of these tree replacement's will be provided in a landscape design/plan, prior to the commencement of construction, upon DA approval. Retained trees will be protected in accordance with Hugh The Arborist (2024).

12.3 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

One Matter of National Environmental Significance was recorded present on the Subject Land; the Large-eared Pied Bat (*Chalinolobus dwyeri*), listed as endangered under the EPBC Act. This species is likely to forage within the Subject Land, though is unlikely to breed within the Subject Land or rely heavily upon this habitat with 'Low' calling activity and no suitable breeding caves are present (**Appendix 5**). Owing to the small scale of impact and avoidance of breeding habitat, no further assessment under the EPBC Act is considered necessary.

Commonwealth listed threatened species that are MNES have potential to occur in the Subject Land on occasion. This includes, Grey-headed Flying-fox (*Pteropus poliocephalus*), nomadic nectivorous birds such as Swift Parrot (*Lathamus discolor*) and Little Lorikeet (*Glossopsitta pusilla*), microbats and predatory birds that may intermittently forage within the Subject Land, though are unlikely to rely heavily upon the vegetation within the Subject Land owing to its small overall area and occurrence in a disturbed urban matrix. These species will continue to utilise habitat the Subject Property in the same manner post-development.

No EPBC listed threatened ecological community occurs within the Subject Property.

No referral to the Commonwealth is required for the proposed development.

12.4 State Environmental Planning Policy (Biodiversity and Conservation)

12.4.1 Chapter 2: Vegetation in Non-Rural Areas

All clearing of vegetation (native and non-native) including dying or dead vegetation that is required as habitat of native animals requires a permit granted by the consent authority.

12.4.2 Chapter 4: Koala Habitat Protection

The Subject Property is located within a Local Government Area listed in Schedule 1 of the Chapter 4: Koala Habitat Protection. Three species of Koala Use Tree Species listed in Schedule 2, with documented koala use in the Central Coast Koala Management Area were identified within the Subject Property (**Table 45**). A review of NSW Wildlife Atlas Data (BioNet) (NSW DCCEEW 2024d) revealed 74 Koala records within the locality. These records all however predate the 21st Century. The closest record is from 1970. The Subject Land is not considered 'core koala habitat'. While suitable koala use trees are present, the Subject Land is within an urbanised environment with no koalas recorded present in the last 18 years.

Table 45. Koala use tree species within the Subject Property

Species	Documented Koala Use in the Central Coast Koala Management Area
Syncarpia glomulifera	High use
Corymbia maculata	Irregular use
Allocasuarina torulosa	Low Use

12.5 State Environmental Planning Policy (Resilience and Hazards) 2021

This State Environment Planning Policy (SEPP) applies to land within the 'Coastal Environment Area' and aims to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objectives of the *Coastal Management Act 2016*.

The Subject Land contains no land mapped under this SEPP (NSW DCCEEW 2024g).

12.6 Fisheries Management Act 1994

The Subject Land contains no mapped 'Key Fish Habitat' (KFH). However, it is located approximately 85m from Pittwater Bay which is mapped as Key Fish Habitat' (DPI 2024b). The Subject Property is also located approximately 500m away from mapped 'Mangrove' Habitat (DPI 2024b). The proposed development will not impact upon 'Key Fish Habitat' or 'Mangrove' Habitat'.

13. References

Action Plans (2024). 81 Riverview Road Avalon Beach, NSW 2107

Australian Bureau of Meteorology (2024) Terrey Hills 2024 Daily Weather Observations http://www.bom.gov.au/climate/dwo/IDCJDW2154.latest.shtml

Australian Standard 4970 (2009) Protection of Trees on Development Sites

Churchill, S (1998) Australian Bats, Reed New Holland, Sydney.

Commonwealth of Australia (2010a) Survey guidelines for Australia's threatened birds. Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999

Commonwealth of Australia (2010b) Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999

Commonwealth of Australia (2010c) Survey guidelines for Australia's threatened frogs. Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999

Commonwealth of Australia (2011) Survey guidelines for Australia's threatened mammals. Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999

Commonwealth of Australia (2013a) Survey guidelines for Australia's threatened orchids. Guidelines for detecting orchids listed as 'threatened' under the Environment Protection and Biodiversity Conservation Act 1999

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14. Appendices

Appendix A. Fauna recorded in the Subject Property by Land Eco Consulting

Appendix B. BAM VIS Field Survey Forms (copied from electronic data sheet)

Appendix C. Biodiversity Credit Reports from Biodiversity Assessment Method Calculator

Appendix D. Species polygon

Appendix E. Microbat Call Analysis Report (Lachlan McRae Fauna Services 2025)

Appendix A. Fauna recorded in the Subject Property by Land Eco Consulting

Class	Scientific Name	Common Name	NSW Biodiversity Conservation Act 2016 Status
Aves	*Alectura lathami*	Australian Brushturkey	Protected
Aves	*Alisterus scapularis*	King Parrot	Protected
Aves	*Cracticus torquatus*	Gray Butcherbird	Protected
Aves	*Hirundo neoxena*	Welcome Swallow	Protected
Aves	*Manorina melanocephala*	Noisy Miner	Protected Key Threatening Process
Aves	*Pelecanus conspicillatus*	Australian Pelican	Protected
Aves	*Platycercus elegans*	Crimson Rosella	Protected
Aves	*Platycercus eximius*	Eastern Rosella	Protected
Aves	*Scythrops novaehollandiae*	Channel-billed Cuckoo	Protected
Aves	*Trichoglossus moluccanus*	Rainbow Lorikeet	Protected
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	Endangered
Mammalia	*Chalinolobus gouldii*	Gould's Wattled Bat	Protected
Mammalia	*Micronomus norfolkensis*	Eastern Coastal Freetail Bat	Vulnerable
Mammalia	*Miniopterus australis*	Little Bent-winged Bat	Vulnerable
Mammalia	*Rhinolophus megaphyllus*	Eastern Horseshoe Bat	Protected
Mammalia	*Ozimops ridei*	Ride's Freetail Bat	Protected
Mammalia	*Scoteanax rueppellii* (possible)	Greater Broad-nosed Bat	Vulnerable
Mammalia	*Scotorepens orion* (possible)	Eastern Broad-nosed Bat	Protected
Mammalia	*Falsistrellus tasmaniensis* (possible)	Eastern False Pipistrelle	Vulnerable

Appendix B. BAM VIS Field Survey Forms (copied from electronic data sheet)

BAM Site - Field Survey Form

Date:	**20.11.24**	**Plot ID:**	**1**	**Photo #:**	
Zone:	**56H**	**Plot Dimensions:**	**Irregular**	**Easting:**	344034
Datum:	**GDA 2020**	**Middle Bearing (o) at 0m:**	290	**Northing:**	6278245
PCT:	PCT 3234 – Hunter Coast Lowland Spotted Gum Moist Forest	**Condition Class**	Infill Planted	**Ecologists:**	Chantelle and Semonn

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	Corymbia maculata	5	1
Tree (TG)	Allocasuarina torulosa	1	1
Other (OG)	Livistona australis	3	1
Other (OG)	Archontophoenix cunninghamiana	15	N/A
Grass & grasslike (GG)	Oplismenus aemulus	0.1	2
Grass & grasslike (GG)	Oplismenus imbecillis	0.2	5
HTE	Tradescantia fluminensis	0.2	20
#N/A	Cyclospermum leptophyllum	0.1	5
HTE	Ehrharta erecta	60	N/A
#N/A	Erigeron bonariensis	0.1	20
HTE	Bidens pilosa	0.1	10
Forb (FG)	Oxalis perennans	0.1	10
Forb (FG)	Youngia japonica	0.1	10
#N/A	Roldana petasitis	6	N/A
#N/A	Strelitzia nicolai	1.5	2
#N/A	Jacaranda mimosifolia	1	10
#N/A	Thaumatophylum bipinnatifidum	2	3
Other (OG)	Stephania japonica	0.1	6
Forb (FG)	Solanum americanum	0.1	1
Fern (EG)	Blechnum cartilagineum	0.1	2
Fern (EG)	Asplenium australasicum	0.6	4

DBH	# Tree Stems Count
80+cm	1
50-79cm	3
30-49cm	6
20-29cm	1
10-19cm	2
5-9cm	0
<5cm	9

Number of Hollow-bearing Trees
0

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

Length of Logs (m)	2

(≥10 cm diameter, >50 cm in length)

BAM Attribute (1 x 1m plots)	Litter Cover (%)
1	100
2	40
3	15
4	25
5	25
Average (#no./5)	**41**

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

#N/A	Lomandra longifolia 'tanika'	0.2	10
#N/A	Agapanthus praecox	0.2	5
#N/A	Hedychium gardnerarium	3	10
#N/A	Solanum chenopodioides	0.1	1
HTE	Hypoestes phyllostachya	2	30
#N/A	Prunus persica	1	2
#N/A	Persea americana	0.1	1
#N/A	Sonchus asper	0.1	10
#N/A	Callisia fragrans	0.1	5
Shrub (SG)	Syzygium spp.	1	2
Fern (EG)	Nephrolepis cordifolia	4	20
Tree (TG)	Clerodendrum tomentosum	0.1	2
Shrub (SG)	Breynia oblongifolia	0.1	2
#N/A	Nerium oleander	4	6
#N/A	Sida rhombifolia	0.1	10
#N/A	Euphorbia pulcherrima	0.1	1
Shrub (SG)	Acacia floribunda	0.1	1
Forb (FG)	Commelina cyanea	0.1	2
#N/A	Passiflora subpeltata	0.1	2
HTE	Asparagus aethiopicus	0.1	1
#N/A	Plerandra elegantissima	0.1	1
#N/A	Ficus benjamina	6	N/A
#N/A	Nandina domestica	0.1	1
#N/A	Freesia laxa	0.1	1
HTE	Ochna serrulata	0.1	1
Grass & grasslike (GG)	Gahnia sieberiana	0.2	2
HTE	Phyllostachys spp. (P. aurea and P. nigra)	0.1	3
Other (OG)	Cayratia clematidea	0.1	2
Tree (TG)	Glochidion ferdinandi	5	1
Shrub (SG)	Ficus coronata	0.1	1
Other (OG)	Cyathea cooperi	0.3	1
#N/A	Christella dentata	0.1	3
#N/A	Monstera deliciosa	3	2

Growth Form	Composition Data	Structure Data
Tree	**6**	**21.1**
Shrub	**6**	**2.5**
Grass	**5**	**0.9**
Forb	**6**	**0.7**
Fern	**4**	**4.8**
Other	**6**	**20.5**
H.T.E	**10**	**64.8**

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

Shrub (SG)	Grevillea banksii	0.2	1
HTE	Ligustrum lucidum	2	2
#N/A	Gnaphalium uliginosum	0.1	5
HTE	Ipomoea indica	0.1	3
#N/A	Ophiopogon japonica	0.1	3
Forb (FG)	Dichondra repens	0.1	30
HTE	Cyperus eragrostis	0.1	1
Forb (FG)	Hydrocotyle hirta	0.2	50
#N/A	Heptapleurum arboricola	0.1	1
#N/A	Solanum mauritianum	1.5	1
Fern (EG)	Platycerium superbum	0.1	1
Shrub (SG)	Elaeocarpus reticulatus	1	4
Tree (TG)	Lagunaria patersonia	4	1
Tree (TG)	Syncarpia glomulifera	6	N/A
#N/A	Potentilla indica	0.1	1
#N/A	Cyperus brevifolius	0.1	5
Grass & grasslike (GG)	Cyperus gracilis	0.1	3
Other (OG)	Howea forsteriana	2	1
#N/A	Crassula ovata	0.1	1
#N/A	Aechmea gamosepala	0.1	2
#N/A	Stellaria media	0.1	1
#N/A	Dietes grandiflora	0.1	1
Grass & grasslike (GG)	Lomandra hystrix	0.3	3

Appendix C. Biodiversity Credit Reports from Biodiversity Assessment Method Calculator

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00053594/BAAS18059/24/00053595	Proposed development at 81 Riverview Road Avalon Beach NSW 2107	28/10/2024
Assessor Name	Report Created	BAM Data version *
Kurtis Lindsay	13/02/2025	Current classification (live - default) (80)
Assessor Number	BAM Case Status	Date Finalised
BAAS18059	Finalised	13/02/2025
Assessment Revision	BOS entry trigger	Assessment Type
0	BOS Threshold: Biodiversity Values Map	Part 4 Developments (Small Area)

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Hunter Coast Lowland Spotted Gum Moist Forest												
1	3234_Infill	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	47.6	43.8	0.02	Geographic Distribution	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	True	1
											Subtotal	**1**
											Total	**1**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
3234_Infill	43.8	43.8	0.02	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	True	1
								Subtotal	**1**

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00053594/BAAS18059/24/00053595	Proposed development at 81 Riverview Road Avalon Beach NSW 2107	28/10/2024
Assessor Name	**Report Created**	**BAM Data version ***
Kurtis Lindsay	13/02/2025	Current classification (live - default) (80)
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18059	Part 4 Developments (Small Area)	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
0	BOS Threshold: Biodiversity Values Map	13/02/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Chalinolobus dwyeri Large-eared Pied Bat	Yes (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Miniopterus australis Little Bent-winged Bat	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Miniopterus orianae oceanensis Large Bent-winged Bat	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Persoonia hirsuta Hairy Geebung	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhizanthella slateri Eastern Australian Underground Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhodomyrtus psidioides Native Guava	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Vespadelus troughtoni Eastern Cave Bat	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Threatened species Manually Added

Common Name	Scientific Name
Bauer's Midge Orchid	Genoplesium baueri
Angus's Onion Orchid	Microtis angusii
Hairy Geebung	Persoonia hirsuta
Loggerhead Turtle	Caretta caretta
Leatherback Turtle	Dermochelys coriacea
Beach Stone-curlew	Esacus magnirostris
Sooty Owl	Tyto tenebricosa

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Angus's Onion Orchid	Microtis angusii	Refer to BAR
Bauer's Midge Orchid	Genoplesium baueri	Refer to BAR
Beach Stone-curlew	Esacus magnirostris	Refer to BAR
Leatherback Turtle	Dermochelys coriacea	Habitat constraints
Loggerhead Turtle	Caretta caretta	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Sooty Owl	Tyto tenebricosa	Habitat constraints
Swift Parrot	Lathamus discolor	Habitat constraints

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00053594/BAAS18059/24/00053595	Proposed development at 81 Riverview Road Avalon Beach NSW 2107	28/10/2024
Assessor Name	**Report Created**	**BAM Data version ***
Kurtis Lindsay	13/02/2025	Current classification (live - default) (80)
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18059	Part 4 Developments (Small Area)	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
0	BOS Threshold: Biodiversity Values Map	13/02/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Beach Stone-curlew	Esacus magnirostris	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Eastern Curlew	Numenius madagascariensis	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Eastern Osprey	Pandion cristatus	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Flame Robin	Petroica phoenicea	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Gang-gang Cockatoo	Callocephalon fimbriatum	3234-Hunter Coast Lowland Spotted Gum Moist Forest

Greater Broad-nosed Bat	Scoteanax rueppellii	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Grey-headed Flying-fox	Pteropus poliocephalus	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Little Bent-winged Bat	Miniopterus australis	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Little Eagle	Hieraaetus morphnoides	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Little Lorikeet	Glossopsitta pusilla	3234-Hunter Coast Lowland Spotted Gum Moist Forest
New Holland Mouse	Pseudomys novaehollandiae	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Regent Honeyeater	Anthochaera phrygia	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Rose-crowned Fruit-Dove	Ptilinopus regina	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Rosenberg's Goanna	Varanus rosenbergi	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Scarlet Robin	Petroica boodang	3234-Hunter Coast Lowland Spotted Gum Moist Forest
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Spotted-tailed Quoll	Dasyurus maculatus	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Square-tailed Kite	Lophoictinia isura	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Superb Fruit-Dove	Ptilinopus superbus	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Swift Parrot	Lathamus discolor	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Turquoise Parrot	Neophema pulchella	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Varied Sittella	Daphoenositta chrysoptera	3234-Hunter Coast Lowland Spotted Gum Moist Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	3234-Hunter Coast Lowland Spotted Gum Moist Forest
White-throated Needletail	Hirundapus caudacutus	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3234-Hunter Coast Lowland Spotted Gum Moist Forest

Threatened species Manually Added

Common Name	Scientific Name
Rose-crowned Fruit-Dove	Ptilinopus regina
Beach Stone-curlew	Esacus magnirostris

Eastern Curlew	Numenius madagascariensis
Turquoise Parrot	Neophema pulchella
Greater Broad-nosed Bat	Scoteanax rueppellii

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	3234-Hunter Coast Lowland Spotted Gum Moist Forest

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Black Bittern	Ixobrychus flavicollis	Habitat constraints

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00053594/BAAS18059/24/00053595

Assessment name
Proposed development at 81 Riverview Road Avalon Beach NSW 2107

BAM data last updated *
28/10/2024

Assessor Name
Kurtis Lindsay

Report Created
13/02/2025

BAM Data version *
Current classification (live - default) (80)

Assessor Number
BAAS18059

Assessment Type
Part 4 Developments (Small Area)

BAM Case Status
Finalised

Assessment Revision
0

BOS entry trigger
BOS Threshold: Biodiversity Values Map

Date Finalised
13/02/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3234_Infill	3234-Hunter Coast Lowland Spotted Gum Moist Forest	Infill	0.02	1	

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00053594/BAAS18059/24/00053595

Proposal Name
Proposed development at 81 Riverview Road Avalon Beach NSW 2107

BAM data last updated *
28/10/2024

Assessor Name
Kurtis Lindsay

Assessor Number
BAAS18059

BAM Data version *
Current classification (live - default) (80)

Proponent Names
Birgit Bessey

Report Created
13/02/2025

BAM Case Status
Finalised

Assessment Revision
0

BOS entry trigger
BOS Threshold: Biodiversity Values Map

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
13/02/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	Endangered Ecological Community	3234-Hunter Coast Lowland Spotted Gum Moist Forest

Species
Chalinolobus dwyeri / Large-eared Pied Bat

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ixobrychus flavicollis / Black Bittern

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3234-Hunter Coast Lowland Spotted Gum Moist Forest	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	0.0	0	1	1

BAM Biodiversity Credit Report (Like for like)

3234-Hunter Coast Lowland Spotted Gum Moist Forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion This includes PCT's: 3234, 3437	-	3234_Infill	No	1	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Chalinolobus dwyeri / Large-eared Pied Bat	**3234_Infill**	0.0	1.00

Credit Retirement Options

Like-for-like credit retirement options

Chalinolobus dwyeri / Large-eared Pied Bat

Spp	IBRA subregion
Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00053594/BAAS18059/24/00053595

Proposal Name

Proposed development at 81 Riverview Road Avalon Beach NSW 2107

BAM data last updated *

28/10/2024

Assessor Name

Kurtis Lindsay

Assessor Number

BAAS18059

BAM Data version *

Current classification (live - default) (80)

Proponent Name(s)

Birgit Bessey

Report Created

13/02/2025

BAM Case Status

Finalised

Assessment Revision

0

BOS entry trigger

BOS Threshold: Biodiversity Values Map

Assessment Type

Part 4 Developments (Small Area)

Date Finalised

13/02/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	Endangered Ecological Community	3234-Hunter Coast Lowland Spotted Gum Moist Forest

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ixobrychus flavicollis / Black Bittern

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3234-Hunter Coast Lowland Spotted Gum Moist Forest	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	0.0	0	1	1.00

3234-Hunter Coast Lowland Spotted Gum Moist Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion This includes PCT's: 3234, 3437	-	3234_Infill	No	1	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

	Wet Sclerophyll Forests (Grassy sub-formation)	Tier 3 or higher threat status	3234_Infill	No	1	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Chalinolobus dwyeri / Large-eared Pied Bat	**3234_Infill**	0.0	1.00

Credit Retirement Options

Like-for-like options

Chalinolobus dwyeri/ Large-eared Pied Bat	Spp	IBRA region	
	Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Appendix D. Species polygon

Appendix E. Microbat Call Analysis Report (Lachlan McRae Fauna Services 2025)

Lachlan McRae Fauna Services
ABN: 96 905 438 927
Lmcrae.ecology@gmail.com

MICROBAT CALL ANALYSIS REPORT

30 January 2025

Job #: 022
Project name: Avalon Microbat Call Analysis
Client: Eco Land Consulting
Project Location: -33.624134, 151.318563 (Avalon Beach, NSW).

Table 1 – Summary of the microbat species recorded from four ultrasonic recorders deployed at Avalon Beach, NSW from 13-19/01/2025. Ordered from highest to lowest ID confidence.

Common Name	Scientific Name	Calling Activity (see section 2.5)	ID Confidence (see section 2.4)	Recorder # (see section 2.1)
Large-eared Pied Bat	*Chalinolobus dwyeri*	Low	Certain	1 & 3
Gould's Wattled Bat	*Chalinolobus gouldii*	Variable (see section 3.1)	Certain	1,2,3 & 4
Eastern Coastal Freetail Bat	*Micronomus norfolkensis*	Low-Moderate	Certain	1,2 & 4
Little Bent-winged Bat	*Miniopterus australis*	Low	Certain	4
Eastern Horseshoe Bat	*Rhinolophus megaphyllus*	Low	Certain	4
Ride's Freetail Bat	*Ozimops ridei*	Low	Probable	1
Greater Broad-nosed Bat or Eastern Broad-nosed Bat or Eastern False Pipistrelle	*Scoteanax rueppellii* or *Scotorepens orion* or *Falsistrellus tasmaniensis*	Moderate	Species group	3

1. Introduction

1.1 Background/Disclaimer

The author of this report, Lachlan McRae, has been engaged to undertake microbat echolocation call analysis for Eco Land Consulting. The analysis will determine the presence/absence of microbat species within the supplied audio data set.

The data necessary for this analysis was provided to the author via an online download link. The author was not involved in the data collection. As such, the author makes no claim that the data was collected appropriately.

Microbat call identification works on a probabilistic scale due to the wide variety of overlapping call types most species can make, and it can therefore be almost impossible to be 100% certain of a call identification for many species. As such, the author is only presenting their professional opinion (see section 5.1 for analyst experience and qualifications).

2. Methods

2.1 Supplied Data

The author/analyst was supplied with ultrasonic audio data (zero crossing files) from four ultrasonic recording devices deployed from 13-19/01/2025. The recorders were Anabat Swifts named “AB01”, “AB02”, “AB03”, & “AB04”. Land Eco Consulting requested that only four nights from each device be analysed so the four nights that had the highest calling activity were selected for analysis (Fig. 1).

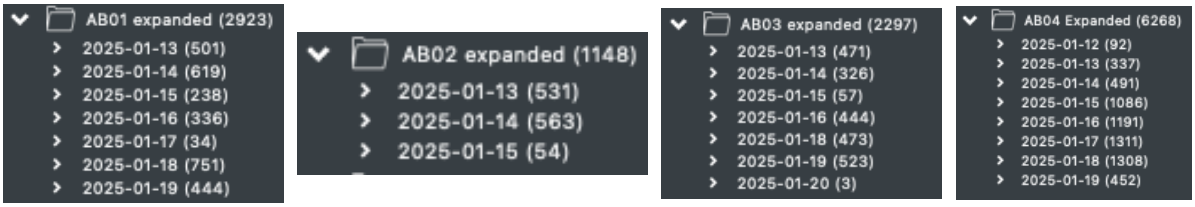

Figure 1 - The number of potential bat calls recorded each night on each recorder, shown in brackets next to the date.

The dates analysed for each recorder were:
AB01 = 13th, 14th, 15th, 16th & 18th January
AB02 = 13th, 14th & 15th January (this recorder only recorded for three nights)
AB03 = 13th, 16th, 18th & 19th January
AB04 = 15th, 16th, 17th & 18th January

AB01 was located at -33.624168, 151.318432 and will henceforth be called Recorder 1.
AB02 was located at -33.624134, 151.318563 and will henceforth be called Recorder 2.
AB03 was located at -33.624160, 151.318223 and will henceforth be called Recorder 3.
AB04 was located at -33.623993, 151.318114 and will henceforth be called Recorder 4.

The recorder deployment info supplied by Eco Land Consulting for each recorder is located below in Table 2.

Table 2 – Recorder deployment information supplied by Eco Land Consulting. The deployment info/category is identical for all four recorders.

Recorder Deployment Category	Answer (you can tick more than 1)
Broad habitat type	- Dry sclerophyll ☐ - Wet sclerophyll ☑ - Rainforest ☐ - Coastal scrub ☐ - Wetland ☐ - Open grassland ☐ - Desert ☐ - Street trees ☐ - Garden ☑
Urbanisation level	- City/urban ☐ - Suburban ☑ - Rural/farmland ☐ - Small or moderate bush-block surrounded by urbanisation ☐ - Natural habitat for >1km in all directions ☐ 
Proximity to a waterbody that is >3m wide/diameter	- Directly overlooking water ☐ - Within 200m of water ☑ - >200m from water ☐
Proximity to a moderate or large sized rocky outcrop/escarpment	- Amongst/overlooking rocky habitat ☐ - Within 2km of rocky habitat ☑ - Further than 2km from rocky habitat ☐
Proximity to an artificial structure such as mine tunnel, shed, building, culvert etc.	House, minimal open cavities/crevices though may be present within structure
Proximity to solid objects	- Amongst forest/woodland with minimal open spaces ☐ - Edge of forest/woodland with some open spaces ☑ - Open area with scattered or no trees ☐

2.2 Analysis Software

Microbat calls were analysed using Titley Scientific's Anabat Insight (version 2.1.2) on MacOS Sequoia (version 15.1.1).

2.3 Candidate microbat species

A list of microbat species with potential to occur at the data collection points, based solely on geographic distribution range, was generated using BatMap (Australasian Bat Society, 2025). A radius of 10km from the data collection point was used (Fig. 2)

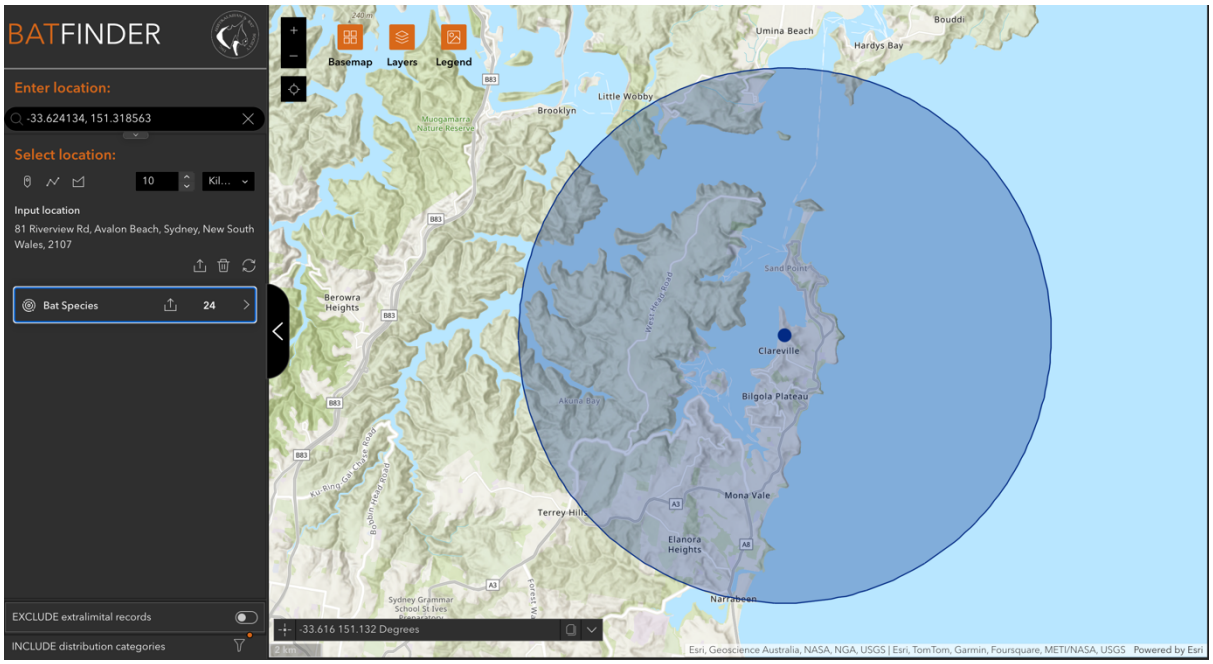

Figure 2 – 10km search distance used to generate a microbat species list with BatMap. Search distance centred on the data collection point in Avalon Beach.

A total of 21 possible microbat species were generated from BatMap (Table 3).

Table 3 – The list of candidate microbat species produced by BatMap's search tool, with a 10km radius search distance from the data collection point in Avalon Beach, NSW. Species ordered from lowest to highest call frequency (Fc).

Common Name	Scientific Name
White-striped Freetail Bat	*Austronomus australis*
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventis*
Large-eared Pied Bat	*Chalinolobus dwyeri*
Gould's Wattled Bat	*Chalinolobus gouldii*
Ride's Free-tailed Bat	*Ozimops ridei*
Eastern Coastal Freetail Bat	*Micronomus norfolkensis*
Greater Broad-nosed Bat	*Scoteanax rueppellii*
Eastern Broad-nosed Bat	*Scotorepens orion*
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*
Southern Myotis	*Myotis macropus*
Lesser Long-eared Bat	*Nyctophilus geoffroyi*
Gould's Long-eared Bat	*Nyctophilus gouldi*
Large Forest Bat	*Vespadelus darlingtoni*

Large Bent-winged Bat	*Miniopterus orianae oceansis*
Chocolate Wattled Bat	*Chalinolobus morio*
Little Forest Bat	*Vespadelus vulturnus*
Eastern Cave Bat	*Vespadelus troughtoni*
Eastern Forest Bat	*Vespadelus pumilus*
Little Bent-winged Bat	*Miniopterus australis*
Eastern Horseshoe Bat	*Rhinolophus megaphyllus*
Golden-tipped Bat	*Phoniscus papuensis*

2.4 Call Identification

Calls were identified to one or more of the 21 species listed above (Table 3) based on 1) *Bat Calls of NSW* by Pennay *et al.* (2004), 2) hundreds of reference calls personally collected by Lachlan McRae within NSW, 3) *Bat Calls of Central Eastern NSW* by Chris Corben (2009), 4) call metrics and ID features obtained from discussions with recognised bat experts including Michael Pennay, Brad Law, Greg Ford and Chris Corben, 5) the deployment information outlined in Section 2.1 (Table 2), and 6) the author's understanding of each species' foraging behaviour and habitat requirements (Churchill 2008, Baker & Gynther 2023).

Each call was assigned to one of the following identification confidence categories:

1) **Certain** — no doubt about the identification of the species. This rating is typically reserved for species that do not overlap in characteristic frequency and/or call shape with any other species.
2) **Almost Certain** — almost no chance of confusion with another species. This rating is typically given instead of "Certain" if there are other species that can produce similar calls on rare occasions.
3) **Probable** —moderate chance of confusion with another species but it is most likely the chosen species.
4) **Species Group** — call could more or less equally belong to one of two or more species.

2.5 Call Activity

Calling activity (i.e., the number of bat calls) for each species was estimated using the following categories:

1) **Low** — Less than an average of 10 calls per night.
2) **Moderate** — An average of 10-50 calls per night.
3) **High** — More than an average of 50 calls per night.

3. Results

3.1 Summary of results

A total of 12,636 audio files (zero crossing) from four Anabat Swifts were analysed to determine the presence/absence of microbat species on each recorder. A total of six species and one species group were identified in the Avalon Beach data set (Table 4–7 & Fig. 5–11).

Table 4 – Results from recorder 1 deployed at Avalon Beach, NSW. Ordered from highest to lowest ID confidence.

Common Name	Scientific Name	Calling Activity (Section 2.5)	ID Confidence (Section 2.4)
Large-eared Pied Bat	*Chalinolobus dwyeri*	Low	Almost Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	Moderate	Certain
Eastern Coastal Freetail Bat	*Micronomus norfolkensis*	Moderate	Certain
Ride's Freetail Bat	*Ozimops ridei*	Low	Probable

Table 5 – Results from recorder 2 deployed at Avalon Beach, NSW. Ordered from highest to lowest ID confidence.

Common Name	Scientific Name	Calling Activity (Section 2.5)	ID Confidence (Section 2.4)
Gould's Wattled Bat	*Chalinolobus gouldii*	Moderate	Certain

Table 6 – Results from recorder 3 deployed at Avalon Beach, NSW. Ordered from highest to lowest ID confidence.

Common Name	Scientific Name	Calling Activity (Section 2.5)	ID Confidence (Section 2.4)
Large-eared Pied Bat	*Chalinolobus dwyeri*	Low	Certain
Gould's Wattled Bat	*Chalinolobus gouldii*	High	Certain
Eastern Coastal Freetail Bat	*Micronomus norfolkensis*	Moderate	Certain
Little Bent-winged Bat	*Miniopterus australis*	Low	Certain
Eastern Horseshoe Bat	*Rhinolophus megaphyllus*	Low	Certain
Greater Broad-nosed Bat or Eastern Broad-nosed Bat or Eastern False Pipistrelle	*Scoteanax rueppellii* or *Scotorepens orion* or *Falsistrellus tasmaniensis*	Moderate	Species group

Table 7 – Results from recorder 4 deployed at Avalon Beach, NSW. Ordered from highest to lowest ID confidence.

Common Name	Scientific Name	Calling Activity (Section 2.5)	ID Confidence (Section 2.4)
Gould's Wattled Bat	*Chalinolobus gouldii*	Low	Certain
Eastern Coastal Freetail Bat	*Micronomus norfolkensis*	Low	Certain

3.2 Supporting call ID evidence

An example call from each recorded species/species group is shown below in compressed mode. Full spectrum and zero-crossing views are both shown on the same spectrogram. Calls are typically displayed in 'compressed mode' at a time scale of "F7-10ms" or "F6-25ms", depending on what display best highlights the most conclusive ID feature. Species are ordered from lowest to highest calling characteristic frequency.

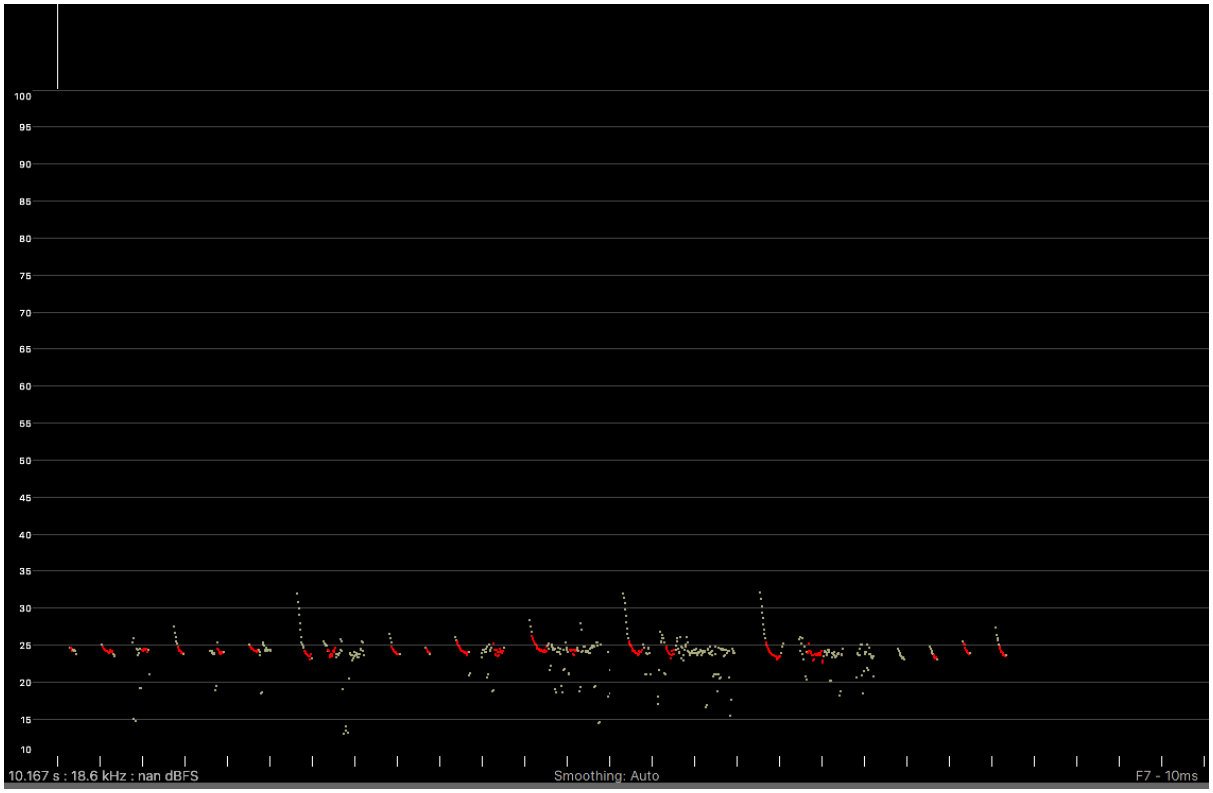

Figure 2 – Chalinolobus dwyeri.

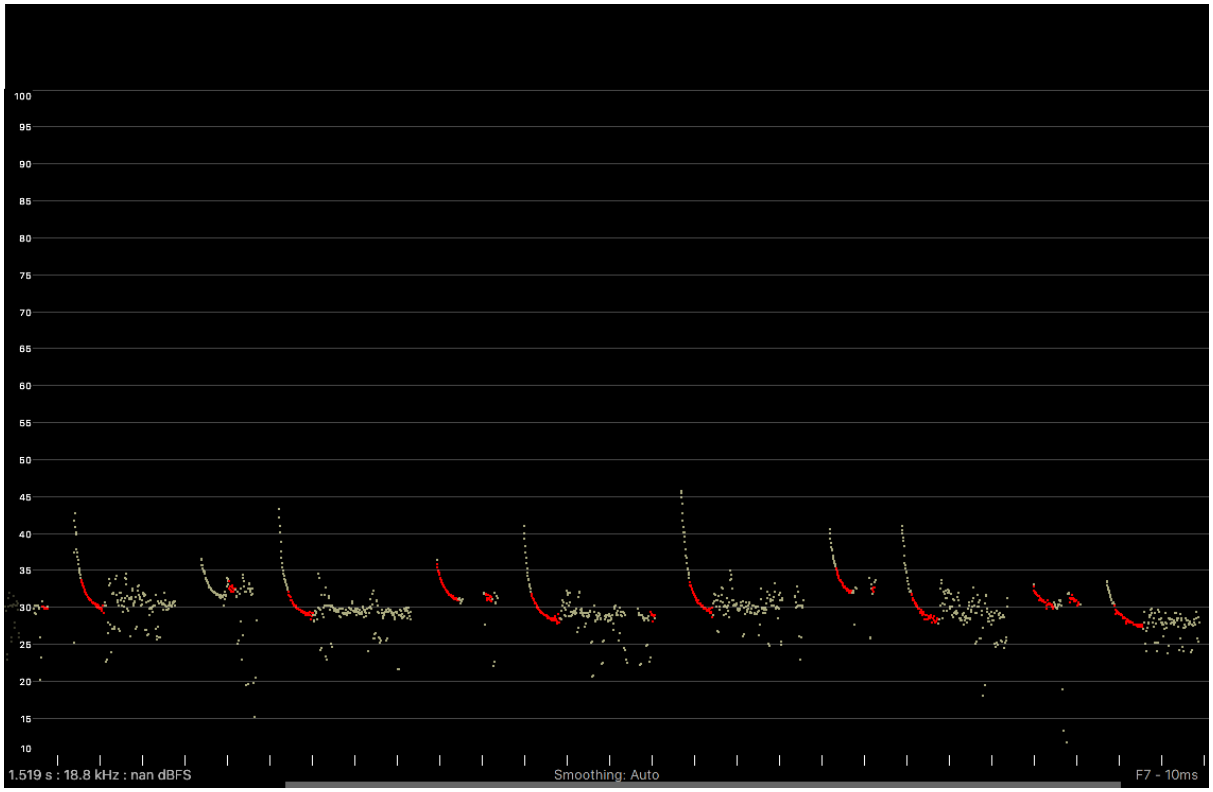

Figure 6 – Chalinolobus gouldii.

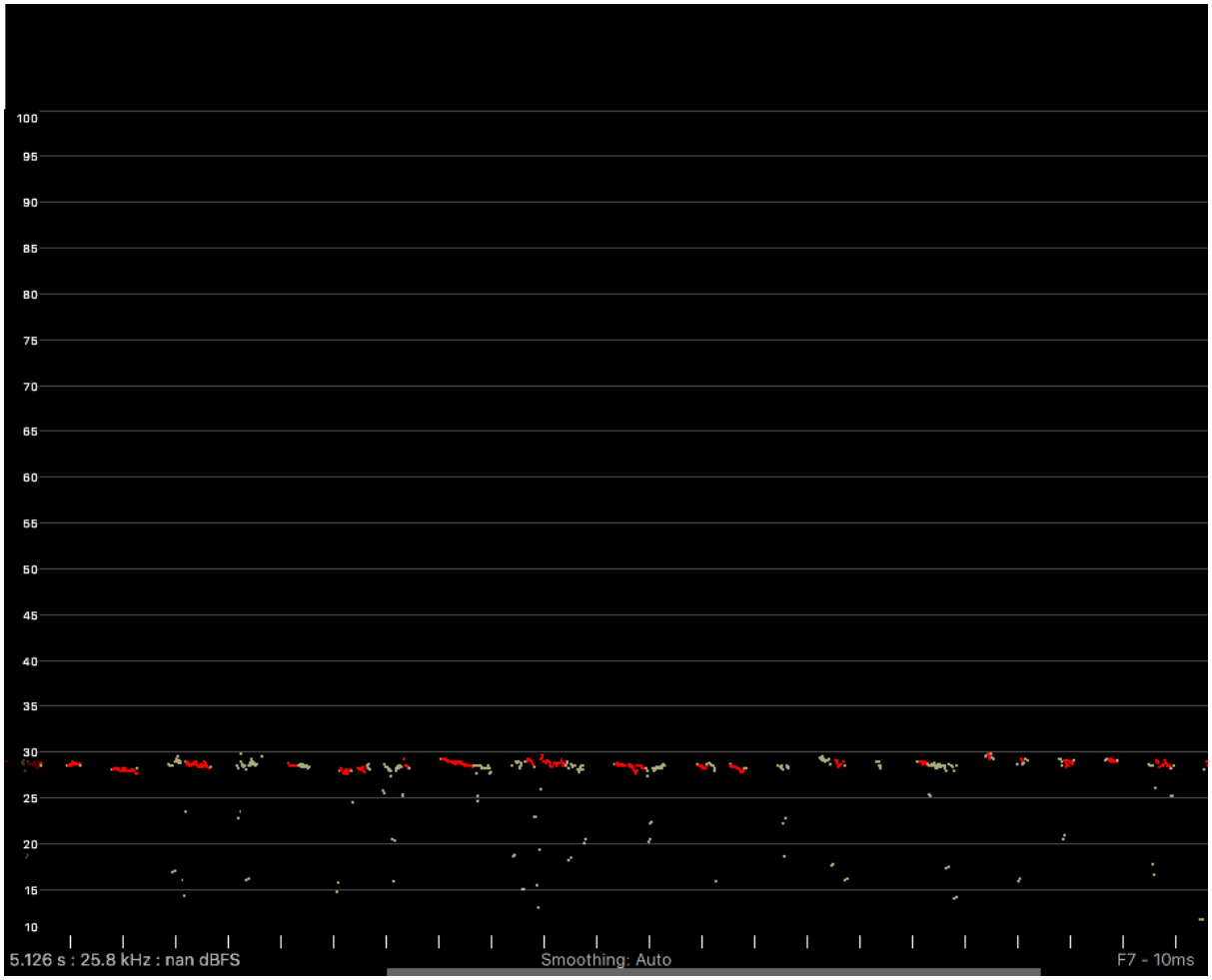

Figure 7 – Ozimops ridei.

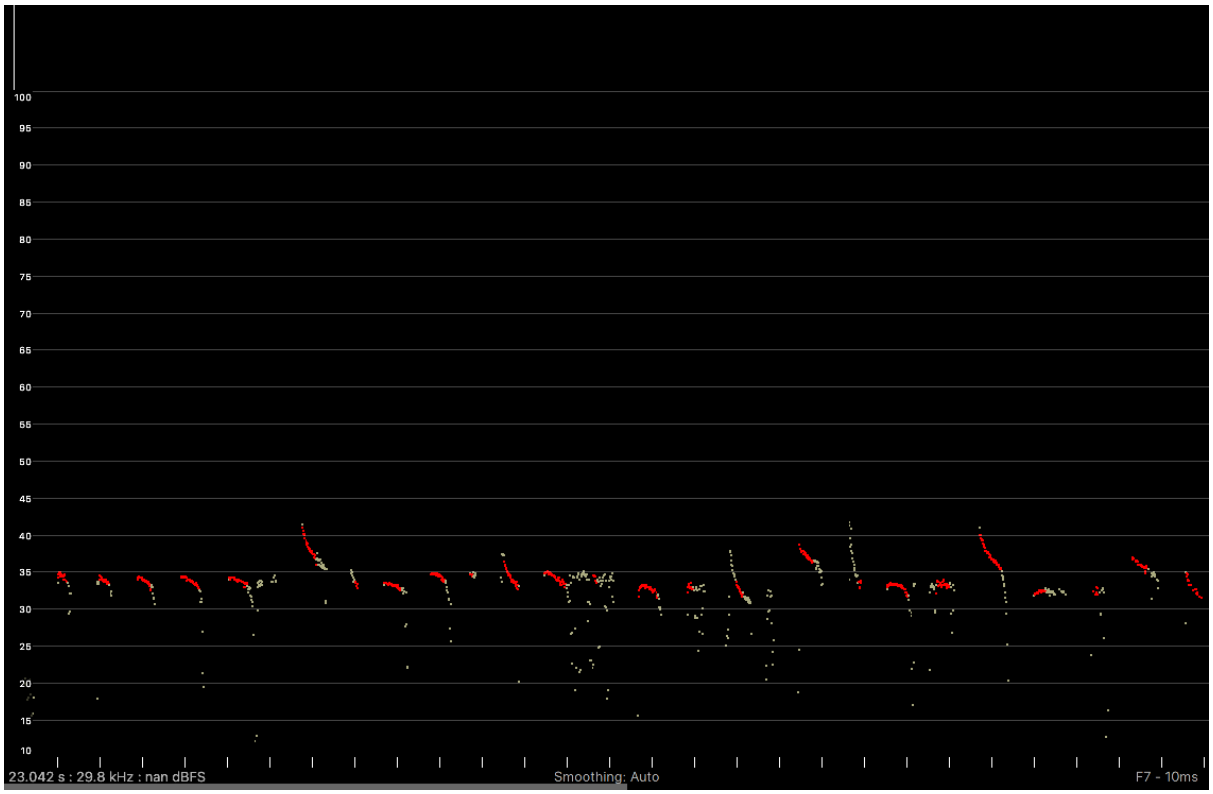

Figure 8 – Micronomus norfolkensis.

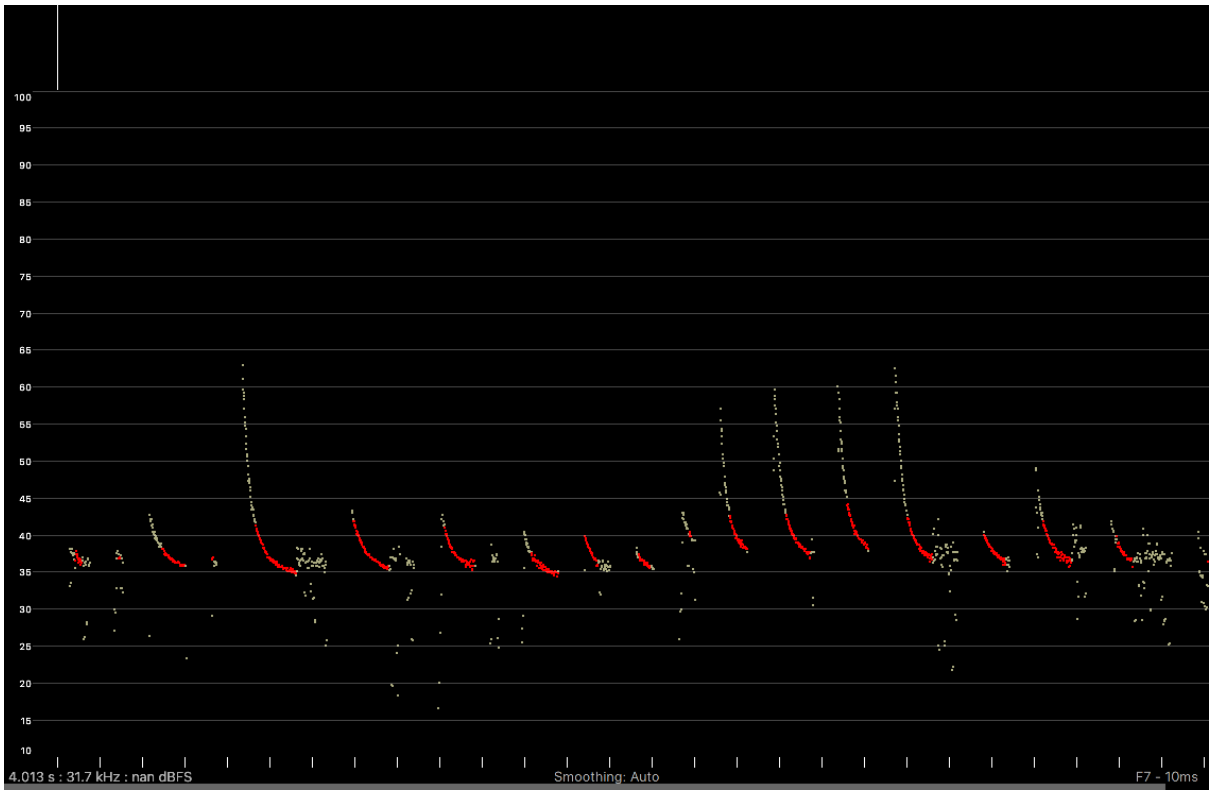

Figure 9 – Scoteanax rueppellii or Scotorepens orion.or Falsistrellus tasmaniensis.

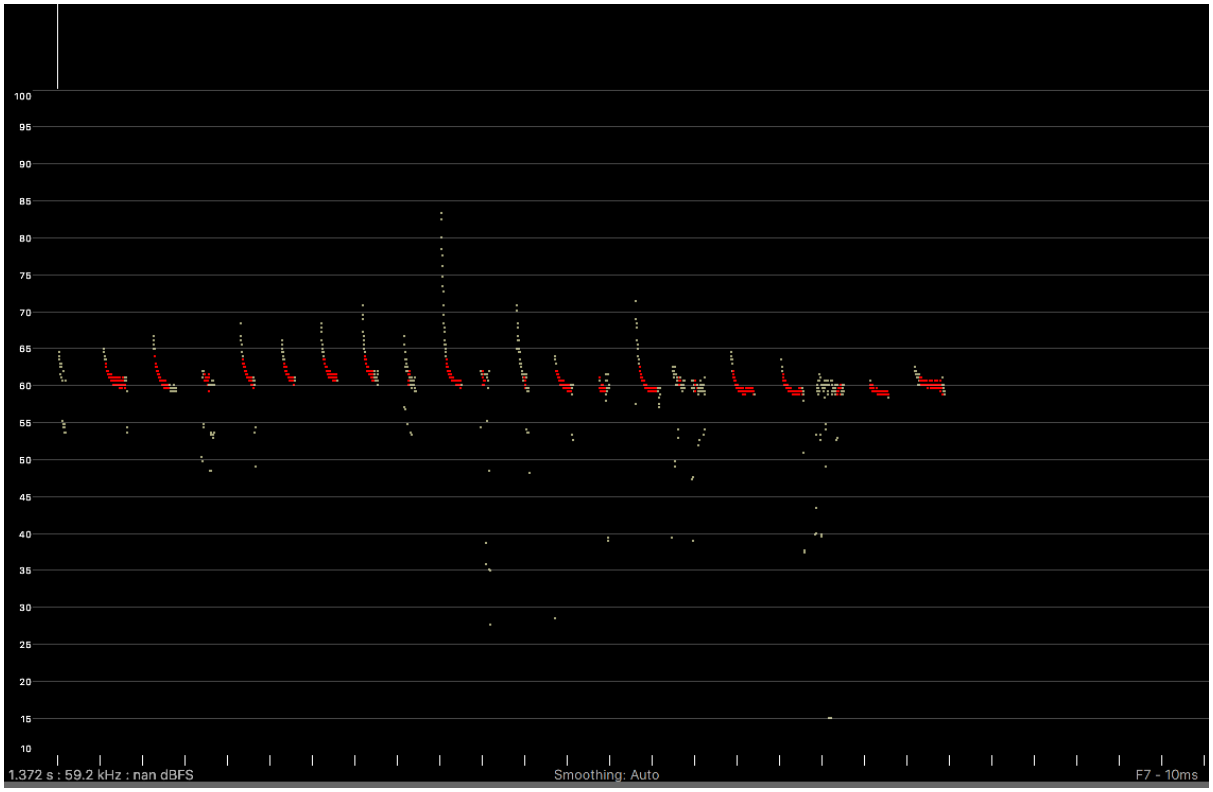

Figure 10 – Miniopterus australis.

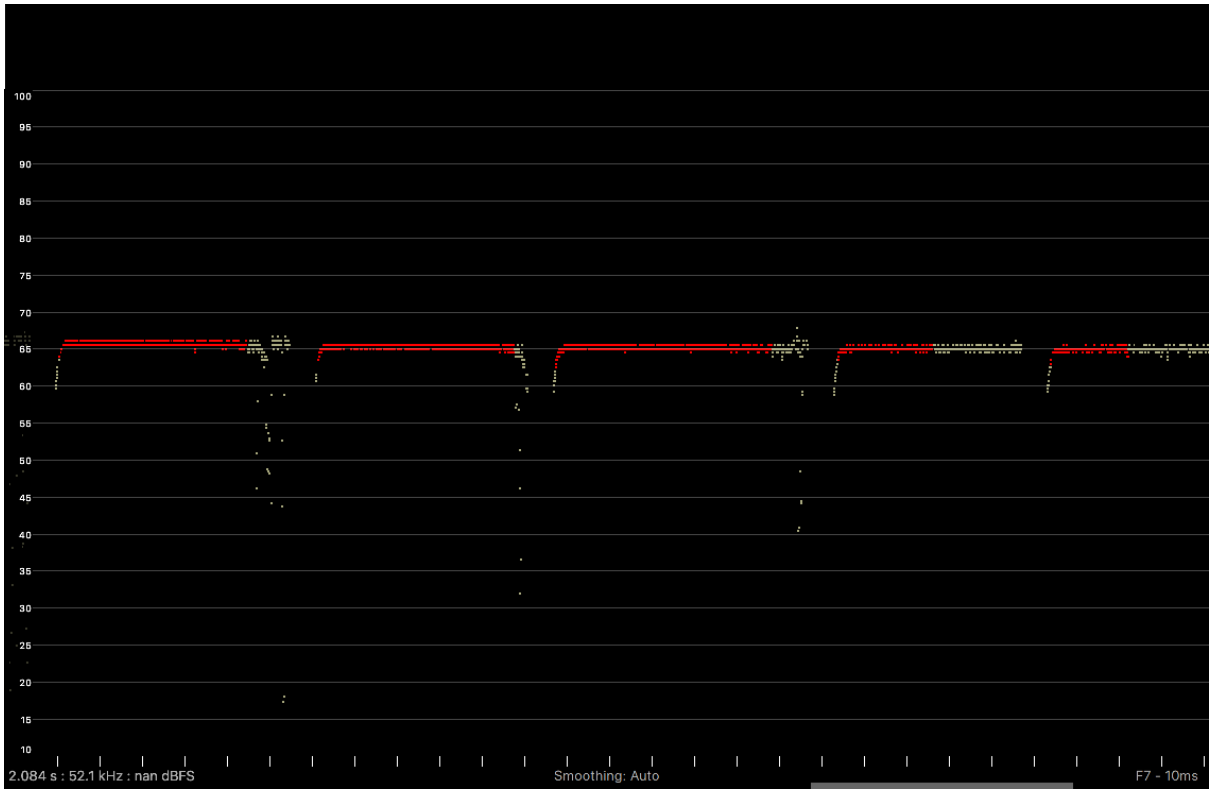

Figure 11 – Rhinolophus megaphyllus

4. References

Australasian Bat Society - *BatMap*. http://ausbats.org.au/batmap. Accessed 28/01/2025.

Baker, A. and Gynther, I. (ed.) (2023). *The Mammals of Australia* (Fourth Edition); Reed New Holland; Sydney.

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Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales. Department of Natural Resources and Mines, Brisbane*.

5. Appendix

5.1 Analyst experience

The author and analyst, Lachlan McRae, has collected hundreds of microbat reference calls throughout NSW. Hundreds of hours have been spent processing and extracting call metrics from those reference calls to determine identification features for each species. These reference calls now form part of his personal NSW reference call library, which is used to significantly increase the accuracy of microbat call analysis within NSW and beyond. Relevant qualifications/completed-courses are listed below:

- PhD on the ecology and conservation of the threatened large-eared pied bat (*Chalinolobus dwyeri*) and eastern cave bat (*Vespadelus troughtoni*) – Macquarie University (in progress).
- Anabat Insight Advanced Workshop – Titley Scientific.
- Kaleidoscope Pro Advanced Training – Wildlife Acoustics.
- Worked as a Fauna Ecologist within the NSW Biodiversity Offset Scheme since 2019.
- Bachelor of Environmental Science and Management HONOURS (1st Class) – University of Newcastle.

Lachlan has gone on to have multiple one-on-one trainings with Dave Roberts from Wildlife Acoustics, Julie Dawson (formerly Broken-Brow) from Titley Scientific, and Brad Law from NSW DPI to further validate his analysis skills and discuss advanced concepts beyond the scope of the above courses. Lachlan also keeps in regular communication with recognised bat experts such as Brad Law, Chris Corben, Greg Ford and Michael Pennay to ensure he remains at the forefront of the latest techniques and knowledge to identify bat calls.

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