Biodiversity Development Assessment Report

252 Hudson Parade, Clareville NSW 2107 By Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands **May 2023**





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Statement of Authorship

This study and report were undertaken by Ecological Consultants Australia at Studio 1/33 Avalon Parade, Avalon. The author of the report is Geraldene Dalby-Ball with qualifications BSc. majoring in Ecology and Botany with over 20 years' experience in this field and Gabriel James with qualifications B Env majoring in Biology.

Limitations Statement

Information presented in this report is based on an objective study undertaken in response to the brief provided by the client. Any opinions expressed in this report are the professional, objective opinions of the authors and are not intended to advocate any particular proposal or pre-determined position.

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Executive Summary

Introduction

Ecological Consultants Australia (ECA) trading as Kingfisher Urban Ecology and Wetlands has been contracted by Zephyr Charters to provide a **Biodiversity Development Assessment Report** (BDAR) for a proposal at 252 Hudson Parade, Clareville NSW 2107 within the Northern Beaches Council Local Government Area (LGA).

Trigger for a formal BDAR under the BC Act 2016:

The proposal triggers the Biodiversity Values Map threshold as per the BOS entry requirements.

Stage 1: Biodiversity Assessment

- On-ground survey took place in August 2022 by Principal Ecologist Geraldene Dalby-Ball.
- Data was gathered across one BAM plot located in the only vegetation zone and within the area mapped on the Biodiversity Values Map.
- Flora and fauna observations were recorded on-site using binoculars and physical examination. Notes, photos and samples of flora species were taken to assess the ecological health and value of the site.
- BioNet searches were performed for flora, fauna and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.

Results

Stage 2: Impact Assessment

- The impact calculations were made based on there being direct impacts on vegetation from the proposed development. The impact area and/or areas of modification have been calculated as 0.08 ha within the 0.1016 ha site.
- Survey plot was within the planted garden vegetation located within the development footprint and assessed as Pittwater and Wagstaffe Spotted Gum Forest (PSGF) (PCT 3234).
- Pittwater and Wagstaffe Spotted Gum Forest is listed as an Endangered Ecological Community (EEC) under the NSW BC Act (2016).
- Pittwater and Wagstaffe Spotted Gum Forest is not listed) under the Commonwealth EPBC Act (1999).
- Vegetation onsite has been significantly altered such that the site does not reflect the natural structural attributes of the PCT.
- Vegetation is structurally and functionally poor due to previous clearing onsite and the dominance of weed species. Thus, the proposed development assessed in this BDAR is not expected to significantly contribute to the loss of PSGF.
- No threatened species were recorded during the site surveys.

Mitigation Measures

- Delineation of work areas
- Fencing and tree protection

- Wildlife corridor and revegetation
- Native species landscaping
- Erosion and sediment controls
- Weed management
- Replacement and installation of nest boxes
- Pathogen prevention

See the recommendations section for a detailed explanation as to how these recommendations improve biodiversity values (section 11).

Conclusions and Recommendations

- The proposed development will have an approximate impact area of 0.08 ha on PSGF (PCT 3234). This vegetation has been significantly altered and degraded from its natural state.
- The site has been managed for at least the past 70 years. The site has a history of vegetation clearing, habitat fragmentation and on-going disturbance, via development. A majority of vegetation on site is exotic weed species.
- The total cost to offset both ecosystem credits generated by this development is TBC by the BCF Charge System upon submission of the BDAR to the consent authority.
- Key mitigation measures include but are not limited to delineation of work areas, vegetation clearing control measures, tree protection, wildlife corridor and revegetation, native species landscaping, weed management, weed removal, installing a nest box, and pathogen prevention should be used to mitigate the impacts associated with the proposal and increase habitat opportunities in the area.

Vegetation zone	РСТ	TEC/EC	Impact area (ha)	Number of ecosystem crea required
1	3234	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	0.08	1

Table E1 Impacts that require an offset – ecosystem credits

Table E2 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
Eastern Cave Bat	Vespadelus troughtoni	0.02	1

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Stage 1: Biodiversity Assessment

1 Introduction

1.1 Proposed development

1.1.1 Development overview

Ecological Consultants Australia (ECA) has been contracted by Zephyr Charters to provide a **Biodiversity Development Assessment Report** for a proposal at 252 Hudson Parade, Clareville NSW 2107 within the Northern Beaches Council Local Government Area (LGA).

The proposal is for the construction of several new buildings including a new resident property, boatshed, carport and garage with integrated granny flat and the construction of an outdoor pool and landscaping to support well-being and provide accessibility within outdoors areas.

Legislative pathway for the proposed development or activity to be considered:

• development that requires consent under Part 4 of the EP&A Act

The site has been assessed in the Biodiversity Assessment Method Calculator (BAM-C) from which offset credits have been generated.

1.1.2 Location

The Subject Site (the "Site") is the area of direct and likely indirect impacts and is defined as the whole of the property. The study area includes the site, as well as any additional surrounding land traversed during the site survey.

Category	Details
Title Reference (Lot/DP)	59/-/DP13760
Total Site Area (m ²)	1,016 m ²
Street Address	252 Hudson Parade, Clareville NSW 2107
LGA	Northern Beaches Council
Land Zoning	C4 – Environmental Living

Table 1.1. Site Administrative Information.



Figure 1.2. Location of the proposed development. Source: SIX Maps. Date accessed: 3/05/2023.

1.2 Site history

The site has been managed as a private residential property. Historical imagery suggests that initial developments occurred as early as the 1950s (NSW Government 2022). Native vegetation would have once covered the area before these initial developments, however, due to modification and major disturbances to the area, the composition and structure of native vegetation is now poor and non-reflective of its original state.

The site includes one vegetation zone due to the limited space available on the property. This vegetation zone has been split into two management zones. Management zone 1 positioned between the house and Hudson Road is in poor condition with minimal tree presence and canopy cover. As such, native species are present within this area, however, are dominated by exotic weeds. Management zone 2 is located at the rear of the property, between the house and the water's edge. The presence of native plant species is also low in the area, outnumbered by the high composition of exotic weed species. Some individual spotted gums are present within this zone which provides some canopy cover to the area.

1.3 Proposed actions

The proposed development includes:

- Demolition of existing buildings.
- Vegetation removal within the proposed building footprint.
- Construction of several new buildings including a new resident property, boatshed, carport and garage with integrated granny flat (see Figure 1.3).
- Construction of an outdoor pool and landscaping to support well-being and provide accessibility within outdoors areas.



Figure 1.3. Site and Roof Plan. Source: Anne Robson Architecture Pty Ltd. DA05. 1/05/2023.



Figure 1.4. Operational Footprint. Source: NSW Six Map. Kingfisher 2022.



1.4 Sources of information used in the assessment

The following sources of information were used for this assessment:

- Atlas of NSW Wildlife (BioNet). New South Wales, Office of Environment and Heritage (OEH).
- Biodiversity Values Map and Threshold Tool. New South Wales, Office of Environment and Heritage (OEH).
- SIX Maps 2022.
- Nearmap 2022.
- SEED 2022.
- SEED NSW State Vegetation Type Map.
- SEED NSW Hydrography.
- NSW Threatened Species Information (DPIE).
- PlantNET (The Royal Botanic Gardens and Domain Trust, 2014).
- Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
- Planning for Bush Fire Protection (PBP) NSW RFS 2019.
- Site and Roof Plan. Anne Robson Architecture Pty Ltd. DA05. 1/05/2023

1.5 Legislative context and statutory requirements

1.5.1 NSW Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* and the *Environmental Planning and Assessment Regulation 2000* institutes and sets out a system for environmental planning and assessment in NSW, and includes Part 4 which deals with development applications on private land and state significant development.

This proposal falls under a Part 4 development and requires development consent and associated environmental assessment.

1.5.2 NSW Biodiversity Conservation Act 2016 and associated documents

The *Biodiversity Conservation Act 2016* (BC Act 2016) is the key legislation that enables the conservation of biodiversity within the state of New South Wales. The BC Act 2016 facilitates the assessment and on-going protection of flora and fauna, including threatened species and ecological communities. The BC Act 2016 outlines assessment and offsetting requirements for activities with the potential to impact on threatened species and ecological communities in NSW, and the clearing of native vegetation.

The BC Act also:

- Outlines the licences required under the BC Act to harm protected flora and fauna;
- Lists Threatened species and ecological communities in Schedules 1 and 2;
- Sets out monetary and imprisonment penalties for offences relating to the harming of protected flora and fauna;

1.5.3 Biodiversity Offsets Scheme Entry

The Biodiversity Offsets Scheme applies to:

local development (assessed under Part 4 of the Environmental Planning and Assessment Act 1979) that triggers the Biodiversity Offsets Scheme threshold (see section 1.6) or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the Biodiversity Conservation Act 2016.

Area Clearing Threshold

The proposal does not trigger the area clearing threshold as per the BOS entry requirements as the impact area (0.08 ha) does not exceed the clearing area threshold (0.25 ha or more). Area clearing thresholds are determined by minimum lot size and guidelines outlined in BAM (OEH 2017) (see Figure 1.6).

Table 1.2. Minimum lot size and threshold which the development exceeds.

Minimum lot size	700 m ²
Threshold for clearing, above which the BAM and offsets scheme apply	0.25 ha or more
Impact area	0.08 ha

Area clearing threshold

The area threshold varies depending 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).

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

Figure 1.6. The area clearing threshold as per the BOS entry requirements. (Table 12, BAM 2020, OEH).

Biodiversity Values Map

The proposed development does impact areas identified by the Biodiversity Values map published by the Chief Executive of the NSW Office of Environment and Heritage (see Figure 1.7).



Figure 1.7. Biodiversity Values Map. Source: DPIE Aug 2022.

1.5.4 NSW State Environmental Planning Policy Koala Habitat Protection 2021.

The State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2021 applies to the proposed development as there is no approved Koala Plan of Management that applies. The subject land is less than one hectare and the land is not considered to constitute 'core koala habitat'. The trees impacted are not 'koala use trees' and hence a KMP is not required.

1.5.5 Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is applicable if it was considered that an impact on a 'matter of National Environmental Significance (NES)' were likely, thus providing a trigger for referral of the proposal to the Department of Environment and Heritage.

Matters of national environmental significance identified in the Act are:

- world heritage properties;
- national heritage places;
- Ramsar wetlands;
- nationally threatened species and communities;
- migratory species protected under international agreements;

- the Commonwealth marine environment; and
- nuclear actions.

The Commonwealth Government has published Significant Impact Guidelines (DE 2013) to assist in the determination of whether an action is likely to have a significant impact on a matter of NES. The proposal is not expected to significantly impact any MNES.

1.5.6 Pittwater Local Environmental Plan (PLEP) 2014

The site is identified as "biodiversity" on the Terrestrial Biodiversity Map as published by Pittwater Council (Map Identification Number: 6370_COM_BIO_010_010_20140217).

As identified in PLEP (2014) the aim of part 7, clause 7.6 is to maintain terrestrial, riparian and aquatic biodiversity by —

- (a) protecting native fauna and flora, and
- (b) protecting the ecological processes necessary for their continued existence, and

(c) encouraging the conservation and recovery of native fauna and flora and their habitats

The proposal will include revegetation areas and biodiversity strategies which will satisfy and contribute to the objectives of the PLEP. Mitigation measures are outlined in section 11 of this report.



Figure 1.8. The site is situated on vegetation mapped as "Biodiversity" and on the Terrestrial Biodiversity Map as published by Pittwater Council.

2 Landscape features and site context

The site is located within residential and open spaces for passive recreation setting. The surrounding properties are made up of medium density residential and patches of native bushland.

Category	Details	
Interim Biogeographic Regionalisation for Australia (IBRA)	Sydney Basin	
IBRA Sub Region	Pittwater	
NSW Landscape	Belrose Coastal Slopes Bsl	
	Mitchell Landscapes v3.1 - Ecosystem Meso Grouping Ecosystem Meso Grouping: SB Pittwater Landscape Code: Bsl Landscape Name: Belrose Coastal Slopes Over Cleared Status: Estimate Fraction Cleared: 0.59	
Dispose Plankau Dispose Plankau Dispose Plankau Dispose Plankau Dispose Plankau		
Landscape features		
Rivers and streams	A drainage gully exists to the east of the site, although it is not considered a waterway and should not be classified as such. The drainage gully does not contain an observable channel, banks or fluvial bed forms (see Figure 2.1)	
Wetlands	No wetlands occur within the site or within close proximity to the proposed development.	
Connectivity features	Vegetation on site is connected to adjoining bushland via canopy trees and gardens. Currently, native planted screening provides minimal connectivity between patches of mature canopy species.	
Areas of geological significance and soil hazard features	No	

Category	Details
Areas of Outstanding Biodiversity Value identified under the BC Act	No
Geology and Soil	"Watagan" is the identified soil landscape for the site as per eSpade2.0 (DPIE, 2021).
	Watagan soil landscapes are categorized by 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.
	Soils—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.



Figure 2.1. Hydrolines surrounding the site (black dot). Source: Water Management (General) Regulation 2018 Hydro Line spatial data.

2.1 Native Vegetation Cover

Native vegetation occurs across a range of conditions throughout the assessment area (see Figure 2.2).



Figure 2.2. Native vegetation cover within 1500 m buffer around the site. Source: SEED 2022.

Table 2.2. Native vegetation cover in the assessment area.

Assessment area (ha)	732.13 ha
Total area of native vegetation cover (ha)	192 ha
Percentage of native vegetation cover (%)	26%
Class (0-10, >10-30, >30-70 or >70%)	>10-30

3 Native vegetation, threatened ecological communities and vegetation integrity

3.1 Native vegetation extent and plant community types

3.1.1 Mapped native vegetation extent

A review of the most complete and consistent representation of the distribution of Plant Community Types (PCTs) across NSW, NSW State Vegetation Type Map Edition C1.1.M1.1, identified one (1) PCTs within the site. The PCT is listed in Table 3.1 below.

PCT Code	PCT Name	BC Act 2016	EPBC Act 1999	Estimated Percentage Cleared
3234	Hunter Coast Lowland Spotted Gum Moist Forest	Pittwater and Wagstaffe Spotted Gum in the Sydney Basin Bioregion State Conservation: Endangered Ecological Community (EEC)	No associated TEC	28%

Table 3.1. Vegetation community synonyms as per NSW and Commonwealth legislation.



Figure 3.1. Current PCT. Source: SEED NSW State Vegetation Type Map. Date accessed: 19/04/2023.

3.1.2 Field survey

The field survey assisted in verifying the distribution and quality of vegetation at the site. Pittwater and Wagstaffe Spotted Gum Forest (PSGF) is mapped across the site via the NSW State Vegetation Type Map.

Approximately 80% of the vegetation onsite has been previously disturbed. The canopy is discontinuous onsite with scattered canopy trees. The mid-stratum is primarily absent within site boundaries. The ground stratum has been highly disturbed, with much of the site dominated by exotic turf grasses and 'High Threat Exotic' (HTE) species. Natural vegetation is evident however its success is hindered by the dominance of exotic species.

Both Vegetation Zone 1 and Vegetation Zone 2 are highly disturbed and show evidence of historical clearing for the development of the current dwelling. Activities such as vegetation stripping, hard landscaping and the creation of building foundations have dramatically altered the plant community from its original state and as such, the area has been unable to return to its original condition. Native vegetation abundance within these areas is low, most likely influenced by the dominance of exotic weed species across the site. Canopy cover is almost absent within Vegetation Zone 1, however, Vegetation Zone 2 does contain some canopy cover, provided by the Spotted Gums (*Corymbia maculata*) which belong to the Pittwater and Wagstaffe Spotted Gum Forest vegetation community.

3.1.3 Changes to mapped vegetation extent

The site is located within Pittwater and Wagstaffe Spotted Gum Forest however the site conditions are not indicative of that vegetation community. The location of the site is positioned on the edge of the vegetation community. As a result, disturbances to the site will not detrimentally impact or fragment the PSGF community which surrounds the area. Native vegetation communities surrounding the site are mapped in Figure 3.2.



Figure 3.2. Extent of native vegetation surrounding property. Source: SEED 2022.

3.1.4 Areas that are not native vegetation

The west border of the property does not intersect with the PSGF community and as such its vegetation does not reflect native vegetation indicative of that community with the exception of the tree canopy as illustrated in Figure 3.3. The north side of the property between the dwelling and the road contains a mixture of some native species, however, the area also contains a high density of exotic weed species. The south side of the property between the dwelling and the water's edge contains minimal mid-story and ground-story cover. Some canopy cover is provided by native trees.



Figure 3.3. Areas of non-vegetation within site. Source: SEED 2022.

3.1.5 Site Photos

The following photos were collected during the site visit by Principal Ecologist Geraldene Dalby-Ball.





Plate 5. Q5



Plate 6. Plot from top



Plate 7. Plot from side

3.2 Vegetation Zones and Integrity Scores

Due to the limited size and area of the site, only one vegetation zone was established. This vegetation zone was determined on site in accordance with species composition and covers areas that are planning to be removed and/or modified containing any existing native vegetation. This singular vegetation zone has been divided into two management zones.

Future vegetation integrity (F-VI) scores in the BAM-C. For integrity, the BAM plot was conducted in the most diverse location on site, where species richness was most evident. Due to the low occurrence on native species on site, F-VI scores are expected to improve. The complete vegetation removal management zones have an F-VI score of 0.

3.2.1 Stratification and plot dimensions

Plots were as per the BAM Method with 20 x 20 and 10 x 40 plots (400 m²) for assessing structure and composition with a centre line extending 50 m and 100 m to create a 20 x 50 and 10 x 100 plot (1000 m²) to assess function. See Biodiversity Assessment Method Operational Manual – Stage 1 (OEH 2018) pages 26-28 for methods used.

https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-operational-manual-stage-1-180276.pdf

3.2.2 Patch size

Vegetation Zone 1 (north and south of existing dwelling)

This site has a singular vegetation zone due to its small size and continuity of soil type. The vegetation zone is located on the north side between the dwelling and the street and on the southern side between the dwelling and the water's edge. Within these areas include developments for several structures including a carport, garage and granny flat on the northside, and an outdoor pool and boatshed on the southside. This would require clearing to facilitate the development. This area has undergone previous clearing and development. Currently, this zone consists of:

- The northside contains mainly mid-story canopy cover. Some native species are present in this area however are dominated by exotic weed species. Top-story canopy cover is low to non-existent within this area.
- The southside of the dwelling has minimal to no mid-story or bottom-story cover. Some top-story canopy cover is present in the form of native trees; *Corymbia maculata* which belong to the PSGF community.

The poor structural diversity is reflected in the low vegetation integrity score. It is highly degraded; it does not reflect the natural attributes of the PSGF community. Due to previous development of this area involving; landscaping, exotic species planting and ongoing maintenance it is unlikely the original vegetation community would recover. The vegetation zone has been divided into two management zones. Management zone 1 is on the northside of the dwelling and Management zone 2 is on the south side of the dwelling. This will reflect the future actions; complete vegetation removal is 0.08 ha across both management zones.

Patch size assigned to the vegetation zone was concluded to be >100 ha. Vegetation on site is less than 100 m from the native vegetation of the adjoining properties. Scattered remnant trees are common across the landscape within the assessment area and form a connection to larger native vegetation throughout the assessment area.

Table 3.2. Current vegetation zones and patch size.

РСТ	Vegetation Zone	Area (Ha)	Patch Size Class
3234 (PSGF)	Vegetation Zone 1 (north and south of existing dwelling)	0.08	>100 ha
Total		0.08	

Table 3.3. Vegetation zone condition scores

Zone ID	Composition Condition	Structure Condition	Function Condition	Vegetation Integrity Score	Hollow Bearing Trees Present?
1	40.5	11.6	11.4	17.5	0



Figure 3.4. Impact area. Source: NSW Six Map 2022.





Figure 3.7. Fragmented vegetation across the surrounding landscape. Source: Six Maps 2022.



Figure 3.8. Previously mapped EEC/CEEC PSGF blue. The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489. Source Six Maps and SEED 2022.



Figure 3.9. Extract from SEED has the area of proposed works mapped as PSGF (PCT1214). This includes mapping of the canopy cover over the existing path/road. Source SEED Map 2022.

The Endangered Ecological Communities onsite; Pittwater and Wagstaffe Spotted Gum Forest (PSGF), continue to support a range of native flora and fauna. Weeds infestations are present in most areas, however through ongoing bushland management these areas can be re-established as pristine examples of their respective communities.

4 Threatened Species

4.1 Flora and Fauna Field Survey

No threatened flora or fauna species were identified during Kingfisher 2022 field surveys.

4.1.1 Opportunistic Flora and Fauna survey methods

During opportunistic surveys, notes and photos were taken of the vegetation types and flora and fauna present onsite were recorded. Surveys were general and opportunistic in nature and were performed by traversing the site.

4.1.2 Diurnal Bird Surveys

Diurnal bird surveys occurred during mid-afternoon. Opportunistic observations of birds were made during vegetation surveys. Several species which are known to nest in hollows were predicted at the site and a dedicated effort was made to traverse the impact area to understand if hollows are present and if they are suitable for predicted bird species.

The site survey for birds primarily focused on their breeding habitat requirements such as hollows, waterways onsite, nests that are present and other features which BAM identified bird species may use for breeding purposes. It was concluded that the impact area hosts potential foraging habitat for all birds species listed in the BAM calculator. Therefore, all bird species identified in the BAM calculator were retained in the assessment for foraging purposes.

However, it is unlikely that threatened avifauna would use the impact area for breeding purposes, due to lack of optimal breeding habitat (suitable hollows, suitable waterways). Justification for species exclusion in the BAM-C can be found in Appendix I. Searches and call playback was not conducted for forest owls and no individuals were observed on site.

4.1.3 Microbats

The impact area hosts marginal foraging habitat for threatened microbat species which are identified in the BAM calculator for the site. All microbat species have been retained in the BAM calculator for foraging purposes. The site survey for microbats primarily focused on their breeding habitat requirements such as caves, outcrops, hollows and other features which microbat species may use for breeding purposes.

It has been concluded that while microbat species may use the site for foraging purposes they are unlikely to use the site for breeding purposes due to lack of optimal breeding opportunities within the impact area. Therefore, impact assessment on microbat breeding habitat has been excluded from the BAM assessment.

4.1.4 Mammal Surveys

Mammal surveys occurred during the mid-afternoon. The proposed development is not expected to significantly impact upon breeding or foraging purposes for any mammal species identified in the BAM Calculator as there are no optional habitat features within the development area.

4.1.5 Amphibian Surveys

Amphibian surveys occurred during the mid-afternoon. Opportunistic observations of amphibians were made during vegetation surveys. Any potential habitat features were investigated however no threatened amphibian species identified in the BAM calculator were identified onsite. Habitat requirements for all threatened amphibian species identified in the BAM calculator are marginal within the impact area.

4.1.6 Reptile and Snail surveys

Reptile and Snail surveys were undertaken by thorough investigation of potential habitat including:

- Leaf litter
- Bark litter
- Stick piles
- Native ground cover vegetation
- Rocks
- Rubbish

No threatened Reptile or Snail species were identified during site investigations.

4.1.7 Koala assessment summary

The proposal is unlikely to have a significant impact on the Koala or areas of critical habitat for the species. It is unlikely that the species would occur on site due to the degraded nature of vegetation and habitat, as such, there is a low likelihood of occurrence for the species.

Desktop (Bionet, ALA) and on-ground surveys were conducted to determine the presence / absence of the species. The on-ground survey also contributed to information regarding habitat availability within the site. Direct observation surveys for the species were generally opportunistic in nature, however no individuals were observed on site. Indirect survey methods including scat and scratching's searches (outlined in DotE; 2014) were conducted. No evidence of the species was found on site.

4.2 Threatened Flora – Desktop

A total of 17 threatened flora species have been recorded within 10km of the study site according to BioNet records. These species are currently listed as vulnerable or endangered under state and/or commonwealth legislation (see Table 4.1). The vulnerable and endangered species to focus on-site searches for can be seen in Table 4.1 below highlighted in bold. This is based on likelihood of occurrence.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Rutaceae	Asterolasia elegans		E1	E	1
Rutaceae	Boronia umbellata Orara Boronia		V,P	V	1
Myrtaceae	Callistemon linearifolius	Netted Bottle Brush	V,3		4
Euphorbiaceae	Chamaesyce psammogeton	Sand Spurge	E1		7
Orchidaceae	Cryptostylis hunteriana	Leafless Tongue Orchid	V,P,2	V	1
Myrtaceae	Eucalyptus camfieldii	Camfield's Stringybark	V	V	7
Myrtaceae	Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	4
Orchidaceae	Genoplesium baueri	Bauer's Midge Orchid	E1,P,2	E	1

Table 4.1 Threatened flora observed in previous ecological surveys within a 10km radius of the study site. NSW DPIE BioNet 2022.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Proteaceae	Grevillea caleyi	Caley's Grevillea	E4A,3	CE	51
Myrtaceae	Kunzea rupestris		V	V	1
Malvaceae	Lasiopetalum joyceae		V	V	1
Orchidaceae	Microtis angusii	Angus's Onion Orchid	E1,P,2	E	2
Proteaceae	Persoonia hirsuta	Hairy Geebung	E1,P,3	E	5
Thymelaeaceae	Pimelea curviflora var. curviflora		V	V	1
Myrtaceae	Rhodamnia rubescens	Scrub Turpentine	E4A		31
Myrtaceae	Syzygium paniculatum	Magenta Lilly Pilly	E1	V	16
Elaeocarpaceae	Tetratheca glandulosa		V		17

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable, P = Protected.

4.3 Threatened Fauna – Desktop

A total of 56 threatened fauna species have been recorded within 10km of the study site according to BioNet records. These species are currently listed as vulnerable or endangered under state and/or commonwealth legislation (see Table 4.2). The vulnerable and endangered species to focus on-site searches for can be seen in Table 4.2 below highlighted in bold. This is based on likelihood of occurrence.

Table 4.2.	Threatened fauna	observed in pre-	vious ecological	surveys withi	n a 10km ra	adius of the	study site.
NSW DPIE	BioNet 2022.						

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Amphibia	Heleioporus australiacus	Giant Burrowing Frog	V,P	V	25
Amphibia	Litoria aurea	Green and Golden Bell E1,P Frog		V	2
Amphibia	Pseudophryne australis	Red-crowned Toadlet	V,P		45
Aves	Anthochaera phrygia	Regent Honeyeater	E4A,P	CE	37
Aves	Ardenna carneipes	Flesh-footed Shearwater	V,P	J,K	1
Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P		2
Aves	Burhinus grallarius	Bush Stone-curlew	E1,P		54
Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	V,P,3		1

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2		74
Aves	Dasyornis brachypterus	Eastern Bristlebird	E1,P,2	1,P,2 E	
Aves	Diomedea exulans	Wandering Albatross	E1,P	E	2
Aves	Diomedea gibsoni	Gibson's Albatross	V,P	V	1
Aves	Esacus magnirostris	Beach Stone-curlew	E4A,P		1
Aves	Glossopsitta pusilla	Little Lorikeet	V,P		8
Aves	Haematopus fuliginosus	Sooty Oystercatcher	V,P		7
Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P		42
Aves	Hieraaetus morphnoides	Little Eagle	V,P		4
Aves	Hirundapus caudacutus	lirundapus caudacutus White-throated Needletail		V,C,J,K	8
Aves	Ixobrychus flavicollis	Black Bittern	V,P		1
Aves	Lathamus discolor	Swift Parrot	E1,P,3	CE	15
Aves	Lophoictinia isura	Square-tailed Kite	V,P,3		3
Aves	Macronectes giganteus	Southern Giant Petrel	E1,P	E	1
Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V,P		1
Aves	Neophema pulchella	Turquoise Parrot	V,P,3		1
Aves	Ninox connivens	Barking Owl	V,P,3		21
Aves	Ninox strenua	Powerful Owl	V,P,3		262
Aves	Numenius madagascariensis	Eastern Curlew	Ρ	CE,C,J,K	8
Aves	Pandion cristatus	Eastern Osprey	V,P,3		5
Aves	Petroica boodang	Scarlet Robin	V,P		1
Aves	Ptilinopus regina	Rose-crowned Fruit-Dove	V,P	V,P	
Aves	Ptilinopus superbus	Superb Fruit-Dove	V,P		2
Aves	Thalassarche cauta	Shy Albatross	V,P	V	3

Class	Scientific Name	e Common Name		Comm. status	Records
Aves	Thalassarche chrysostoma	Grey-headed Albatross	Р	E	1
Aves	Thalassarche melanophris	Black-browed Albatross	V,P	V	1
Aves	Tyto novaehollandiae	Masked Owl	V,P,3		4
Mammalia	Cercartetus nanus	Eastern Pygmy-possum	V,P		279
Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V	16
Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	V,P	E	5
Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P		2
Mammalia	Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E1,P	E	31
Mammalia	Micronomus norfolkensis	Eastern Coastal Free- tailed Bat	V,P		12
Mammalia	Miniopterus australis	Little Bent-winged Bat	V,P		43
Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P		71
Mammalia	Myotis macropus	Southern Myotis	V,P		17
Mammalia	Petauroides volans	Greater Glider	Ρ	V	1
Mammalia	Petaurus norfolcensis	Squirrel Glider	V,P		5
Mammalia	Phascolarctos cinereus	Koala	V,P	V	76
Mammalia	Pseudomys novaehollandiae	New Holland Mouse	Ρ	V	9
Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	138
Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail- bat	V,P		1
Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	V,P		7
Mammalia	Vespadelus troughtoni	Eastern Cave Bat	V,P		1
Reptilia	Caretta caretta	Loggerhead Turtle	E1,P	E	4
Reptilia	Chelonia mydas	Green Turtle	V,P	V	8
Reptilia	Eretmochelys imbricata	Hawksbill Turtle	Р	V	1
Reptilia	Varanus rosenbergi	Rosenberg's Goanna	V,P		23

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable, P = Protected.

4.4 Endangered population

Two (2) endangered populations have been recorded to occur within 10km of the site. Table 4.3 below displays the populations.

Table 4.3. Endangered population observed in previous ecological surveys within a 10km radius of the study site. NSW DPIE BioNet 2022.

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Mammalia	Petaurus norfolcensis	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1
Mammalia	Phascolarctos cinereus	Koala in the Pittwater Local Government Area	E2,V,P	V	76

Likelihood of occurrence

See Appendix I for a 'Rationale for Likelihood of Occurrence', which outlines why species have been retained or omitted from BAM calculations. Reasons for inclusion or removal are based on species habitat preferences, site investigations, species survey, BioNet records and expert opinion. During the survey, none of the above threatened species were observed on-site. Marginal foraging habitat for several species is present onsite. Thus, all predicted species were retained in the BAM-C. Habitat suitability has been assessed in Appendix I for candidate species generated in the BAM-C.

Stage 2: Impact Assessment

5 Efforts to Avoid and Minimise

5.1 Consideration of Alternatives

5.1.1 'Do nothing' scenario

This option was dismissed as the objectives of the project would not be met. The development proposal is taking place on a private residential site. The proposal has been presented by the landowner of the property who has intentions to reinstate the current dwelling as well as the installation of some additional buildings and recreational areas.

5.1.2 Alternative locations within site

Due to the size of the lot boundary and restrictions with space, there are no alternative locations within this site for the developments which have been proposed. Neighbouring properties surround the site, all of which contain some degree of vegetation that acts as important connecting vegetation for the surrounding flora.

Alternative locations were considered for the placement and construction of the driveway and garage to prevent the removal of one Spotted Gum (*Corymbia maculata*). Due to the root spread on the tree and restrictions on space, however, this was not feasible as stated by the Arborist in Figure 5.1.



5.1.3 Proposed Location and Design

Confirmed tried to locate the drive and offset parking to retain the tree. Due to location and root spread, was deemed not possible. The rest of the house is being built where the existing house is already located.
6 Direct Impacts

6.1 Vegetation disturbance and Loss

Two (2) Spotted Gum (Corymbia maculata) are proposed for removal (see Figure 6.1).



Figure 6.1. Tree Retention Map. Source: Arboricultural Impact Assessment. Source: Arborsaw 2023.

6.1.1 Vegetation Zone 1

A total of 0.08 ha of vegetation within the building footprint (Management zones 1 and 2) will undergo complete or partial removal or modification. This area consists of a highly disturbed garden with minimal to no mid-story to ground-story cover. The ground vegetation is dominated by exotic species with a mix of local and non-local native species throughout. This area is substantially degraded such that the original vegetation community is unlikely to recover. Areas of potential habitat for PSGF will be lost, although the site has been subject to vegetation removal and modification for the previous 70 years.

Two (2) Spotted Gum (*Corymbia maculata*) are proposed for removal. One is located on the north side of the dwelling within Management zone 1 and one is located on the south side of the dwelling within Management zone 2.

Tree Id	Tree Ownership	Common Name	Botanical Name	Trees In Group	Tree Age	TPZ Radius [m]	TPZ Area [m2]	SRZ Radius [m]	Height [m]	Canopy [m]	Health	Structure	ULE [Yrs.]	Observations	Recommendations	Arborist Notes	Landscape Significance	Retention Value	Proposed Impact	Retention Status
30	Council land	Spotted Gum	Corymbia maculata	1	Mature	12.6	498.51	3.69	25	20	Good	Good	Long (>40 years)	Deadwood < 30mm, Sap exudation, Wound(s)		Council tree	High	А	No Impact	Retain and Protect
31	Council land	Spotted Gum	Corymbia maculata	1	Mature	7.2	162.78	2.81	25	1	Good	Average	Long (>40 years)	Deadwood > 30mm, Wound response growth, Wound(s)		Council tree. Basal wound with good response growth.	High	В	No Impact	Retain and Protect
32	Council land	Smooth-barked Apple Myrtle	Angophora costata	1	Semi- Mature	2.88	26.04	1.61	12	5	Good	Average	Medium (15-40 years)	Suppressed		Council tree	Medium	В	No Impact	Retain and Protect
33	Council land	Turpentine	Syncarpia glomulifera	1	Semi- Mature	4.56	65.29	2.34	10	10	Good	Average	Long (>40 years)	Suppressed		Council tree	Medium	в	No Impact	Retain and Protect
34	Council land	Spotted Gum	Corymbia maculata	1	Semi- Mature	4.08	52.27	2.2	20	6	Good	Average	Long (>40 years)			Council tree	Medium	В	No Impact	Retain and Protect
35	Client site	Spotted Gum	Corymbia maculata	1	Semi- Mature	4.32	58.6	2.3	20	8	Average	Good	Long (>40 years)	Deadwood < 30mm, Dieback			High	в	Within Development footprint	Remove
36	Neighbouring property	White Stringybark	Eucalyptus globoidea	1	Semi- Mature	3.6	40.69	2.08	15	10	Good	Good	Long (>40 years)	Deadwood > 60mm, Suppressed	Remove deadwood > 30mm	Deadwood over phone line. Move timber pile at base away from trunk.	Medium	в	Minor Encroachment	Retain and Protect
37	Neighbouring property	Smooth-barked Apple Myrtle	Angophora costata	1	Mature	9.36	275.09	3.14	25	20	Good	Average	Long (>40 years)	Crossing/rubbing branches, Deadwood > 60mm, Mechanical damage, Sap exudation	Remove deadwood > 30mm, Remove selective branches, Remove TPZ/SRZ incursion	Move timber pile at base away from trunk. Large rubbing branch with significant flattening. Reomve top side branch	High	A	Minor Encroachment	Retain and Protect
38	Neighbouring property	Weeping Fig	Ficus benjamina	1	Semi- Mature	2.64	21.88	1.88	10	10	Good	Average	Medium (15-40 years)	Co-dominant stems, Inappropriate location, Infrastructure contact	Consider removing	Exempt	Low	с	Minor Encroachment	Retain and Protect
39	Neighbouring property	Camellia	Camellia sasanqua	1	Semi- Mature	2	12.56	1.61	5	5	Good	Good	Long (>40 years)	Wound(s)		Overhangs site	Low	с	Canopy Encroachment	Retain and Protect
40	Neighbouring property	Spotted Gum	Corymbia maculata	1	Mature	9	254.34	3.09	22	18	Good	Average	Long (>40 years)	Epicormic growth, Previous failure(s)			High	A	No Impact	Retain and Protect
41	Client site	Spotted Gum	Corymbia maculata	1	Semi- Mature	2.88	26.04	1.94	12	4	Good	Good	Long (>40 years)				Medium	в	Minor Encroachment	Retain and Protect
42	Client site	Spotted Gum	Corymbia maculata	1	Semi- Mature	3.84	46.3	2.15	18	6	Good	Good	Long (>40 years)	Deadwood < 30mm			Medium	в	Minor Encroachment	Retain and Protect
43	Client site	Spotted Gum	Corymbia maculata	1	Semi- Mature	2	12.56	1.61	12	4	Good	Good	Long (>40 years)	Mechanical damage, Wound(s)		Minor trunk wound	Medium	В	No Impact	Retain and Protect
44	Client site	Spotted Gum	Corymbia maculata	1	Semi- Mature	3.48	38.03	2.1	14	6	Good	Average	(>40 years)	Epicormic growth, Suppressed			Medium	В	No Impact	Retain and Protect
45	Client site	Spotted Gum	Corymbia maculata	1	Mature	8.88	247.6	3.04	22	20	Good	Average	Long (>40 years)	Epicormic growth, Wound(s)			High	A	Minor Encroachment	Retain and Protect
46	Client site	Spotted Gum	Corymbia maculata	1	Mature	6.24	122.26	2.65	20	12	Good	Average	Long (>40 years)	Epicormic growth, Wound(s)			High	A	No Impact	Retain and Protect
47	Client site	Spotted Gum	Corymbia maculata	1	Semi- Mature	3.12	30.57	2.02	12	4	Good	Good	Long (>40 years)				Medium	В	Conflicts with inclinator alignment.	Remove
Tree Id	Tree Ownership	Common Name	Botanical Name	Trees In Group	Tree Age	TPZ Radius [m]	TPZ Area [m2]	SRZ Radius [m]	Height [m]	Canopy [m]	Health	Structure	ULE [Yrs.]	Observations	Recommendations	Arborist Notes	Landscape Significance	Retention Value	Proposed Impact	Retention Status
48	Neighbouring property	Spotted Gum	Corymbia maculata	1	Mature	6.6	136.78	2.67	20	10	Good	Good	Long (>40 years)				High	А	Minor Encroachment	Retain and Protect

Figure 6.2. Tree data. Source: Arborsaw 2023.

7 Indirect Impacts

7.1.1 Weed growth and invasion

Weeds must be properly managed to avoid spreading into native bushland. Weeds are to be managed in the direct works zone by stopping seed spread on machinery, tools, equipment, and worker clothes (e.g., boots). Additionally, after weed removal around the perimeter area of the construction, there must be continuous maintenance of the site otherwise exacerbated weed growth may occur due to the presence of weeds preworks. Weeds will colonize and pioneer on any cleared grounds so must be managed throughout the project as well as on-going post-works.

7.1.2 Introduction of pathogens

The introduction of pathogens may occur into the site, and surrounding remnant bushland, via machinery, tools, equipment, and worker clothing (e.g., boots). Diseases to watch out for include Phytophthora (also known as Root Rot – type of water mold) and Myrtle Rust (Puccinia psidii – type of fungus). See Appendix IV for Bushland Hygiene Protocols for Phytophthora.

7.1.3 Soil disturbance and erosion

The removal of vegetation and trees can result in soil disturbance. The soil appears to be sodic thus erosion can occur at a faster rate. Soil compaction could occur from machinery use. It is recommended that soil compaction in non-built areas is to be avoided and not occur within the trees to be retained. Replacement of woody debris and a covering of organic matter over the cleared site will prevent erosion and thus is highly recommended.

7.1.4 Water Quality

There are no streams present on-site however the proposed actions may result in the transport of sediment from the work zones because of increased storm water runoff to areas downstream. Which may impact water quality, riparian vegetation, and aquatic fauna. Recommendations to maintain and improve water quality on-site have been included in Section 11.

8 Serious and Irreversible Impact Assessment (SAII)

The following section provides details which address section 10.2 of the Biodiversity Assessment Method (BAM) and thus has referenced the guiding document *Guidance to assist a decision-maker to determine a serious and irreversible impact* in order to satisfy BAM requirements.

The document *Guidance to assist a decision-maker to determine a serious and irreversible impact* outlines the steps taken to determine serious and irreversible impacts in section 3.2. The steps are as follows.

- 1. Step one: Identify relevant entities at risk of a SAII
- 2. Step two: Evaluate the extinction risk of the entity to be impacted
- 3. Step three: Detail measures taken to avoid, minimise and mitigate impacts on the entity
- 4. Step four: Evaluate a serious and irreversible impact
- 5. Step five decision making

8.1.1 Step one - Identify relevant entities at risk of a SAII

Following 3.2.1 in Guidance to assist a decision-maker to determine a serious and irreversible impact:

The Biodiversity Assessment Report (BAR) will identify species or ecological communities at risk of a SAII that are likely to be affected by the proposal. These entities are identified in the BAM Calculator (BAM-C). The front page of the credit report provided by the BAM-C will also identify all the entities that are considered to be at risk of a SAII and are impacted on by the proposal.

The BAM-C Credit report can be found in Appendix V.

The following section identifies SAII entities recognised by the BAM Calculator as being at risk of a serious and irreversible impact. Description of the principles for the Listed entities are available in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* and are summarised as:

- Principle 1 species or ecological community currently in a rapid rate of decline
- Principle 2 species or ecological communities with a very small population size
- Principle 3 species or area of ecological community with very limited geographic distribution
- Principle 4 species or ecological community that is unlikely to respond to management and is therefore irreplaceable

The list of SAII entities identified by the document was accessed via;

https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development

Scientific Name	Common Name	Principles				
		1	2	3	4	
Pittwater and Wagstaffe Spotted Gum Forest (PSGF) (PCT 3234)	Pittwater and Wagstaffe Spotted Gum Forest (PSGF) (PCT 3234)			x		
Chalinolobus dwyeri	Large-eared Pied Bat				х	
Vespadelus troughtoni	Eastern Cave Bat				х	

Table 8.1. All SAII entity recognised by the BAM Calculator for the site.

8.1.2 Step two - Evaluate the extinction risk of the entity to be impacted

• Pittwater and Wagstaffe Spotted Gum Forest (PSGF)

Pittwater Spotted Gum Forest (PSGF) satisfies Principle 1 and 2 of SAII criteria;

- Principle 1 species or ecological community currently in a rapid rate of decline
- Principle 2 species or ecological communities with a very small population size

The proposed development will have an approximate impact area of 0.08 ha within the 48.4 ha local patch of PSGF. Vegetation due to be impacted on the site has been significantly altered such that the site does not reflect the natural structural attributes of PSGF as the area is used for driveway access and exotic garden species. Vegetation marginally reflects attributes of the PSGF community, this is primarily due to historical actions on site including; development, clearing, erosion, and exotic species landscaping. A majority of vegetation on site is regrowth or has been planted by the property owner. Exotic species are dominant across the site, and current management and uses are preventing the recruitment of the original vegetation community. Thus, the proposed development is not expected to significantly contribute to the loss of PSGF due to the degraded nature of the site.

• Microbat species (Large-eared Pied Bat and Eastern Cave Bat)

Habitat removal for the microbat species is a serious concern as the species is unlikely to respond to management (Principle 4). Maternity or breeding habitat is not present for the species within the impact area or the site. Breeding habitats such as caves, outcrops, suitable hollows and other features which microbat species may use for breeding purposes were not identified within the impact area or onsite.

The impact area hosts marginal foraging habitat for microbats in the form of canopy cover and insect abundance. Two trees are proposed for removal, resulting in a loss of marginal foraging habitat. Alterations and degradation of habitat onsite pre-BDAR would have caused a greater disruption to the species than the proposed development.

Foraging habitat will be lost, however, it is expected that the trees are not significantly contributing towards the long-term survival of the species, as it is considered to be marginal habitat, only to be used occasionally or opportunistically. It is expected that the local population of microbats will not be significantly affected by the proposed development as they are highly mobile and may only use the site occasionally.

Known/potential breeding sites have been identified in Figure 8.1. No known breeding or potential breeding habitat in the form of cliffs and caves is located within 100 m of the site.

8.1.3 Step three - Detail measures taken to avoid, minimise and mitigate impacts on the entity

• Pittwater and Wagstaffe Spotted Gum Forest (PSGF)

The proposal is expected to have a negligible impact on PSGF as the core habitat for PSGF will not be removed. The vegetation proposed for removal is in poor condition and it is unlikely that the original vegetation community would recover without assistance.

The proposal includes a corridor along the impacted vegetation to be revegetated using species selected from the PSGF planting list. Delineation of works areas and exclusion zones for all vegetation to remain have been recommended.

• Microbat species (Large-eared Pied Bat and Eastern Cave Bat)

It has been established that maternity or breeding habitat is not present within the impact area for the microbat species. The impact area hosts marginal foraging habitat for the species in the form of canopy cover and insect abundance. To avoid additional disturbance on potential foraging habitat, only vegetation that requires removal because of proximity to the proposed building or the need to conform to the bushfire protection requirements will be removed or modified.

Two microbat nest boxes are recommended for installation within the site boundaries. This will increase the potential for microbats to roost in the area post-development. Native species landscaping across the site is also recommended to increase the potential habitat area for the microbat species.

8.1.4 Step four - Evaluate a serious and irreversible impact

• Pittwater and Wagstaffe Spotted Gum Forest (PSGF)

The proposed development assessed in this BDAR is not expected to significantly contribute to the loss of PSGF due to the poor condition of vegetation onsite. Vegetation is both structurally and functionally poor due to historical actions on site. It is unlikely that this proposal would place PSGF at risk of extinction or cause a serious or irreversible impact.

• Microbat species (Large-eared Pied Bat and Eastern Cave Bat)

Maternity or breeding habitat is not present for the species within the impact area or onsite. The impact area hosts marginal foraging habitat for microbats in the form of canopy cover and insect abundance. Foraging habitat will be lost, however, it is expected that the trees are not significantly contributing towards the long-term survival of the species, as it is considered to be marginal habitat, only to be used occasionally or opportunistically. It is expected that the proposal will not cause a disruption to the lifecycle of the microbat species. Therefore, the species will not be placed at risk of a serious or irreversible impact.

8.2 Information required as per Section 9.1.1 and 9.1.2. BAM 2020

- 8.2.1 Additional impact assessment provisions for threatened ecological communities at risk of an SAII
- 1. The assessor is required to provide further information in the BDAR or BCAR regarding the impacts on each TEC at risk of an SAII. This must include the action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR and BCAR.

Actions and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII have been presented in the mitigation measures section of this report (see Section 11).

- 2. The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including:
 - a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal).

The distribution of Pittwater and Wagstaffe Spotted Gum Forest is highly restricted. Information on the disturbance since 1970 is not available, however it is generally agreed that approximately 0.05% remains of its original pre-European extant.

- extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:
 - i. change in community structure
 - ii. change in species composition
 - iii. disruption of ecological processes
 - iv. invasion and establishment of exotic species
 - v. degradation of habitat, and
 - vi. fragmentation of habitat

The following extract provides details pertaining to the items in question 2 (b) above. NSW Threatened Species Scientific Committee, *Pittwater Spotted Gum Forest* Final Determinations. <u>https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2013/pittwater-wagstaffe-spotted-gum-forest-nsw-scientific-committee-final-determination.pdf?la=en&hash=95E95CC5FFA86592227BE0A6B42614F597BCE468</u>

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, the scale recommended for assessing area of occupancy by IUCN (2010), and an extent of occurrence of c. 104 km2 (based on a minimum convex polygon, as recommended by IUCN 2010). The geographic distribution is therefore inferred to be highly restricted.

Approximately 33% of the remaining stands of the community are reserved, including c. 47 ha in Bouddi National Park and c. 3 ha in Brisbane Water National Park (Bell 2009). Thomas and Benson (1985) mapped c. 37 ha within Ku-ring-gai Chase National Park but this has not been substantiated in more recent studies. Within Pittwater local government area, c. 50 ha of the community occur in Council reserves (Bangalay Ecological & Bushfire and Eastcoast Flora Survey 2011), including Stapleton Park and McKay, Crown of Newport, and Angophora bushland reserves. The structure of Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion was originally open-forest however, it now exists outside of reserves as woodland or remnant trees with few large stands remaining. Remnant trees may have particular ecological and genetic significance and may be important sources of propagation material for use in rehabilitation projects. The community has been extensively cleared, particularly in the Pittwater Local government area, and is threatened by further clearing for housing, bushfire mitigation and onsite wastewater disposal. The total reduction in geographic distribution of Pittwater and Wagstaffe Spotted Gum Forest since European settlement is estimated to be c. 75% (Bell 2009, Bangalay Ecological & Bushfire and Eastcoast Flora Survey 2011, Bell and Stables 2012). The community is therefore inferred to have undergone a large reduction in geographic distribution. 'Clearing of native vegetation' is listed as a Key Threatening Process under the Threatened Species Conservation Act 1995.

Weed invasion poses a significant threat to Pittwater and Wagstaff Spotted Gum Forest in the Sydney Basin Bioregion. Weed species affect the structure of the community and reduce its ecological function by smothering native plants, reducing both reproduction and survival, and inhibiting emergence and establishment of their seedlings. The exotic taxa listed below, many of which are escaped garden plants, have been recorded from Pittwater and Wagstaffe Spotted Gum Forest (DECCW 2012, in litt.) a

'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants', 'Invasion and establishment of exotic vines and scramblers', 'Invasion, establishment and spread of Lantana (Lantana camara L. sens. lat)', 'Invasion of native plant communities by Chrysanthemoides monilifera', and 'Invasion of Native Plant Communities by African Olive Olea europaea L. subsp. cuspidata (Wall. ex G.Don Ciferri)' are listed as Key Threatening Processes under the Threatened Species Conservation Act 1995.

Inappropriate fire regimes are a major threat to Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion. In the Pittwater local government area, most remnants of the community have not been burnt in a high intensity fire since at least the 1960's (Holden 1999). An absence of regular fire has also allowed the proliferation of bird-dispersed species, such as Pittosporum undulatum, Glochidion ferdinandi, Livistona australis and Elaeocarpus reticulatus, which have responded well to elevated nutrient levels and are increasing their abundance within the community (Smith and Smith 2000, Pittwater Council 2002, Bangalay Ecological & Bushfire and Eastcoast Flora Survey 2011). Prolonged absence of fire within this community is likely to result in a decline in abundance of short lived species with fire-cued germination and recruitment (Smith and Smith 2000).

Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion is threatened by clearing for urban development, urban runoff, dumping of rubbish and garden refuse, weed invasion, inappropriate fire regimes, fragmentation, and demographic and environmental stochasticity due to the small size of most remaining remnants (Bell 2009, Bangalay Ecological & Bushfire and Eastcoast Flora Survey 2011). Collectively, these threats have led to changes in community structure and species composition, habitat degradation and fragmentation, and invasion and establishment of exotic species, and are indicative of a large reduction in ecological function of the community.

Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion provides important habitat and food sources for the Endangered Population of the Squirrel Glider (Petaurus norfolcensis) on the Barrenjoey Peninsula, north of Bushrangers Hill, which is listed under the Threatened Species Conservation Act 1995 (Smith and Smith 2000). The ecotone between Pittwater and Wagstaffe Spotted Gum Forest and Hawkesbury Sandstone Open-Forest is also one of several key habitats for the Endangered Population of the Koala (Phascolarctos cinereus) in the Pittwater local government area, which is listed under the Threatened Species Conservation Act 1995 (Smith and Smith 2000). Both the Squirrel Glider and the Koala are listed as Vulnerable Species in New South Wales.

- c. evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the:
 - i. extent of occurrence
 - ii. area of occupancy, and
 - iii. number of threat-defined locations

Clause 17 Reduction in geographic distribution of ecological community

The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:

(b) a large reduction in geographic distribution.

Clause 18 Restricted geographic distribution of ecological community

The ecological community's geographic distribution is estimated or inferred to be:

(b) highly restricted,

and the nature of its distribution makes it likely that the action of a threatening process could cause it to decline or degrade in extent or ecological function over a time span appropriate to the life cycle and habitat characteristics of the ecological community's component species.

Clause 19 Reduction in ecological function of ecological community

The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:

(b) a large reduction in ecological function,

as indicated by any of the following:

- (d) change in community structure,
- (e) change in species composition,
- (f) disruption of ecological processes,
- (g) invasion and establishment of exotic species,
- (h) degradation of habitat,
- (i) fragmentation of habitat.
 - d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).

N/A

3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Subsection 9.1.1(2.), the assessor must record this in the BDAR or BCAR.

Does not indicate data is deficient.

- 4. In relation to the impacts from the proposal on the TEC at risk of an SAII, the assessor must include data and information on:
 - a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:
 - i. in hectares,

0.08 ha

and

ii. as a percentage of the current geographic extent of the TEC in NSW.

~0.002%

Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal. The assessor should consider for example, changes to fire regime (frequency, severity), hydrology, pollutants, species interactions (increased competition, changes to pollinators or dispersal), fragmentation, increased edge effects and disease, pathogens and parasites, which are likely to contribute to the loss of flora and/or fauna species characteristic of the TEC.

- b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:
 - i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals

No isolated patches or fragments of the TEC exist within the site boundary. The local patch of the PSGF is connected to surrounding TEC via mature top-story canopy cover. This patch extends southwards into larger areas of the TEC via some tighter corridors. Smaller fragments of the TEC do exist to the south of the property which border Pittwater however these will be unaffected by the proposed developments (Figure 8.1).



Figure 8.1. Mapped PSGF within 500m of the construction footprint. Previously mapped PCT. PSGF (PCT 1214) blue. Source: The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489

ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:

Distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and

No change in distance between patches of remnant TEC and the area to be impacted. The PSGF proposed to be impacted does not exclusively connect two patches of PSGF and will only be impacted by a reduction in canopy cover.

Estimated maximum dispersal distance for native flora species characteristic of the TEC, and

N/A see above.

iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.

The PSGF community on site is currently in poor/fair condition. PSGF community outside of the formal reserve system is generally characterised by remnant canopy with exotic understory with the exception of areas with Bush Care groups where it can be in excellent condition.

Veg Zone	Condition	Area	Composition score	Structure score	Function Score	VI score
1	Fair	0.08	40.5	11.6	11.4	17.5

Table 8.2. Vegetation Condition of the TEC.

5. The assessor may also provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate.

N/A PSGF remains at risk of SAII.

- 8.2.2 Additional impact assessment provisions for threatened species at risk of an SAII
- 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. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR or BCAR.

Actions and measures taken to avoid the direct and indirect impact on the species at risk of an SAII have been presented in the mitigation measures section of this report (see Section 11).

- 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
 - 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

N/A

- b. evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation)presented by:
 - i. an estimate of the species' current population size in NSW, and
 - ii. an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and
 - iii. 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
 - ii. area of occupancy
 - iii. number of threat-defined locations (geographically or ecologically distinct areas
 - iv. in which a single threatening event may rapidly affect all species occurrences), and
 - v. whether the species' population is likely to undergo extreme fluctuations

N/A

- 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
 - ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or
 - 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)

The species cannot be reliably predicted to occur on-site based on vegetation and other landscape features (either foraging or breeding). Any impacts on breeding habitat used by this species could be considered potentially serious and irreversible. Potential breeding habitat in PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat.

Prescribed Impact Assessment 9

The development will not significantly impact the features outlined in Table 9.1 below. The proposed actions will not affect water quality as there will be erosion and silt management controls onsite to prevent runoff. Below is a table showing the potential impact the development would have on features that threatened species or communities can be dependent on.

Feature	Present	Description of feature characteristics and location	Potential Impact	Potential Threatened species or community using or dependent on feature	Section of the BAR where prescribed impact is addressed.
Karst, caves, crevices, cliffs or other geologically significant feature	No	N/A	N/A	N/A	N/A
Rocks	Yes	Landscaping rocks within the garden	Negligible	N/A	N/A
Human made structure	Yes	Dwelling	Demolition of existing dwelling	Microbat Species	Section 8.1 and 9.1

Table 9.1.	Expected	impact (on potentia	al habitat	onsite.
10010 0111	Enpedicia	mpace	on potenti		01101001

9.1 **Demolition of Human-made Structures**

Yes

Non-native

vegetation

Scattered

throughout

The development proposal includes the demolition of the main dwelling. Microbat species are known to utilise human structures in residential and industrial areas where suitable natural roosting habitat is not available. The demolition of the inhabited structure contributes to the removal of roosting habitat for microbat species. It is understood that these species also inhabited and uninhabited buildings. No evidence of microbat species was observed during site surveys. It is concluded that microbat species are not inhabiting the existing dwelling.

Negligible

N/A

N/A

10 Impact Summary

10.1 Ecosystem and Species Credits

The total cost to offset both ecosystem credits generated by this development is TBC by the BCF Charge System upon submission of the BDAR to the consent authority. A credit is a unit used to measure the impact of a development. Credits have a price and are traded by the Biodiversity Conservation Trust (BCT) under the Biodiversity Conservation Scheme (BOS). A credit may be created due to a number of factors including but not limited to, the amount of vegetation removed, critical habitat removed, and alteration of the landscape.

10.1.1 Ecosystem Credits derived from the BAM-C

The proposed development and associated works generated one ecosystem credit for the site. This is a reflection of the very poor vegetation integrity at the site (see Figure 10.1).

Ecosystem credit classes

Ecosystem credit summary

PCT		TEC	Area	HBT Cr	No HBT Cr	Credits
3234-Hu	inter Coast Lowland Spotted Gum Moist Forest	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	0.08	0	1	1

Figure 10.1. Ecosystem credit summary from the BAM calculator.

10.1.2 Species Credits derived from the BAM-C

The proposed development and associated works generated species credits for two species including the Large-eared pied bat (*Chalinolobus dwyeri*) and Eastern Cave Bat (*Vespadelus troughtoni*) (see Figure 10.2).

Species credit classes

Species credit summary

Species	Vegetation Zone/s names	Area / Count	Credits
Chalinolobus dwyeri / Large-eared Pied Bat	3234_Fair	0.02	1
Vespadelus troughtoni / Eastern Cave Bat	3234_Fair	0.02	1

Figure 10.2. Species credit summary from the BAM calculator.

It has been concluded that not all land within the impact area holds suitable habitat for threatened species. Thus, some species have been excluded due to severe habitat degradation.

Appendix I lists the species credit species predicted by the BAM Calculator and details whether the species have been further assessed based on site suitability (i.e., Habitat constraints and/or habitat degradation within the development site). Under Section 6.4.1.13 of the BAM, species credit species can be excluded from further assessment if an assessment of habitat constraints and microhabitats determines that the habitat within the development site is substantially degraded such that the species credit species is unlikely to occur. See section "6.1.2 BAM Candidate Species for Further Assessment".

The species credits generated in this BDAR were generated in the areas of "complete vegetation removal" and site "thinning for APZ". The vegetation zone was divided into these areas as the activities within the each are not expected to significantly degrade or remove breeding habitat features (including hollows) for the species credit species. This method is in accordance with the BAM Section 6.4 (steps 3 - 6).

10.2 Impacts that do not need further assessment

The site is of small size and limited space. The BAM assessment plot covered all areas of the site, not including any areas that contained existing dwellings prior to the survey. All areas of the property which included vegetation were part of the biodiversity assessment and therefore, no impacts were required for further assessment.

11 Mitigation Measures

11.1 Management tasks

11.1.1 Delineation of work areas

During the development, impacts to the site and the vegetation to be retained should be reduced by the delineation of work areas. The access to the site would be best restricted to the development footprint only. An exclusive zone will be established for the vegetation outside the work areas.

11.1.2 Fencing and tree protection

See Arboricultural Impact Assessment by Arborsaw 2023. Tree protection will be consistent with the Arboricultural Impact Assessment. The main trees to be managed are trees within close proximity to building works.

11.1.3 Wildlife corridor and revegetation

The proposed development is situated between two previously separated patches of remnant vegetation. The Spotted Gums proposed for removal do not provide canopy connectivity between these patches. Whilst the current vegetation within the garden area is proposed for removal and the northern property boundary consists of non-local native species, it is unlikely to provide a useful habitat corridor. Poor vegetation density and lack of community structure result in approximately 750 m² of poor vegetated area.

Post-development native species landscaping and bush regeneration within Management Zone 1 would improve the condition of the native species which are currently present whilst also eliminating the dominant exotic weeds currently on site. Native species landscaping and revegetation within Management Zone 2 would improve habitat connectivity within the site.

Planting is one of several best practice measures to retain and support the long-term survival of the vegetation community on site. Species plantings should aim to restore maximum diversity at the site. This will provide greater foraging and breeding habitat for native species and could deliver greater biodiversity gain outcomes in the area whilst adhering to bushfire protection requirements. Shrub and ground covers will also increase the habitat for other wildlife including small insectivorous birds.

Plantings of tube stock across the site should be selected from locally native canopy, shrub and ground cover species and this is to be in accordance with bushfire protection requirements. Species characteristic of the PSGF community are considered suitable for revegetation activities.

Planting in the northern side of the site, within Management Zone 1 would significantly improve habitat connectivity with the surrounding PSGF community. Canopy cover within this area is minimal, therefore revegetation of this area with tree species would improve habitat conditions and availability for fauna species.

See Landscaping Plan for Pittwater Spotted Gum Forest 252 Hudson Parade, Clareville prepared by Ecological Consultants Australia Pty Ltd May 2023.

11.1.4 Tree replacement ratio

Any trees removed are replaced at a ratio greater than 1:1 (for trees not covered by a biodiversity offset strategy) and consider that a tree replacement ratio of 2:1 is preferable to enhance habitat. Tree protection will be consistent with the Arboricultural Impact Assessment. See Arboricultural Impact Assessment Report prepared by Arborsaw 2023.

Prior to removing any vegetation or other habitat that has been approved for removal, the applicant should inspect the vegetation for signs of native fauna use particularly bird nests and possum habitat and dreys. Works should only be conducted when no fauna will be impacted.

11.1.5 Native species landscaping

The landscape planting schedule is revised by a qualified bush regenerator or qualified Ecologist. The schedule uses a diversity of local provenance native species from the relevant native vegetation community (or communities) that occur, or once occurred on-site (rather than use exotic species or non-local native species). The northern part of the site has a greater native composition, and this can be used to replicate the planting of species across the rest of the site.

11.1.6 Erosion and sediment controls

Where required, sediment controls will be put in place. These will include, but not limited to sediment fencing, jute mating, crushed sandstone, and coir logs. Sediment controls will be revied during site inspection and/or after significant rainfall (more than 10 mm in 24 hours resulting in site runoff). Sediment and erosion control measures must ensure that no settlement of sediment or silt is to occur within areas of vegetation to be retained. All sediment fences should be retained for as long as practical. If removed, then monitoring is required to ensure flows do not concentrate and cause further erosion. If concentrated flows do occur and/or erosion gullies develop then coir logs baffles are required.

11.1.7 Weed management

Weeds are present on the site and must be appropriately managed to ensure they do not spread. There must be continuous maintenance of the vegetation on-site otherwise increased weed growth may result, exacerbated by the high abundance of weeds present pre-works. Weeds will colonize and pioneer on any cleared grounds, therefore must be managed during works as well as ongoing post-works. See Appendix III.

All bush regeneration activities requiring the use of chemicals must be performed in accordance with the NSW Pesticides Act 1999. Herbicides must not be applied whilst exotic plants are setting seed. The weed removal program aims to be broad in approach and sustained in application to provide the best possible conditions for natural regeneration and to control weeds within the site.

Although soil borne pathogens have not been identified as a Key Threatening Process, accidental spread of pathogens can occur at any time. To prevent the introduction of pathogens, Bushland Hygiene Protocols outlined in Appendix II must be followed. Hydrological conditions may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to moist soil and proximity to water. It is recommended that Bushland Hygiene Protocols be followed closely.

11.1.8 Weed Removal Techniques

Weed removal proposed for the site will consist of hand removal techniques, manual/mechanical removal using bush regenerator tools and winter thermal (flame) weeding. This approach will reduce the amount of herbicide used and reduce the amount of off-target damage through spot-on application.

Woody perennial weeds less than 2 metres in height will require cut and paint or scrape and paint bush regenerator techniques based on the germinating/epicormic behaviour of the plant (especially plants that tend to coppice or sucker).

It is recommended that seed heads are removed prior to the commencement of primary works. This would be best performed carefully by hand with secateurs with the aim of avoiding the spread flowers or seeds into planting zones. See Appendix III for further details.

11.1.9 Replacement and installation of nest boxes

Where hollow-dependent native fauna is found using existing hollows, compensatory tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow-dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

The installation of a single nest box designed for microbats should be added to the site to replace the potential loss of roosting habitat. This will encourage threatened microbats to utilise the area. The client should consider installing other habitat features such as logs and rocks.

Image from: nestboxes.com.au

11.1.10 Pathogen prevention

To prevent the introduction of pathogens, Bushland Hygiene Protocols outlined in Appendix IV should be followed. The site is considered to be an area that may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to its moist soil and proximity to the drainage channel. It is recommended that Bushland Hygiene Protocols be followed closely.



Phytophthora infected vegetation. (Image by Rasbak, licensed under the Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license.)



Myrtle Rust generally infects new leaf growth. (Image by John Tann, licensed under the Creative Commons Attribution 2.0 Generic license.)

12 Conclusions

- The proposed development will have an approximate impact area of 0.08 ha on PSGF (PCT 3234). This vegetation has been significantly altered and degraded from its natural state.
- The site has been managed for at least the past 70 years. The site has a history of vegetation clearing, habitat fragmentation and ongoing disturbance, via development. A majority of vegetation on site is exotic weed species.
- The total cost to offset both ecosystem credits generated by this development is TBC by the BCF Charge System upon submission of the BDAR to the consent authority.
- Key mitigation measures include but are not limited to delineation of work areas, vegetation clearing control measures, tree protection, wildlife corridor and revegetation, native species landscaping, weed management, weed removal, installing a nest box, and pathogen prevention should be used to mitigate the impacts associated with the proposal and increase habitat opportunities in the area.

13 Appendices

13.1 Appendix I – Rationale for Likelihood of Occurrence

Rationale for Likelihood of Occurrence all Species Credit Species (candidate species) predicted by the BAM Calculator (BAM-C) and details whether the species have been retained or omitted from the calculator.

Where a species has a specific habitat constraint, which is not present within the subject land, or if the species is a vagrant within the IBRA subregion, the species is considered unlikely to occur and no further assessment is required. Additionally, in accordance with section 6.4.1.17 of the BAM, a candidate species credit species can be considered unlikely to occur within the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to utilise area. As discussed in Sections 2 and 3, much of the vegetation within the subject land and 1,500 m buffer has been previously cleared, fragmented and is subject to ongoing disturbance.

A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) in accordance with section 6.4.1.17 of the BAM does not require further assessment on the subject land (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) has been included below for each Candidate Species for the BDAR.

Family	Scientific Name	Common Name	Habitat Requirements	Retained in BAM-C	Likelihood of Occurrence
Orchidaceae	Rhizanthella slateri	Eastern Australian Underground Orchid	Habitat requirements are poorly understood, and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore, usually located only when the soil is disturbed. Flowers September to November.	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. No flora bearing the key identifying features of the species identified during site surveys. The site has been significantly altered and degraded from its natural state. It has a long history of clearing, fragmentation and on- going disturbance. No further assessment required.

Flora

Family	Scientific Name	Common Name	Habitat Requirements	Retained in BAM-C	Likelihood of Occurrence
Myrtaceae	Rhodamnia rubescens	Scrub Turpentine	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. No flora bearing the key identifying features of the species identified during site surveys. The site has been significantly altered and degraded from its natural state. It has a long history of clearing, fragmentation and on- going disturbance. No further assessment required.
Orchidaceae	Rhodomyrtus psidioides	Native Guava	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. This species is characterised being extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. No flora bearing the key identifying features of the species identified during site surveys. The site has been significantly altered and degraded from its natural state. It has a long history of clearing, fragmentation and on- going disturbance. No further assessment required.

Fauna

Class	Scientific Name	Common Name	Habitat Requirements	Retained in BAM-C	Likelihood of Occurrence
Aves	Anthochaera Phrygia	Regent Honeyeater	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. This species has been seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests.	Breeding: No Foraging: Yes	Low likelihood of occurrence. The site displayed marginal foraging habitat for the species in the form of canopy cover. Breeding habitat does not occur on-site or within the development footprint. No further assessment is required.
Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid elevation dry open forest and woodland close to these features.	Breeding: No Foraging: Yes	Low likelihood of occurrence. The site displayed marginal foraging habitat for the species in the form of insect abundance and canopy cover. Breeding habitat does not occur on-site or within the development footprint. No further assessment is required.
Aves	Lathamus discolor	Swift Parrot	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera. Mugga Ironbark E.	Breeding: No Foraging: Yes	Low likelihood of occurrence. The site displayed marginal foraging habitat for the species in the form of canopy cover. Breeding habitat does not occur on-site or within the development footprint. No further assessment is required.

Class	Scientific Name Common Name		Habitat Requirements	Retained in BAM-C	Likelihood of Occurrence	
			sideroxylon, and White Box E. albens. Commonly used lerp infested trees include Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E. pilularis. Return to home foraging sites on a cyclic basis depending on food availability.			
Mammalia	<i>Miniopterus</i> australis	Little Bent- winged Bat	Moist eucalypt forest, rainforest, or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing- bats (M. schreibersii) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	Breeding: No Foraging: Yes	Low likelihood of occurrence. The site displayed marginal foraging habitat for the species in the form of insect abundance and canopy cover. Breeding habitat does not occur on-site or within the development footprint. No further assessment is required.	
Mammalia	Miniopterus orianae oceanensis	Large Bent- winged Bat	Primarily roosts in caves but will utilise mine shafts, storm-water tunnels, buildings and other man-made structures. Forms colonies within a maternity cave and disperse within a 300km range. Forage in forested areas in the tree canopy.	Breeding: No Foraging: Yes	Low likelihood of occurrence. The site displayed marginal foraging habitat for the species in the form of insect abundance and canopy cover. Breeding habitat does not occur on-site or within the development footprint. No further assessment is required.	

Class	Scientific Name	Common Name	Habitat Requirements	Retained in BAM-C	Likelihood of Occurrence
Mammalia	Vespadelus troughtoni	Eastern Cave Bat	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.	Breeding: No Foraging: Yes	Low likelihood of occurrence. The site displayed marginal foraging habitat for the species in the form of insect abundance and canopy cover. Breeding habitat does not occur on-site or within the development footprint. No further assessment is required.

13.2 Appendix II – Species Polygon



Figure 13.1. Large-eared Pied Bat and Eastern Cave Bat Offset Polygon (blue). Source: Nearmap 2023.



Figure 13.2. Pittwater and Wagstaffe Spotted Gum Forest Offset Polygon (blue). Source: Nearmap 2023.

13.3 Appendix III – Key Weed Removal Methods

Physical removal

Technique	Method	Equipment
Hand Removal	Seedlings and smaller weed species where appropriate will be pulled out by hand, without risk of injury to workers. The size that this can occur varies throughout the treatment area. Generally, it ranges from post seed to approximately 300mm in height. Rolling and raking is suitable for larger infestations of Wandering Jew. The weed can be raked and stems and plants parts rolled. The clump of weed material can then be bagged and removed from site.	Tools: Gloves, Rakes, Knife and Weed Bags
Crowning	 Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning. A knife, mattock or trowel is to be driven into the soil surrounding the bulb or rhizome at an angle of approximately 45 degrees with surrounding soil, so as to cut any roots that may be running off. This is to occur in 360 degrees around the bulb/rhizome. The rhizome or bulb is to be bagged and removed from the site and disposed of at an appropriate waste recycling facility Soil disturbance is to be kept to a minimum when using this technique. 	Tools: Knife, mattock, trowel, impervious gloves, and all other required P.P.E.
Cut and Paint Stems	 Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent of vigorous growth will be cut and painted with Roundup[®] Biactive Herbicide or equivalent. Juvenile and smaller weed species will be cut with secateurs at base of plant, and herbicide applied via applicator bottle. Stem to be cut horizontally as close to the ground as possible, using secateurs, loppers or a pruning saw. Horizontal cuts to be made on top of stem to prevent the herbicide running off the stump. Apply herbicide to the cut stem immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Herbicide is not to reach sediment or surrounding non-targeting plants. 	Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup [®] Biactive Herbicide and all other required P.P.E.

Scrape and Painting	More resilient weed species, where other techniques are less reliable are to be scraped with a knife or chisel and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current herbicide license. Weed species will be scraped with a knife or chisel up the length of the trunk, and herbicide applied via applicator bottle. Scrape the trunk from as close to the ground as possible to approximately ¾ of the plant height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants. Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.	Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup [®] Biactive Herbicide, and all other required P.P.E.
Cut with a Chainsaw and Paint	Larger size weed species, too large for cutting with hand tools, shall be cut with a chainsaw and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current chainsaw and herbicide license. Larger weed species will be cut with a chainsaw at base of plant, and herbicide applied via applicator bottle. Cut the stem horizontally as close to the ground as possible, using the chainsaw. Remove upper branches to reduce bulk of plant. If cutting at the base is impractical, cut higher to get rid of the bulk of the weed, then cut again at the base and apply herbicide. Make cuts horizontal to prevent the herbicide running off the stump. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Ensure there is no runoff of poison. All care must be taken by the contractor not to spill herbicide into water, onto sediment, or surrounding non-targeting plants. Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.	Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup [®] Biactive Herbicide, and all other required P.P.E.
Spot Spraying	Spot spraying involves spraying non-seeding annuals and grasses, and for regrowth of weeds once an area has been cleared or brushcut. Works to be carried out by a contractor with a current herbicide license.	Tools: protective clothing, safety glasses, herbicide

Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being	sprayer, impervious
targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care	gloves, Herbicide, and
must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.	all other required
	P.P.E.

Flame Weeding

Thermal (flame) weeding is a method where high temperatures are applied to weeds, causing the plant to die. Thermal weeding is particularly useful in situations where conservation or health considerations are high and weed density is low such as waterways where herbicide use is not permitted.

While flame weeding is not suited to most streetscapes due to the fire hazard nor can it be used on materials such as soft fall and similar playground equipment it is noted that 'flame' weeding in waterways allows weed management in areas where herbicides are not permitted.

Also, for native vegetation areas thermal weeding, with a flame weeder, has been shown to stimulate germination of native plants while killing the seeds of annual weeds such as Devils Pitchfork, *Bidens pilosa*. Flame weeding is also effective in killing persistent weeds like Mother of Millions.

Best results are obtained when follow up weed control is undertaken 4-6 weeks after treatment. In addition, weed control should be conducted periodically after that for example to control weeds over a period of a year it is likely that between 3-5 applications will be necessary, depending on rainfall and the extent of the weed seed bank. This method is most effective on young annual weeds and least effective on older perennial weeds. In some cases, control of perennial weeds will be ineffective however this depends on the species present and its age.





Mgt and Eco-burn Glenorie in the Hills Shire Council





Flame weeding should be undertaken outside of the fire seasons. Flame weeding allows for the mimicking of a burn in areas where a control burn could not be undertaken. See native plants regenerating after flame weeding. Images provided by Dragonfly Environmental



13.4 Appendix IV – Bushland Hygiene Protocols for Phytophthora (Hornsby Council Recommendations)

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.
- Always assume that the activity you are about to undertake has the potential to introduce the disease.
- Arrive at site with clean shoes, i.e.: no dirt encrusted on them.
- If you arrive with shoes that are encrusted with dirt, they will have to be completely soaked in metho or disinfectant and allow a few minutes to completely soak in. NEVER scrape untreated dirt off your shoes onto the ground.
- Before you move onto the site spray the bottom of your shoes with 70% metho. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.
- Check all tools and equipment that comes in contact with soil are clean before entering the area (they should have been cleaned on site at the end of the previous work session). If there is any dirt on them, spray them with 70% metho.
- Clean all tools at the end of each work session while still on site ensuring this is done away from drainage lines and adjacent work areas. Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
- Preferably compost all weed material on site.
- Never drag vegetation with exposed roots and soil through bushland.
- When removing weeds from site, remove as much soil as possible from them in the immediate work area and carefully place vegetative material into plastic bags.
- Try not to get the bag itself dirty; don't put it on/in a muddy area.
- Always work from the lower part of a slope to the upper part.
- Always work in areas known to be free of the pathogen before working in infected areas.
- Minimise activities wherever possible when the soil is very wet.
- Vehicles should not be driven off track or into reserves (unless vehicle decontamination is carried out before and after entering a single work site)
- Only accredited supplies of plants/mulch to be used.

Kit should contain: 1 bucket, 1 scrubbing brush, 1 spray bottle (metho 70% solution), 1 bottle tap water, 1 bottle methylated spirits. Contact Hornsby Bushcare if you require any refills or replacements of your Phytophthora Kits on 9484 3677 or <u>bushcare@hornsby.nsw.gov.au</u>

Facts about Phytophthora

Phytophthora cinnamomi (Phytophthora) is a microscopic, soil borne, water-mould that has been implicated in the death of remnant trees and other plants in Australian bushland. Phytophthora is not native to Australia. It is believed to have been introduced sometime after European settlement. Phytophthora is a national problem and is listed as a key threatening process under the Commonwealth's Environmental Protection and Biodiversity Conservation Act 1999.

Symptoms including Dieback

"Dieback" simply means dying or dead plants. There are many causes of dieback; Phytophthora is just one of them. Often dieback is the result of a combination of factors such as changed drainage patterns and nutrient loads (e.g.: increased stormwater run-off) or changed soil conditions (e.g.: dumped fill or excavation of/near root zone). Plants that are stressed are more vulnerable to Phytophthora.

Initial symptoms of Phytophthora include wilting, yellowing and retention of dried foliage, loss of canopy and dieback. Infected roots blacken and rot and are therefore unable to take-up water and nutrients. Severely infected plants will eventually die. Symptoms can be more obvious in summer when plants may be stressed by drought. If you suspect that Phytophthora is on your site, please contact the Bushcare team to collect a soil sample to be lab tested. This is usually done in the warmer months where conditions are optimum for the disease.

Infection

There is no way of visually telling if Phytophthora is present in the soil as its structures and spores are microscopic (invisible to the naked eye). Phytophthora requires moist soil conditions and warm temperatures for infection, growth, and reproduction. Spores travel through moist soil and attach to plant roots. Once Phytophthora has infected a host plant it can grow inside plant root tissue independent of external soil moisture conditions. After infection, Phytophthora grows through the root destroying the tissue which is then unable to absorb water and nutrients.

13.5 Appendix V – BAM-C Credit Reports

13.5.1 Vegetation Zones Report



BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00034747/BAAS17054/22/00034748	252 Hudson Pde Clareville	14/04/2023
Assessor Name	Report Created	BAM Data version *
Geraldene Susan Dalby-ball	04/03/2023	50
Assessor Number	Assessment Type	BAM Case Status
BAAS19008	Part 4 Developments (Small Area)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
0	04/05/2023	BOS Threshold: Biodiversity Values Map
	* Disclaimer: BAM data last updated may indicate eithe	er complete or partial update of the

* 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	РСТ	Condition	Area	Minimum number of plots	Management zones
1	3234_Fair	3234-Hunter Coast Lowland Spotted Gum Moist Forest	Fair	0.08	1	
Assess	ment Id	Proposal Name				Page 1 of 1

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13.5.2 Credit Summary Report



Proposal Details

BAM Credit Summary Report

Assessment Id	Proposal Name	BAM data last updated *
00034747/BAAS17054/22/00034748	252 Hudson Pde Clareville	14/04/2023
Assessor Name	Report Created	BAM Data version *
Geraldene Susan Dalby- Ball	04/05/2023	58
Assessor Number	BAM Case Status	Date Finalised
BAAS19008	Finalised	04/05/2023
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (Small Area)	BOS Threshold: Biodiversity Values Map

* 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	Vegetatio	TEC name	Current	Change in	Are	Sensitivity to	Species	BC Act Listing	EPBC Act	Biodiversit	Potenti	Ecosyste
	n		Vegetatio	Vegetatio	а	loss	sensitivity to	status	listing status	y risk	al SAII	m credits
	zone		n	n integrity	(ha)	(Justification)	gain class			weighting		
	name		integrity	(loss /								
			score	gain)								

Assessment Id

Proposal Name

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BAM Credit Summary Report

Hunte	lunter Coast Lowland Spotted Gum Moist Forest											
1	3234_Fair	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	17.5	17.5	0.08	Geographic Distribution	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	True	1
											Subtot al	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 du	vyeri / Large-eare	d Pied Bat (Fa	una)						
3234_Fair	17.5	17.5	0.02	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	True	1
								Subtotal	1

Assessment Id

Proposal Name

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252 Hudson Pde Clareville

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BAM Credit Summary Report

Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
3234_Fair	17.5	17.5	0.02	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	1
								Subtotal	1

Assessment Id

Proposal Name

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BDAR 252 Hudson Parade, Clareville | May 2023

13.5.3 Candidate Species Report



Proposal Details

BAM Candidate Species Report

Assessment ld 00034747/BAAS17054/22/00034748	Proposal Name 252 Hudson Pde Clareville	BAM data last updated * 14/04/2023
Assessor Name Geraldene Susan Dalby- Ball	Report Created 04/05/2023	BAM Data version * 58
Assessor Number BAAS19008	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 04/05/2023	BOS entry trigger BOS Threshold: Biodiversity Values Map

* 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 (assumed present)	 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?				

Assessment Id

Proposal Name

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BAM Candidate Species Report

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	Yes (assumed present)	□ Jan □ Feb □ Mar □ Apr
		🗆 May 🗆 Jun 🗖 Jul 🗖 Aug
		Sep Oct Nov Dec
		Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Eastern Australian Underground Orchid	Rhizanthella slateri	Habitat degraded
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Refer to BAR
Swift Parrot	Lathamus discolor	Refer to BAR

Assessment Id

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252 Hudson Pde Clareville

13.5.4 Predicted Species Report



BAM Predicted Species Report

Proposal Details		
Assessment Id	Proposal Name	BAM data last updated *
00034747/BAAS17054/22/00034748	252 Hudson Pde Clareville	14/04/2023
Assessor Name	Report Created	BAM Data version *
Geraldene Susan Dalby-Ball	04/05/2023	58
Assessor Number	Assessment Type	BAM Case Status
BAAS19008	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
0	BOS Threshold: Biodiversity Values Map	04/05/2023

* 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)
Barking Owl	Ninox connivens	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Black Bittern	Ixobrychus flavicollis	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 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
Glossy Black- Cockatoo	Calyptorhynchus lathami	3234-Hunter Coast Lowland Spotted Gum Moist Forest

Assessment Id

Proposal Name

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252 Hudson Pde Clareville



BAM Predicted Species Report

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
Masked Owl	Tyto novaehollandiae	3234-Hunter Coast Lowland Spotted Gum Moist Forest
New Holland Mouse	Pseudomys novaehollandiae	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Powerful Owl	Ninox strenua	3234-Hunter Coast Lowland Spotted Gum Moist Forest
Regent Honeyeater	Anthochaera phrygia	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
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
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

None added

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

Assessment Id

Proposal Name

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BAM Predicted Species Report

Assessment Id

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Proposal Name

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13.5.5 Biodiversity Credit Report (Like for like)



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *	
00034747/BAAS17054/22/00034748	252 Hudson Pde Clareville	14/04/2023	
Assessor Name Geraldene Susan Dalby-Ball	Assessor Number BAAS19008	BAM Data version * 58	
Proponent Names	Report Created	BAM Case Status	
Marcel Dupont-Louis	04/05/2023	Finalised	
Assessment Revision	Assessment Type	Date Finalised	
0	Part 4 Developments (Small Area)	04/05/2023	
BOS entry trigger	* Disclaimer: BAM data last updated may indicate either complete or partial update of the		
BOS Threshold: Biodiversity Values Map	BAM calculator database. BAM calculator database ma	ay 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					
Vespadelus troughtoni / Eastern Cave Bat					

Assessment Id

Proposal Name

00034747/BAAS17054/22/00034748

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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

No Changes

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	0.1	0	1	1

Assessment Id

Proposal Name

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BAM Biodiversity Credit Report (Like for like)

3234-Hunter Coast Lowland	Like-for-like credit retirement options						
Spotted Gum Moist Forest	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_Fair	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_Fair	0.0	1.00
Vespadelus troughtoni / Eastern Cave Bat	3234_Fair	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	

٨		0		- m	0.0	5	+ 1	ы	
m	22	e	23		ne		L.	u	

Proposal Name

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BAM Biodiversity Credit Report (Like for like)

Vespadelus troughtoni / Eastern Cave Bat	Spp	IBRA subregion
	Vespadelus troughtoni / Eastern Cave Bat	Any in NSW

Assessment Id

Proposal Name

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13.6 Appendix V– EPBC Act Considerations

The following section includes an assessment of potential impacts to the Koala (*Phascolarctos cinereus*) which is a listed species as per Matters of National Environmental Significance (MNES).

This assessment has used the *Significant impact guidelines 1.1- Matters of National Environmental Significance – page 11* to conclude whether the proposed activity will have a significant and irreversible impact on the species. The following section addresses significant impact criteria which applies to vulnerable species (including the Koala) listed on the EPBC Act 1999.

Survey effort

The survey guidelines suggested within the Koala Habitat Protection Guideline (DPIE, 2020) and EPBC Act Referral Guidelines for the vulnerable koala published by Commonwealth Department of Environment (DotE; 2014) were used a general guide. A targeted on-ground survey for the Koala was conducted on the site with each tree being directly observed. Binoculars were available for use however the trees are so distant and the canopies clear that a Koala would have been seen if present. Searches were also made in accessible surrounding land holdings and along road ways, binoculars were used here to facilitate clear sight into inaccessible areas (including some private property). Off-site observational surveys for Kolas were opportunistic in nature and focused primarily where potential habitat is greatest (and accessible). Desktop (Bionet, ALA) and on-ground surveys were conducted to determine the presence / absence of the species. The on-ground survey also contributed to information regarding habitat availability within the site. Indirect survey methods including; scat and scratching's searches (outlined in guiding documents) were conducted. No evidence of Koalas was found on site.

On site, detailed observations were made within all patches of vegetation. Individual trees were inspected at their base for koala scat, scratching's and presence / absence within each tree. No individuals were observed during the survey both on and off site.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of an important population of a species

There is a low likelihood of occurrence for the species. It is unlikely that the species would occur on site due to the degraded nature of vegetation and habitat. No individuals (nor an important population) would be expected to occur on site. The site has been significantly altered such that it does not reflect natural attributes of the original vegetation community. Therefore, the proposal is unlikely to lead to a long-term decrease in the size of an important population.

Reduce the area of occupancy of an important population

The species or an important population of the species is unlikely to occur on site due to habitat degradation. Vegetation surveys revealed a low abundance of koala use trees within the impact area. As such the area is unlikely to be occupied by the Koala and the proposal is unlikely to reduce the area of occupancy of an important population.

Fragment an existing important population into two or more populations.

No important population for the species has been recorded in the assessment area. It is expected that the proposal will have a negligible impact upon individuals within the vicinity of the proposed development area.

Adversely affect habitat critical to the survival of a species.

No *Core koala habitat* is proposed to be impacted as a result of the development. See Koala Assessment Report for further impact assessment and recommendations.

Conclusion

The proposal is unlikely to have a significant impact on the Koala or areas of critical habitat for the species. The *Koala habitat assessment tool* (DotE; 2014) was used to determine the importance of habitat on site for the Koala. Targeted surveys resulted in no evidence of Koala activity within the site. See Koala Assessment Report for further impact assessment and recommendations.

13.7 Appendix VI – BDAR Requirements Compliance

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area			
Report section	Information	Included	
Introduction	 Introduction to the biodiversity assessment including: brief description of proposed development identification of subject land boundary, including: operational footprint construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure 	Section 1	
	General description of the subject land	Section 1	
	Sources of information used in the assessment, including reports and spatial data	Section 1	
	Identification of the assessment method applied (i.e., linear or site based)	Section 1	
	Map of the subject land boundary showing final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	Section 1	
Landscape	Identification of site context components and landscape features at the proposed site, including: general description of subject land topographic and hydrological setting, geology and soils	Section 2	
	percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2(4.)	Table 2.1	
	IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Table 2.1	

Minimum info	inimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area			
	Other relevant landscape features which may include: Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3–4.) and	Table 2.1		
	Appendix E)			
	wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(4.))	Table 2.1		
Ē	connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Table 2.1		
	areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(10.)	Table 2.1		
	areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.)) MAPS and TABLES (in document	Table 2.1		
	Site Map	Section 2		
	- boundary of subject land			
	- cadastre of subject land			
	- landscape features identified in BAM Subsection 3.1.3			
_	- areas of outstanding biodiversity value within the subject land			
	Location Map	Section 2		
	- digital aerial photography at 1:1,000 scale or finer			
	- boundary of subject land			
	- 1500 m buffer area or 500 m buffer for linear development			
	- landscape features identified in BAM Subsection 3.1.3			

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area				
	- additional detail (e.g., local government area boundaries) relevant at this scale			
	 areas of outstanding biodiversity value within the assessment area 			
	Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location map	Section 2		
	include:			
	- IBRA bioregions and subregions			
	- rivers, streams and estuaries			
	- wetlands and important wetlands			
	- connectivity of different areas of habitat			
	- areas of geological significance and soil hazard features			
	All report maps as separate jpeg files Individual digital shape files of:	Provided to client		
	- subject land boundary			
	- assessment area (i.e., buffer area) boundary			
	- cadastral boundary of subject land			
	- areas of native vegetation cover			
	- areas of habitat connectivity			
Native vegetation, TECs and	Patch size (in accordance with BAM Subsection 4.3.2)	Section 3		
	Identification of the dominant PCT on the subject land and extent (ha) with justification of method used	Section 3		
	(existing information or plot-based survey data)			
	Identification of any TEC associated with the PCT (BAM Subsection 4.2.2)	Section 3		

Minimum infe	Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area				
vegetation	Estimate of percent cleared value of dominant PCT (BAM Subsection 4.2.1(5.))	Table 3.1			
integrity	Identification of any TEC on site that is not associated with the dominant PCT (Note: This TEC is required to be assessed and offset.)	Table 3.1			
	Equivalence with mapping units of previous vegetation maps reviewed as part of the assessment (i.e., equivalent mapping units)	Section 3			
	Vegetation integrity of the PCT(s) on the subject land as individual vegetation zones	Table 3.3			
	Justification for how this was determined (i.e., qualitatively by observing values for the condition attributes set out in Table 2 of the BAM or quantitatively by collecting field data for the condition attributes at a plot in accordance with BAM Subsection 4.3.4)	Section 3			
	Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsections 4.3.3(5.))	Section 3			
	Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM	BioNet Vegetation			
	Subsection 4.3.3(5.) and BAM Appendix A)	Classification			
	- identify the PCT or vegetation class for which local benchmark data will be applied	benchmark values			
	- identify published sources of local benchmark data (if benchmarks obtained from published sources)	used			
	 describe methods of local benchmark data collection (if reference plots used to determine local benchmark data) 				
	- provide justification for use of local data rather than BioNet Vegetation Classification benchmark values				
	- Map of native vegetation extent for the subject land (as described in BAM Section 3.1)	Section 3			

Minimum info	ormation requirements for the Biodiversity Development Assessment Report: Streamlined assessment modu	ule – Small area
	 Map of PCT/vegetation zones within the subject land (as described in BAM Section 4.2(1.) Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries Map of TEC distribution on the subject land Patch size of native vegetation (as described in BAM Subsection 4.3.2) 	
	 Table of current vegetation integrity scores for vegetation zone within the site including: composition condition score structure condition score function condition score Report from BAM-C (Small area module) including vegetation integrity scores (BAM Section 4.4) 	Section 3
	 All report maps as separate jpeg files Plot field data (MS Excel format) Digital shape files for all maps and spatial data Field data sheets (if relevant) for determining vegetation integrity (BAM Subsection 4.3.4) 	Provided to client
Habitat suitability for	- Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land	Section 4
threatened species	 Determination of the suite of threatened species likely to occur on or use the proposed site according to Steps 1 and 2 in BAM Section 5.2 including species to be assessed for ecosystem credits and the list of species to be assessed for species credits 	Section 4

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area			
 List of ecosystem credit species derived from the TBDC (as described in BAM Subsections 5.2.1 and 5.2.2) with justification for the exclusion of any ecosystem credit species based on habitat constraints (as described in BAM Subsection 5.2.2) 	Appendix I - Rationale for likelihood of occurrence		
 Identification of candidate species credit species that are at risk of an SAII and therefore, must be further assessed (BAM Section 9.1) Note: Candidate species credit species that are not at risk of an SAII and not incidentally recorded on the subject land do not require further assessment. For candidate species credit species that are at risk of an SAII, a description of the species, any habitat constraints or microhabitats associated with the species on the subject land and information used to create the species polygon/s in accordance with Steps 3 to 5 of BAM Section 5.2 including: justification for determining that a candidate species credit species at risk of an SAII is unlikely to have suitable habitat on the subject land or specific vegetation zone (based on a field assessment of the subject land and published literature or an expert report prepared in accordance with Box 3 of the BAM) 	Section 8		
 determination of the presence of remaining candidate species credit species at risk of an SAII (by assuming presence, conducting a threatened species survey or an expert report). Note: If the subject land is mapped on an important habitat map for a species, or for a component of its habitat, the subject land is considered to have suitable habitat for the species to be present. 	Section 8		
 species polygons identifying the location and area of suitable habitat for each candidate threatened species at risk of an SAII that is recorded on the subject land and is measured by area, OR 	Appendix II		

Minimum info	ormation requirements for the Biodiversity Development Assessment Report: Streamlined assessment modu	ule – Small area
	 species polygons identifying the area of suitable habitat and targeted surveys identifying the count and location of individuals on the subject land for each candidate threatened flora species at risk of an SAII that is recorded on the subject land and is measured by count 	N/A no threatened flora species expected to occur on site
	 species polygons for each threatened species identified on the subject land that is not at risk of an SAII (i.e., incidentally observed during site visit) Biodiversity Assessment Method 140 Report section BAM ref. Information Maps & tables (in document) Data (to be supplied) 	N/A no threatened species observed during site visit
	- Determination of habitat condition within species polygon/s for each threatened species (measured by area) at risk of an SAII or incidentally observed during the site visit (Step 6 of BAM Section 5.2)	Appendix II
	 For flora species credit species at risk of an SAII or incidentally observed during site visit, provide a count, or an estimation, of the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(4.)) 	N/A no threatened flora species expected to occur within the site
	Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and:	Section 10
	- identifying any ecosystem credit species removed from the list of species on the basis of further assessment in accordance with BAM Subsections 5.2.2 and 5.2.3	Section 10
	- identifying the sensitivity to gain class of each species (BAM Section 5.4)	Section 10

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
	 Table detailing species credit species within the subject land at risk of an SAII (BAM Section 9.1) or incidentally observed during the site visit including any associated habitat feature/components and its abundance (flora)/extent of habitat (flora and fauna) and biodiversity risk weighting (BAM Sections 5.2–5.4) 	Section 10
	 Map of species credit species records within the subject land and species polygons for flora and fauna species at risk of an SAII or incidentally observed during the site visit (as described in BAM Subsection 5.2.5(1–7.)) 	Appendix II
	 Digital shape files of species polygons Species polygon map in jpeg format Expert reports and any supporting data used to support conclusions of the expert report Field data sheets (if relevant) for threatened species surveys 	Provided to client
Prescribed impacts	Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	Section 9
	If relevant, maps showing location of any prescribed impact features (i.e., karst, caves, crevices, cliffs, rocks, humanmade structures, etc.)	Section 9
	 If relevant, digital shape files of prescribed impact feature locations Prescribed impact features map in jpeg format 	
Avoid and minimise impacts	 Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology 	Section 5

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area			
	 alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Subsections 7.1.2 and 7.2.2 Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.) 		
	 Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility Map of final proposal footprint, including construction and operation Maps demonstrating indirect impact zones where applicable 	Section 1, 11	
	Digital shape files of: - final proposal footprint - direct and indirect impact zones - Maps in jpeg format	Provided to client	
Assessment of Impacts	 Determine the impacts on native vegetation and threatened species habitat, including: description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Sections 8.1) 	Section 6, 7	

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area			
	 description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal (as described in BAM Subsection 8.2 		
	 Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K 	Section 9	
	Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Section 3	
Mitigation	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM	Section 11	
and	Subsections 8.4.1 and 8.4.2, including (as described in BAM Subsection 8.4.1(2.):		
Management	- techniques, timing, frequency and responsibility		
of Impacts	- identify measures for which there is risk of failure		
	- evaluate the risk and consequence of any residual impacts		
	 document any adaptive management strategy proposed 		
	- mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)		
	Identification of measures for mitigating impacts related to:	Section 11	
	- displacement of resident fauna (as described in BAM Subsection 8.4.1)		
	- indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))		
	Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity	Section 11	
	values that are uncertain (BAM Section 8.5)		
	Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Section 11	

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area			
Thresholds for assessing and offsetting the impacts of the proposal	Information from the TBDC and/or other sources to report on the current status of threatened species,	Section 8	
	threatened populations at risk of an SAII and TEC/s for the proposal, and		
	Report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1	Section 8	
	Report on impacts of the proposal on threatened species and/or threatened populations at risk of an SAII in	Section 8	
	accordance with BAM Section 9.1		
	Identification of impacts requiring offset in accordance with BAM Section 9.2	Section 3	
	Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Section 10	
	Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 10	
	Map showing the extent of TECs at risk of an SAII within the subject land	Section 3, 10	
	Map showing the location of threatened species at risk of an SAII within the subject land Map showing location		
	of:		
	- impacts requiring offset		
	- impacts not requiring offset		
	- areas not requiring assessment		
	Digital shape files of:	Provided to client	
	- extent of TECs at risk of an SAII within the subject land		
	- threatened species at risk of an SAII within the subject land		
	- boundary of impacts requiring offset		
	- boundary of impacts not requiring offset		

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area			
	 boundary of areas not requiring assessment Maps in jpeg format 		
Applying the no net loss standard	Description of the impact on PCTs/TECs	Section 8	
	Description of the impact on threatened species at risk of an SAII or incidentally observed via site visit	Section 8	
	Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9	Section 10, Appendix V	
	Number of species credits required for impacts on biodiversity values according to BAM Subsection 10.1.3, including any species credit species that has been incidentally observed on the subject land	Section 10, Appendix V	
	 Note: Species credits for any species at risk of an SAII are calculated in the event that the decision-maker forms the opinion that the proposed impact is unlikely to be serious and irreversible and therefore can be offset. Identification of credit class for ecosystem credits and species credits according to BAM Section 10.2 (this can be generated from BAM-C) 	Appendix V	
	Table showing biodiversity risk weightings	Appendix V	
	Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1)	Appendix V	
	Table of BC Act listing status for PCTs and threatened species requiring offset	Appendix V	
	Table of species at risk of an SAII or incidentally observed on site assessed for species credits and the number of credits required	Appendix V	
	BAM-C credit report	Appendix V	

14 Expertise of authors

With over 20 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and onground knowledge make Geraldene a valuable contribution to any project. Geraldene has over 8 years local government experience as manager of environment and education for Pittwater Council. Geraldene presented papers on the topic at the NSW Coastal Conference, Sydney CMA and Hawkesbury Nepean forums. Geraldene is a Technical Advisor Sydney Olympic Park Wetland Education and Training (WET) panel. Geraldene has up to date knowledge of environmental policies and frequently provides input to such works. Geraldene was a key contributor to the recent set of Guidelines commissioned by South East Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

Geraldene is a frequent contributor to many community and professional workshops on ecological matters particularly relating to environmental management. She is an excellent Project Manager.

Geraldene is a joint author on the popular book Burnum Burnum's Wildthings published by Sainty and Associates. Author of the Saltmarsh Restoration Chapter Estuary Plants of East Coast Australia published by Sainty and Associates (2013). Geraldene's early work included 5 years with Wetland Expert Geoff Sainty of Sainty and Associates. Geraldene is an expert in creating and enhancing urban biodiversity habitat and linking People with Place.

_t Geraldene Dalby-Ball DIRECTOR

SPECIALISATIONS

- Urban Ecology and habitat rehabilitation and re-creation.
- Urban waterway management assessing, designing and supervising rehabilitation works
- Saltmarsh and Wetland re-creation and restoration assessment, design and monitoring
- Engaging others in the area of environmental care and connection
- Technical Advisor environmental design, guidelines and policies
- Sound knowledge and practical application of experimental design and statistics
- Project management and supervision
- Grant writing and grant assessment
- Budget estimates and tender selection
- Expert witness in the Land and Environment Court

CAREER SUMMARY

- Director and Ecologist, Ecological Consultants Australia. 2014-present
- Director and Ecologist, Dragonfly Environmental. 1998-present
- Manager Natural Resources and Education, Pittwater Council 2002-2010
- Wetland Ecologist Sainty and Associates 1995-2002

QUALIFICATIONS AND MEMBERSHIPS

- Bachelor of Science with 1st Class Honors, Sydney University
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- Practicing member and vice president Ecological Consultants Association of NSW



Gabriel James TRAINEE ECOLOGIST

Finishing his environmental degree at Macquarie University, Gabriel's passion for nature is evident through his pursuit as an ecologist, working on a range of projects across all sectors. Gabriel has contributed to a number of government projects where he conducted ecological surveys to identify the presence of any threatened species and habitat features.

These have been for the development of sustainable energy alternatives as well as the construction of a feral predator-free fence with aims to introduce endangered native species and re-establish their populations.

Within these projects, Gabriel has developed his skills in fauna handling and species identification for both flora and fauna across multiple regions within NSW. Additionally, Gabriel has been required to liaise with clients to achieve both efficiency for the client as well as a positive outcome for the environment.



SPECIALISATIONS

- Urban and landscape ecology
- Flora and Fauna Assessments
- Habitat tree assessment, marking and mapping
- GIS mapping

CAREER SUMMARY

- Trainee Ecologist, Ecological Consultants Australia. 2022-present
- Bush Regenerator, Dragonfly Environmental. 2021
- Landscaping labourer, Oxygenhort Horticultural Services. 2019present

QUALIFICATIONS AND MEMBERSHIPS

- Bachelor of Environmental Science Major in Biology, Macquarie University.
- WHS General Induction of Construction Industry NSW White Card.
- First Aid Certificate

Brooke is an ecologist with valuable on-ground experience working on bush regeneration projects throughout the Sydney region, including revegetation and weed management projects.

Brooke is passionate about conserving and restoring natural areas for native species to thrive.

Brooke completed her undergraduate Bachelor of Science degree majoring in Conservation Biology. Brooke has knowledge of experimental design and analysis, research and reports, geographic information systems (GIS), environmental legislation, and flora identification.

Brooke has experience working with conservation organisations, including Sea Shepherd Australia, helping to raise awareness around the destruction of habitats in the world's oceans. She has participated in the organisation and delivery of fundraising events around Sydney.

Brooke has exceptional communication and customer service skills and an extended client relations history.

Brooke Thompson ECOLOGIST



SPECIALISATIONS

- Urban and Landscape Ecology
- Fauna and Flora Assessments
- Vegetation Management
- Habitat Tree Assessment, Marking and Mapping

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. 2022-present
- Natural Area Specialist, Dragonfly Environmental. 2022

QUALIFICATIONS AND MEMBERSHIPS

 BSc Conservation Biology, University of Wollongong.

WorkCover WHS General Induction of Construction Industry NSW White Card.