Biodiversity Development Assessment Report

918 Barrenjoey Rd, Palm Beach NSW 2108

By Ecological Consultants Australia Pty Ltd TA

Kingfisher Urban Ecology and Wetlands

Updated February 2022

About this document

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Statement of Authorship

This study and report was 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 Luke Johnson with qualifications B EnvSc.

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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Signed: Geraldene Dalby-Ball – Director of Ecological Consultants Australia

Executive Summary

Introduction

Ecological Consultants Australia (ECA) has been contracted by Matt Goodman to provide a **Biodiversity Development Assessment Report** for a proposal at 918 Barrenjoey Rd, Palm Beach NSW 2108 within the Northern Beaches Council Local Government Area (LGA).

Trigger for a formal BDAR under the BC Act 2016:

The proposed development impact areas identified by the Biodiversity Values map published by the Chief Executive of the NSW Office of Environment and Heritage. The area impacts is only minor as the majority of the site in not on the BV map. It is noted at all area to the rear of the site (that is BV mapped) will remain untouched. The only area of BV mapping that is, just, impacted is a small (~1m wide) line of the street side of the property. NB this area mapped as BV is currently cleared/weeds.

Stage 1: Biodiversity Assessment

- On-ground survey took place in October 2021 by Senior Ecologist Geraldene Dalby-Ball.
- Data was gathered with one BAM plot in the area with the highest cover of native vegetation. Noting the development area is cleared with an existing house.
- Flora and fauna observations were recorded on-site using binoculars and physical examination. Notes, photos and samples of flora species were taken to assess 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 to vegetation from the proposed development. The impact area and/or areas of modification has been calculated as 0.02ha within the 829m^2 site (including areas with an existing dwelling).
- Original arborcultual impacts assessment resulted in the required removal of four trees within the property. At the direction of Northern Beaches Council, the client engaged additional assessments of impacts to trees within the property. This resulted in the possible retention of Trees T1 and T4 under the recommendations/conditions outlined in section 10.1.5.
- Two trees (T2 - E. piperita, T5 – G. ferdinandi), are proposed for removal and to be replaced with at least 1 x *Corymbia maculata* – T5 is within the BV mapped area.
- Three Trees (T1, T3, T4) are to be retained and protected under conditions set out in the revised AIA.
- Survey plots were within the site boundary and concentrated in the area with the most remnant vegetation (the rear of the site adjoining the bushland).
- Vegetation onsite has been significantly altered such that the site does not reflect the natural structural attributes of the original vegetation community.

- Vegetation is structurally and functionally poor due to previous clearing / landscaping onsite. Thus, the proposed development assessed in this BDAR is not expected to significantly contribute to loss of native vegetation. Works are also 98% outside of areas mapped on the BV map.
- No threatened species were recorded during the site surveys. Powerful Owls and microbats are known from this area.

Stage 3: Improving Biodiversity values

- Fauna refuge zone
- Delineation of work areas
- Weed Management and removal
- Native seed collection
- Preservation of habitat
- Nest boxes
- Native species landscaping

See recommendations section for a detailed explanation as to how these recommendations improve biodiversity values.

Conclusions and Recommendations

- The development is outside the BV mapped area where ever possible. The small incursion can not be avoided as this is needed as vehicle access and is the only flat area. Also this mapped area is weed and cleared.
- The proposed development will have an approximate impact area of 0.02ha on *potential* Pittwater Spotted Gum Forest (PSGF) (the PCT mapping shows PCT1214). Noting that the site has very few attributes of PSGF and is not mapped as PSGF. As a precautionary practice the EEC has been used as the default vegetation community – due to lack of species present to determine PCT accurately. NB bushland the rear is not PSGF however it is typical that such elevated areas are more stand stone influenced.
- Two trees are proposed for removal due to poor health and impacts on proposed development.
- The site has been managed for residential purposes for the previous 80 years. Native vegetation would have once covered the area. Areas of the site that have been subject to development have significantly altered and degraded it from its natural state.
- The total cost to offset both ecosystem credits and species credits generated by this development is $1,072.16 (including GST), assuming payment will be made into the Biodiversity Conservation Fund.
- Measures including but not limited to; nest boxes, native species landscaping, delineation of works zones, weed removal, tree protection and fauna refuge zones will be used to reduce impacts associated with the proposal and increase habitat opportunities in the area and safeguarding of the bushland to the rear (east) of the site.

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Stage 1: Biodiversity Assessment

1 Introduction

Ecological Consultants Australia (ECA) has been contracted by Matt Goodman to provide a **Biodiversity Development Assessment Report** for a proposal at 918 Barrenjoey Rd, Palm Beach NSW 2108 within the Northern Beaches Council Local Government Area (LGA).

1.1 Site information and general description

The Subject Site (the "Site") is the area of direct and likely indirect impacts and is defined as the whole of the property.

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

Table 1 - Site Administrative Information

Category	Details
Title Reference (Lot/DP)	16/-/DP650061
Area (ha)	829m^2
Street Address	918 Barrenjoey Road, Palm Beach NSW 2108
LGA	Northern Beaches Council
Land Zoning	E4: Environmental Living

Figure 1.1 - Site of the proposed development, BV and proposed . Source: SIxMaps 2021.

NB works almost wholly outside BV map (Blue hatch construction area including disturbance area that will be revegetated.

Figure 1.2 - Construction Footprint. NB we have overestimated this for the BDAR.

Figure 1.2b – Operational Footprint. Includes APZ management for whole of the property.

1.2 Site history

The site has been managed for residential purposes for the previous 200 years. Native vegetation would have once covered the area although due to modification and disturbance, the site has lost many natural attributes. Areas of the site that have been subject to development have significantly altered and degraded it from its natural state. However, the local plant community continues to exist in gardens across a range of conditions.

A majority of vegetation on site is regrowth (rear of the existing dwelling) or was weed or been planted by the previous property owner (in-front of the existing property). Native vegetation is restricted to rear between existing granny flat and bushland. There is little to no remnant vegetation left within the construction area. Exotic species seedlings and cleared land is dominant across the front section (majority) of the site.

1.3 Proposed actions

The proposed development involves extensive alterations and additions to the existing dwelling, with new construction within the original footprint and hard landscaping. The proposed dwelling will maintain the majority of landscaped (cleared) garden and within the construction footprint. The proposal includes the installation of a new pool. Removal of two native canopy tree will be required to facilitate the proposed plans. No other native vegetation is proposed to be removed. The site will be improved in future with the removal of environmental weeds and planting including species representative of the original vegetation community.

The rear (northern area) of the site doesn't need plantings as there will be natural regeneration there.

Planting as part of this work will return native ground and mid-story species and tube-stock canopy planting (4 to maturity after 5 years) will see long-term retention of canopy.

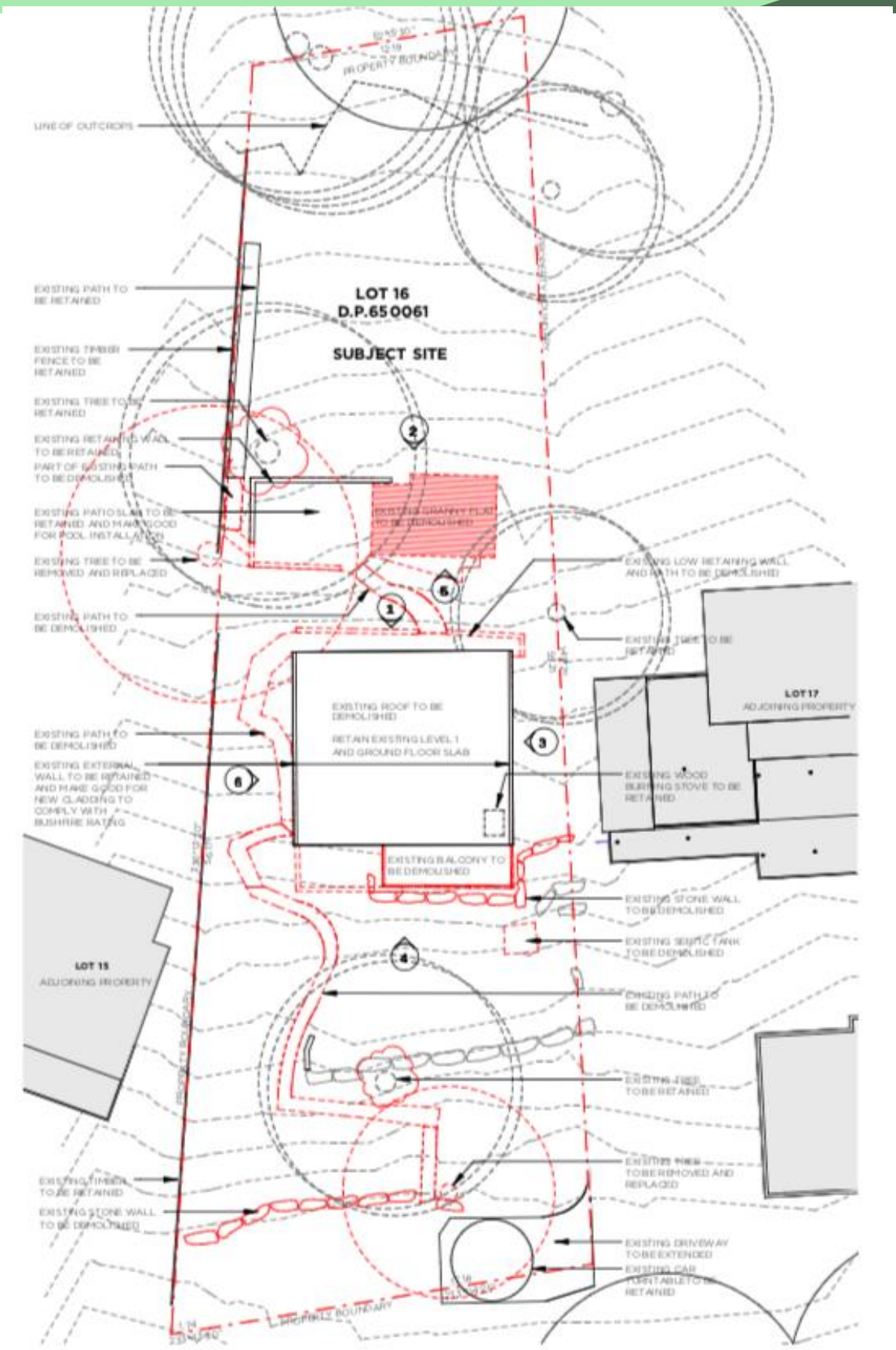


Figure 1.3 – Existing and Proposed development. Source: MGAO DA Master Set, Rev 1. 16/02/22.

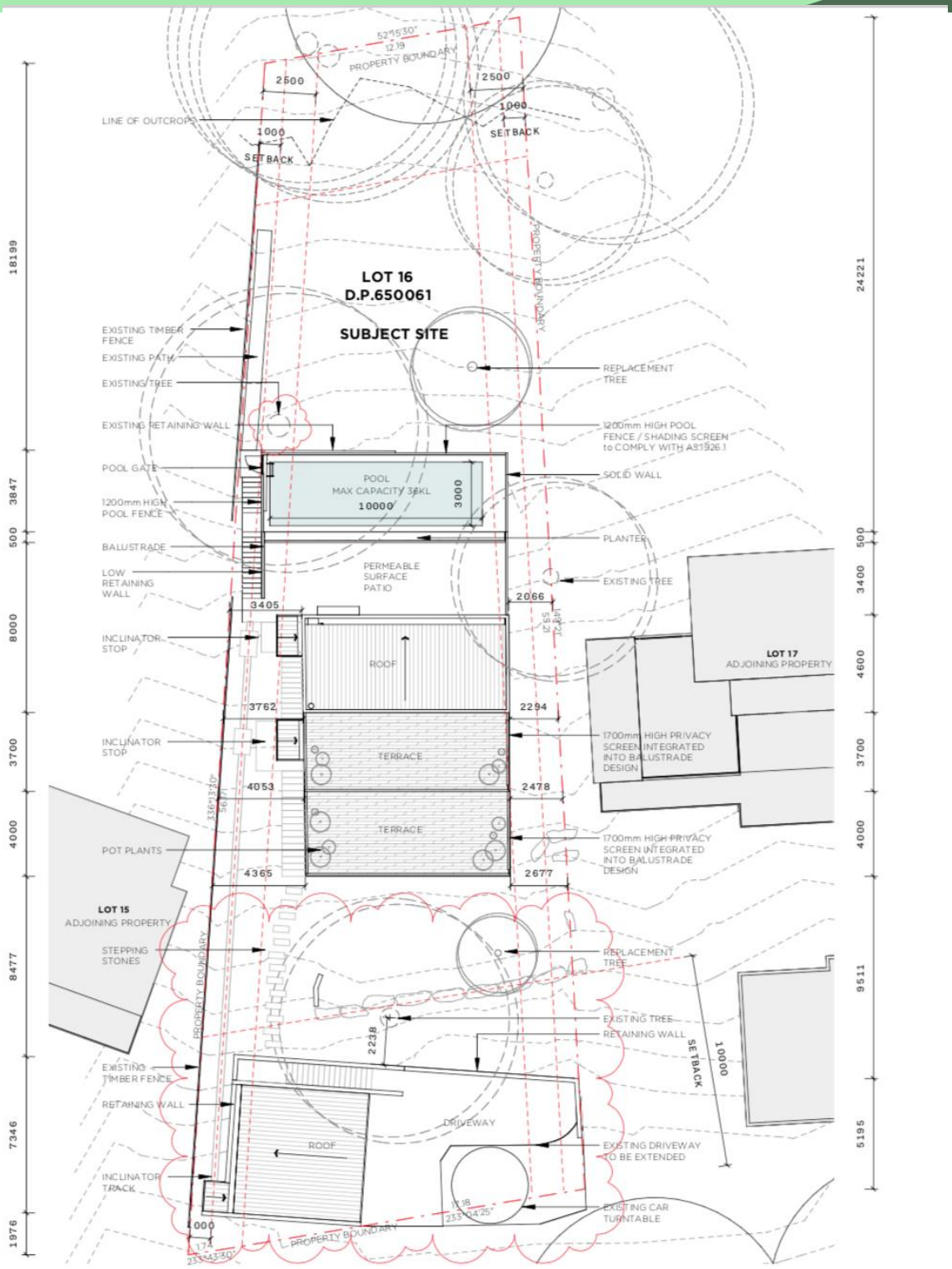


Figure 1.4 Proposed development. Source: MGAO DA Master Set, Revision 1. 16/02/22.

1.4 Sources of information used in the assessment

The following sources of information were used for this assessment:

- SeedMaps 2021
- SydneyMetroArea_v3.1_E-VIS__4489 OEH (2016)
- BioNet DPIE (2021)
- Planning for Bush Fire Protection (PBP) NSW RFS 2019.
- DA Master Set. Revision 1 MGAO 16/02/22.
- Existing Proposed Rev. A. MGAO 29/10/21. (superceded)
- Natural Environment Referral Response – Biodiversity. Northern Beaches Council 08/10/21.
- Natural Environment Referral Response – Biodiversity. Northern Beaches Council 14/12/21
- Natural Environment Referral Response – Biodiversity. Northern Beaches Council 04/02/22
- Arborcultural Impact Assessment & Tree Protection Plan. Vertical Tree Management and Consultancy. Version 3, 14/02/22.
- 918 Barrenjoey Landscape Plan. Kingfisher Ecology. Updated February 2022.

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.

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 which exceeds the threshold.

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;

- Under Part 7 (s7.4), introduces a list of activities/proposal that exceeds the biodiversity offsets scheme threshold.

The NSW *Biodiversity Conservation Regulation 2017* sets out the Biodiversity Offsets Scheme entry threshold for Part 4 developments under the EP&A Act 1979. If the development triggers as least one (1) entry threshold, the development must be assessment under The BC Act using the Biodiversity Assessment Method (BAM) (OEH 2017). See also https://www.environment.nsw.gov.au/biodiversity/entryrequirements.htm

The development triggers the Biodiversity Offsets Scheme entry threshold (due to a very small area of BV map in development area). The assessment type used in the BAM-C is Part 4 Developments (Small Area). Vegetation zones have annexed the appropriate areas of native vegetation which will be modified or removed. Thus, an adequate BDAR has is provided to the consent authority.

1.5.3 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 which applies. The subject land is less than one hectare and is not considered to constitute core koala habitat. The area to be impacted does contain “Koala Use Trees and hence a KMP is not required.

1.5.4 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.

1.5.5 Pittwater Local Environmental Plan 2014 and P21 Development and Control Plan

The site is identified as “biodiversity” on the Terrestrial Biodiversity Map as published by Pittwater Council. (Map Identification Number: 6370_COM_BIO_015_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, replacement canopy planting and biodiversity strategies which will satisfy and contribute to the objectives of the PLEP and P21DCP. Mitigation measures are outlined in section 10 of this report.

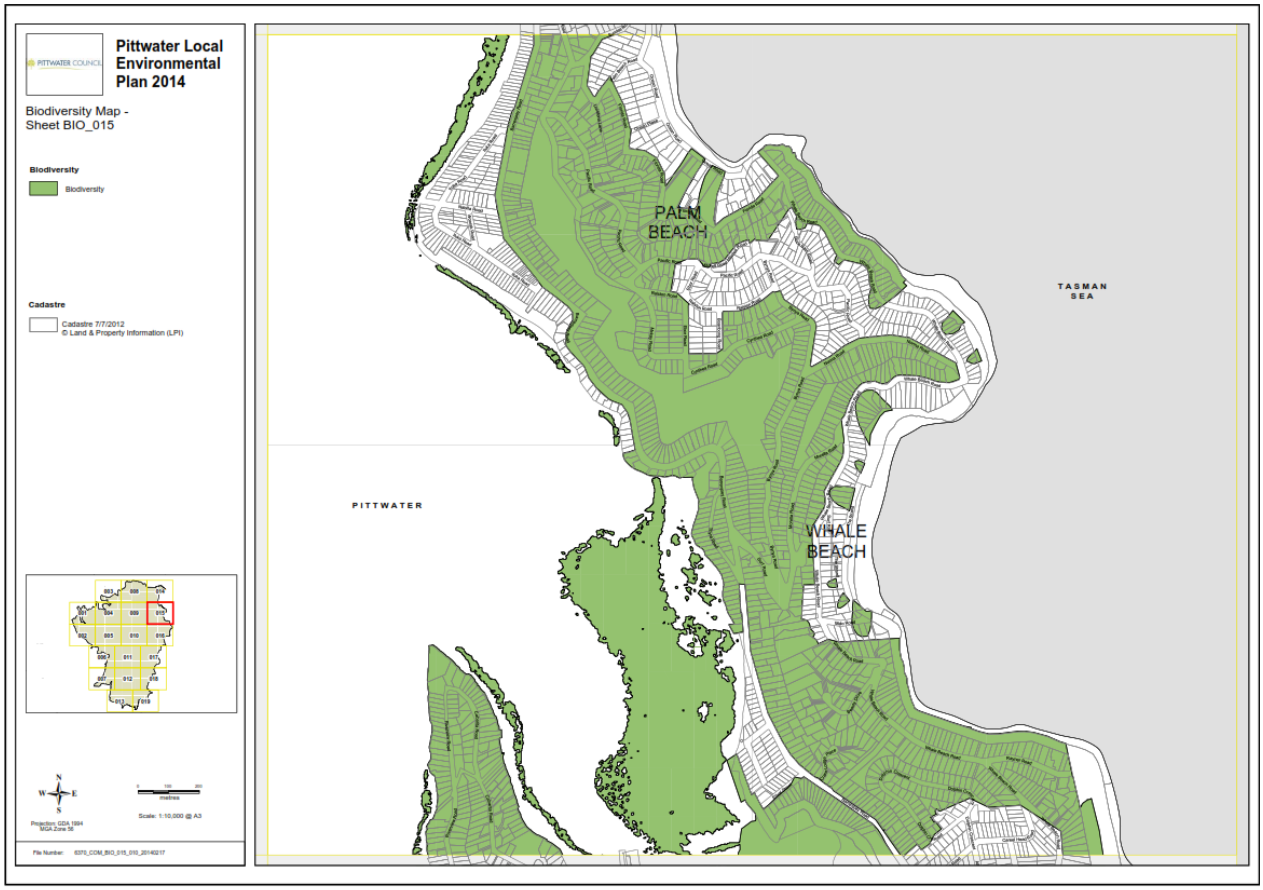


Figure 1.5 - The site is situated on “Biodiversity” on the Terrestrial Biodiversity Map as published by Pittwater Council.

1.6 Biodiversity Offsets Scheme threshold

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.

1.6.1 BOS Area Clearing Threshold

The proposal does not trigger the area clearing threshold as per the BOS entry requirements as the impact area is less than the clearing area threshold. Area clearing thresholds are determined by minimum lot size and guidelines outlined in BAM (OEH 2017) (figure 1.6).

Table 1.1. Minimum lot size and threshold which the development exceeds.

Minimum lot size	**700m²**
Threshold for clearing, above which the BAM and offsets scheme apply	**0.25ha**
Impact area	**0.02ha**

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.

1.6.2 Biodiversity Values Map

The proposed development impact areas identified by the Biodiversity Values map published by the Chief Executive of the NSW Office of Environment and Heritage.

Figure 1.7 - Biodiversity Map – Site in red. Source: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

2 Landscape features and site context

The site is located within agricultural/rural/light industrial setting. The surrounding properties are made up of agricultural (Cropping) rural (grazing and pasture paddocks) and patches of native bushland.

Table 2 - Site Biodiversity Information

Category	Details
Interim Biogeographic Regionalisation for Australia (IBRA)	Sydney Basin
IBRA Sub Region	Pittwater
NSW Landscape 	Belrose Coastal Slopes Bsl 
% Native vegetation cover	25% in the 1500m radius circle See Figure 1.8
Landscape features	
Rivers and streams	No rivers or streams are located within the site of the surrounding lots. The steep slope and proximity to Careel Bay results immediate dispersal of storm water runoff.
Wetlands	No wetlands occur within the site or within proximity to the proposed development.
Connectivity features	Vegetation on site is connected to adjoining bushland via canopy trees and gardens.
Areas of geological significance and soil hazard features	No
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.

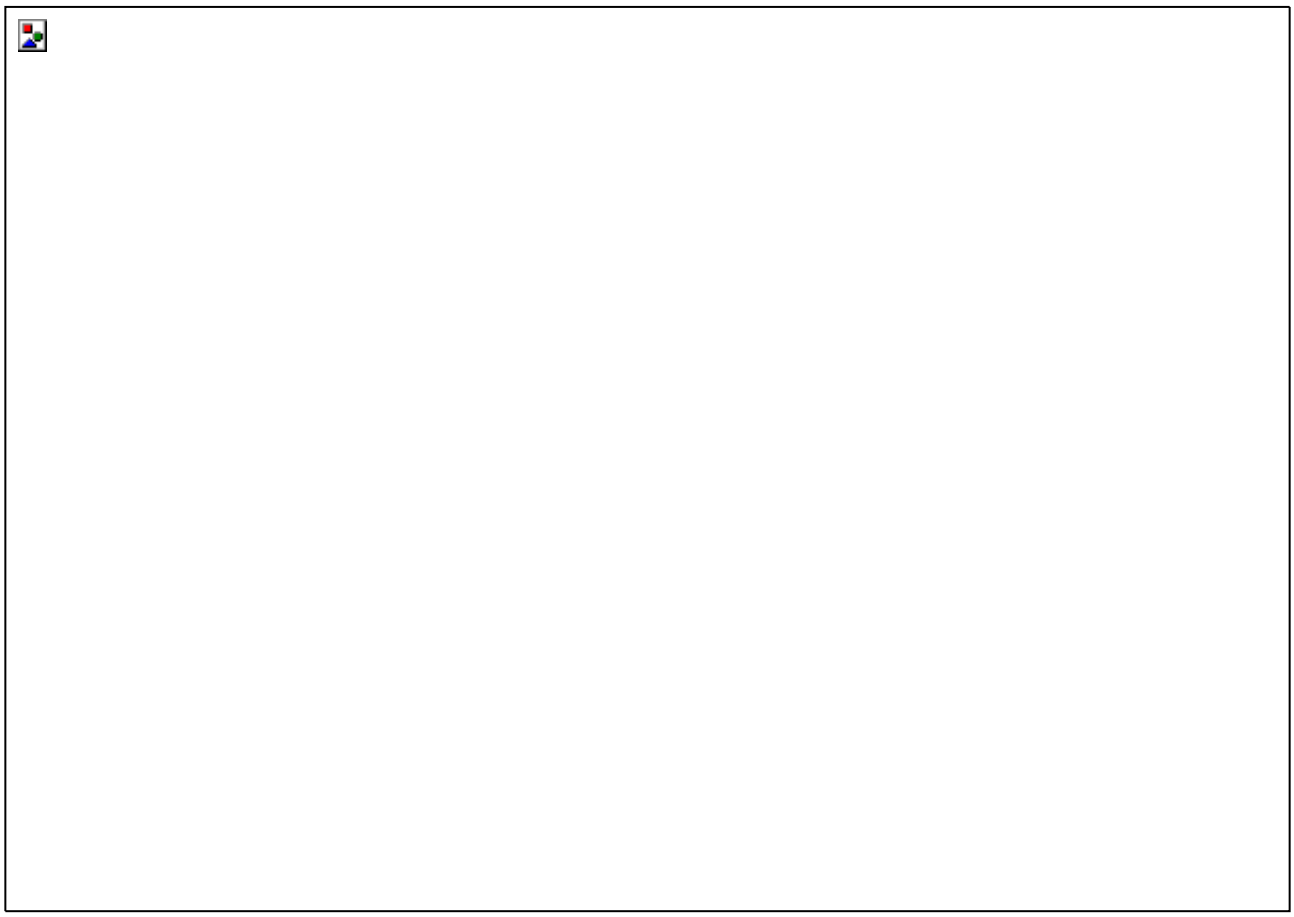


Figure 1.8 - Red circle showing the 1500m buffer around the site.

3 Native vegetation

3.1 Desktop and Survey results – Plant Community Types (PCTs)

A review of the most up-to-date vegetation mapping, SydneyMetroArea_v3.1_E-VIS__4489 DPIE (2016), identified one plant community types (PCT) within site. The PCT is identified as; *Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion* (PCT1214).

Table 3.1 – Table of vegetation community synonyms as per NSW and Commonwealth legislation.

NSW PCT Code	NSW PCT Name	BC Act 2016	EPBC Act 1999
1214	Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion State Conservation: Endangered Ecological Community (EEC)	No associated TEC

3.1.1 Field Survey

The field survey assisted in verifying the distribution and quality of vegetation at the site. Pittwater Spotted Gum Forest (PSGF) (PCT1214) is mapped across the site via *Sydney Metro Area V3.1 2016 E_VIS_4489 OEH OEH (2016).*

Approximately 90% of the vegetation onsite has been previously disturbed. Native vegetation is isolated to the garden and landscaped areas within the site. A small section of native bush vegetation is present at the rear of the property. This area will not undergo any modification or impact and will be retained and protected. The majority of the site consists of cleared open ground footpaths and exotic turf grasses. Vegetation assessment focused on areas of garden with native vegetation. Canopy vegetation is absent within the construction footprint. Middle stratum contains a number of shrub and small tree species associated with the Pittwater Spotted Gum PCT such as Cheese Tree and *Pittosporum undulatum.* Ground vegetation is also primarily absent within the construction footprint, however sections of the garden and much of the site dominated by 'High Threat Exotic' (HTE) species with a small percentage of mixed native ferns. Vegetation onsite is displaying signs of natural regeneration although this is being hindered by the high abundance of exotic weeds.

Vegetation has been assessed as Pittwater Spotted Gum Forest (PSGF) (PCT1214) in the BAM-C. This finding was concluded following desktop investigations and field assessments. See section 5 for a description of vegetation zones and the impact assessment.

Stratification and plot dimensions

Due to the small size of vegetation the plot consisted of the entire site and a vegetated portion of the neighbouring property (see figure 5.1.). Shapefiles of the plot location and size have been provided to the client. Plots were as per the BAM Method with 20 x20 plots (400m^2) for assessing structure and composition with a centre line extending 50m to create a 20 x 50 plot (1000m^2) to assess function. See Biodiversity Assessment Method Operational Manual – Stage 1 (OEH 2018) page 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

Figure 3.1. Subject site within mapped vegetation surrounding the property SydneyMetroArea_v3.1_E-VIS__4489 OEH (2016) . Source: SEED 2021.

3.1.2 Site Photos

Included are photos of vegetation zone and the general condition of vegetation at the site.

Plate 1. Front 'garden' and existing landscaping and house. Tree 5 proposed for removal and replacement.

Plate 2. Weeds such as Asparagus Fern, are common throughout the property.

Plate 3. Granny flat and existing retaining walls in the area of the proposed pool

Plate 4. Bushland to the rear of the site will be retained and no additional clearing is required in this zone with regards to fire management. Bushland here is in good condition with occasional Asparagus Fern and Ochna

Plate 5. Quadrat 1 (1x1)

Plate 6. Quadrat 2 (1x1)

Plate 7. Quadrat 3 (1x1)

Plate 8. Quadrat 4 (1x1)

Plate 10. Plot photo. NB started here and continued up to the edge of the dwelling and then restarted the remainder of the 50m transit in front of the dwelling. There was no one area large enough to do the whole thousand metres squared without splitting it into either side of the existing house.

Plate 11. Looking to the north (rear) of the site.

Plate 12. Looking to the west and over into the rear of the neighbours property. Neighbouring property is turfgrass with spotted gum trees.

Plate 13. Looking to the east to the rear of the neighbours property. Understory again is turf and canopy trees are native.

Plate 14. Looking to the south from the rear of the property over the existing granny flat and house. This area will remain as managed bushland/native garden.

4 Threatened Species

4.1 Flora and Flora Field Survey

No threatened flora or fauna species were identified during Kingfisher 2021 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 were conducted for forest owls, no individuals were recorded 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.

4.2 Threatened Flora - Desktop

A total of 9 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.

Table 4.1. Threatened flora observed in previous ecological surveys within a 10km radius of the study site. NSW DPIE Bionet 2021.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Rutaceae	*Boronia umbellata*	Orara Boronia	V,P	V	1
Myrtaceae	*Callistemon linearifolius*	Netted Bottle Brush	V,3		5
Euphorbiaceae	*Chamaesyce psammogeton*	Sand Spurge	E1		2
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue Orchid	V,P,2	V	1
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	1
Proteaceae	*Macadamia integrifolia*	Macadamia Nut		V	7
Proteaceae	*Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	5
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	E4A		13
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	V	13

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

4.2 Threatened Fauna - Desktop

A total of 48 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 previous ecological surveys within a 10km radius of the study site. NSW DPIE Bionet 2021.

Class	Scientific Name	Common Name	NSW Status	Comth. Status	No. of records
Amphibia	*Heleioporus australiacus*	Giant Burrowing Frog	V,P	V	6
Amphibia	*Pseudophryne australis*	Red-crowned Toadlet	V,P		25
Aves	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	CE	2
Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		1
Aves	*Burhinus grallarius*	Bush Stone-curlew	E1,P		46
Aves	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		1
Aves	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		56
Aves	*Dasyornis brachypterus*	Eastern Bristlebird	E1,P,2	E	1
Aves	*Diomedea exulans*	Wandering Albatross	E1,P	E	3
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		3
Aves	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		4
Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P		44
Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		3
Aves	*Hirundapus caudacutus*	White-throated Needletail	P	V,C,J,K	2
Aves	*Ixobrychus flavicollis*	Black Bittern	V,P		1
Aves	*Lathamus discolor*	Swift Parrot	E1,P,3	CE	6
Aves	*Macronectes giganteus*	Southern Giant Petrel	E1,P	E	1
Aves	*Neophema pulchella*	Turquoise Parrot	V,P,3		1
Aves	*Ninox connivens*	Barking Owl	V,P,3		20
Aves	*Ninox strenua*	Powerful Owl	V,P,3		210
Aves	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	8

Class	Scientific Name	Common Name	NSW Status	Comth. Status	No. of records
Aves	*Onychoprion fuscata*	Sooty Tern	V,P		2
Aves	*Pandion cristatus*	Eastern Osprey	V,P,3		7
Aves	*Petroica boodang*	Scarlet Robin	V,P		1
Aves	*Ptilinopus regina*	Rose-crowned Fruit-Dove	V,P		2
Aves	*Ptilinopus superbus*	Superb Fruit-Dove	V,P		2
Aves	*Tyto novaehollandiae*	Masked Owl	V,P,3		3
Mammalia	*Cercartetus nanus*	Eastern Pygmy-possum	V,P		22
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	V	6
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	1
Mammalia	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	E1,P	E	26
Mammalia	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V,P		5
Mammalia	*Miniopterus australis*	Little Bent-winged Bat	V,P		27
Mammalia	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P		29
Mammalia	*Myotis macropus*	Southern Myotis	V,P		9
Mammalia	*Petauroides volans*	Greater Glider	P	V	1
Mammalia	*Petaurus norfolcensis*	Squirrel Glider	V,P		3
Mammalia	*Phascolarctos cinereus*	Koala	V,P	V	70
Mammalia	*Pseudomys novaehollandiae*	New Holland Mouse	P	V	8
Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	75
Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		5
Mammalia	*Vespadelus troughtoni*	Eastern Cave Bat	V,P		1
Reptilia	*Caretta caretta*	Loggerhead Turtle	E1,P	E	2
Reptilia	*Chelonia mydas*	Green Turtle	V,P	V	9
Reptilia	*Eretmochelys imbricata*	Hawksbill Turtle	P	V	4
Reptilia	*Varanus rosenbergi*	Rosenberg's Goanna	V,P		4

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

4.3 Endangered population

Two (2) endangered populations have been recorded to occur within 10km of the site. Table 4.3 outlines these populations. It is unlikely that either of these populations would occur at the site due to habitat requirements and site accessibility. See Appendix I for rationale.

Table 4.3. Endangered populations in the LGA. Source: NSW OEH Bionet 2021.

Scientific Name	Endangered Population	NSW Status	Comth. Status	No. of records
Petaurus norfolcensis	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1
Phascolarctos cinereus	Koala in the Pittwater Local Government Area	E2,V,P	V	70

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 and several candidate species generated species credit species due to the impact on foraging habitat.

Stage 2: Impact Assessment

5 BAM Calculator

5.1 Vegetation Zones and Integrity Scores

Vegetation zones were determined on species composition at the site. The vegetation zones cover areas in which native vegetation is proposed for removal and/or modification.

Future vegetation integrity (F-VI) scores in the BAM-C, for APZ management zones are reflective of Inner Protection Area (IPA) maintenance practices as outlined in Planning for Bush Fire Protection (PBP) NSW RFS (2019). Within the APZ, species diversity is expected to remain as per current survey results. However, the structural attributes of the vegetation will be modified in the APZ, therefore F-VI scores were adjusted accordingly. The complete vegetation removal management zones have a F-VI score of 0.

Data for the BAM-C was gathered across a single BAM plot located in the construction footprint zone at the site.

Zone One

The zone is located entirely within the construction footprint of the proposed dwelling. The vegetation is in a highly disturbed condition consisting of cleared open ground, exotic turf grass. The dominant vegetation consists of multiple High Threat Weeds including Asparagus fern and *Erharta erecta*. Mature *Corymbia maculata* are present outside the boundary of this zone and will be protected and retained. This zone has undergone historical disturbance for over 50 years through vegetation removal, landscaping and previous development. As a result the vegetation condition in this zone is reflective of the low Vegetation Integrity (VI) Score (10) as assessed in the BAM-C.

This vegetation has been assessed as Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion (PCT1214) in the BAM-C. This finding was concluded following desktop investigations and field plot-based assessments and the experience of the assessing ecologist with vegetation in this area of NSW. A precautionary approach was taken and assumed that if managed correctly the seedbank of the original PCT would be likely to exist and vegetation was assessed as Pittwater Spotted Gum Forest (PSGF) TEC, in the BAM -C, albeit in poor condition.

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

The vegetation zone has been divided into two management zones within the BAM-C. This will reflect the future actions. Total vegetation removal and APZ areas consisting of garden and landscaped vegetation was calculated to be a total of approximately 0.06ha.

Table 5.1. Table of current vegetation integrity scores for vegetation zones on site.

PCT	Vegetation Zone	Area (Ha)	Vegetation Integrity Score (VI)	Change in VI Score
1214 (PSGF)	1. Removal	0.03	12.6	-12.6
1214 (PSGF)	2. APZ	0.03	12.6	-12.6
Total		**0.06**		

Zone 1 includes the removal of 4 trees including a Cheese Tree.

Figure 5.1 - Vegetation zones and BAM plot locations on site.

Figure 5.2 – Vegetation Zone and Cleared/existing structure within the property.

Figure 5.2b – Management Zones for Vegetation zone 1.

5.2 Species and Ecosystem Credits

The total cost to offset both ecosystem credits and species credits generated by this development is $1,072.16 (including GST), assuming payment will be made into the Biodiversity Conservation Fund. 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, amount of vegetation removed, critical habitat removed and alteration of the landscape.

5.2.1 Ecosystem Credit Species derived from BAM

The development and associated works generated zero ecosystem credits for the site. This is a reflection of the very poor vegetation integrity at the site. See below, figure 5.3 for the ecosystem credit summary.

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

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Pittwater	1214 - Pittwater Spotted Gum forest	Yes	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	18.83%	$120.18	1.5516	$3,690.56	0	$0.00
								Subtotal (excl. GST)	$0.00
								GST	$0.00
								Total ecosystem credits (incl. GST)	$0.00

Figure 5.3 - Ecosystem credit summary from the BAM calculator.

5.2.2 Species Credit Species derived from BAM

The development and associated works generated species credits for one species including; Large-eared pied bat (*Chalinolobus dwyeri*).

In total the cost to offset the species credits generated will be $1,072.16 (including GST), assuming payment will be made into the Biodiversity Conservation Fund. The individual credit price for each species can be seen below in figure 5.4. The species polygon as per BAM 6.4 is not included as the area of habitat to be impacted includes the entire vegetation zone

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10157	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	Vulnerable	$741.31	20.6900%	$80.00	1	$974.69
						Subtotal (excl. GST)	**$974.69**
						GST	**$97.47**
						Total species credits (incl. GST)	**$1,072.16**
Calculated as on: **08/11/2021 15:40:10**						**Grand total**	**$1,072.16**

Figure 5.4 - 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. References used for the rationale table are species records from Bionet and information from the relevant DPIE species profile for each species and from the Threatened Biodiversity Data Collection.

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, further 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 not Asset Protection Zones (APZ). The three vegetation zones were divided into these areas as the activities within the APZ area 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).

6 Direct Impacts

6.1.1 Vegetation disturbance and Loss

Native vegetation will be removed to accommodate for the proposed development footprint. However, the area that makes up the current construction footprint is substantially degraded such that the current use of the area as footpath and cleared ground would hinder any natural recovery of the original plant community. Areas of potential habitat for PSGF will be lost (0.03ha), although the site has been subject to vegetation removal and modification for the previous 50 years. Two mature native trees are proposed for removal and to be replaced with canopy species associated with PWSG community. Arborcultural impact assessment of the trees required to be removed are supplied below.

6.2.1 Tree 2 – *Eucalyptus piperita*

The mature Sydney Peppermint tree is growing on the shared property boundary with the majority within 920 Barrenjoey Road and is considered a priority for removal. This tree is growing on a 45 degree lean towards the South. The lean appears to have corrected itself overtime as most of the canopy from 15 metres above ground level is up right. This heavily phototropic lean is putting significant strain on the tension roots of the tree within the loamy sand. The canopy of the tree is in fair health; however, it is sparse. The tree contains over 30% deadwood with significant tip dieback within every branch in the canopy. This tree has poorly structured branch unions throughout the overextended stem. With most of the canopy over the existing dwelling and over the proposed dwelling, it falls in a moderate risk category. The excavations required for the installation of the inclinator, side access and proposed dwelling will have a significant impact on the SRZ and TPZ of this tree (figure 3). The proposed construction will have an irreversible effect on this tree.

6.2.2 Review information. The tree has a heavy lean over the existing dwelling. To be able to achieve Asset protection Zone targets the tree is recommended to be removed as there is no viable pruning optionfor branches in a manner that does not overhang the dwelling and in accordance with the Australian Standard AS4373 "Pruning of Amenity Trees". This is due to the entire canopy overhanging the dwelling.

6.5. Tree 5 – *Glochidion ferdinandi*

The over mature Cheese Tree located at the front driveway and access steps to the property is in poor health and structure. This tree has reached over maturity and is in advanced stages of decline. The tree at ground level has fair structure and appears to be growing on top of a rock shelf. The canopy of the tree has 20% live canopy remaining. This tree is in over maturity and in advanced, irreversible stages of decline and considered a priority for removal.

The remaining vegetation in zone 1 will be managed as an APZ (0.03ha) within the property boundary. The majority of the vegetation does not require modified in order to facilitate the creation of an APZ, as the site's APZ is already established and managed as such. Whilst native species planting post construction is expected to improve the species diversity within the site, the likely hood of continued impact within the APZ is expected through slashing and mowing. Therefore, as a precautionary approach this management zone has also been assessed within the BAM-C for complete removal.

7 Indirect Impacts

7.1.1 Weed growth and invasion

Weed species are present and must be properly managed so they do not spread.

At the direct works zone weeds are to be managed 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 it may result in increased weed growth, exacerbated by the high abundance of weeds present pre-works.

Weeds will colonize and pioneer on any cleared grounds so must be managed throughout the duration of the project as well as on-going post woks

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 for Bushland Hygiene Protocols for Phytophora.

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 upon areas is to be avoided and not to 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 onsite however the proposed actions may result in 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 listed in section 10 below.

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 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 IV.

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/biodiversity-offsets-scheme/serious-and-irreversible-impacts

Table 8. All SAII entity recognised by the BAM Calculator for the site.

Scientific Name	Common Name	Principles

		1	2	3	4
Chalinolobus dwyeri	Large eared pied bat				**X**
Pittwater Spotted Gum Forest (PSGF) (PCT1214).	Pittwater Spotted Gum Forest (PSGF) (PCT1214).	X	**X**		

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

- **Large eared pied bat (*Chalinolobus dwyeri)***

Habitat removal for the Large eared pied bat (*Chalinolobus dwyeri)* 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 habitat such as caves, outcrops, suitable hollows and other features which microbat species may use for breeding purposes for 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. One *Eucalyptus piperita* and one over mature *Glochidion ferdinandi* are proposed for removal, resulting in a loss of marginal foraging habitat and a reduction in future potential roosting habitat in the form of hollows. 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 Large-eared pied bat (*Chalinolobus dwyeri)* will not be significantly affected by the proposed development as they are highly mobile and may only use the site occasionally.

- **Pittwater 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 0.06ha within the 15.6ha local patch of PSGF. Vegetation due to be impacted on site has been significantly altered such that the site does not reflect the natural structural attributes of PSGF as the area is used for footpath access and turfed garden. Vegetation marginally reflects attributes of the PWSG community, this is primarily due historical actions on site including; clearing, erosion, grazing and exotic species. A majority of vegetation on site is regrowth or has been planted by the property owner. Exotic species are dominant across the site, current management and uses are preventing the recruitment of the original vegetation community.

Thus, the proposed development is not expected to significantly contribute to loss of PSGF due to the degraded nature of the site.

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

- **Large eared pied bat (*Chalinolobus dwyeri)***

It has been established that maternity or breeding habitat is not present within the impact area for the Large-eared pied bat (Chalinolobus dwyeri). 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 which requires removal because of proximity to the proposed building or the need to conform 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 potential habitat area for the Large-eared pied bat (Chalinolobus dwyeri).

- **Pittwater Spotted Gum Forest (PSGF)**

The proposal is expected to have a negligible impact upon PSGF as 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 drainage line which is 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.

8.1.4 Step four - Evaluate a serious and irreversible impact

- **Large eared pied bat (*Chalinolobus dwyeri)***

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 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 to the Large eared pied bat (*Chalinolobus dwyeri*). Therefore, the species will not be placed at risk of a serious or irreversible impact.

- **Pittwater Spotted Gum Forest (PSGF)**

The proposed development assessed in this BDAR is not expected to significantly contribute to 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.

Stage 3: Improving Biodiversity Values

9 Avoid and minimise impacts

The development will not significantly impact 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.

Table 9.1 - Expected impact on potential habitat onsite.

Feature	Present	Description of feature characteristics and location	Potential Impact	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	No	N/A	N/A	N/A	N/A
Human made structure	Yes	House within the development site	Negligible	N/A	N/A
Non-native vegetation	Yes	Scattered throughout	Negligible	N/A	N/A

9.1.1 Efforts to minimise impacts on Biodiversity

Original arborcultual impacts assessment resulted in the required removal of four trees within the property. At the direction of Northern Beaches Council, the client engaged additional assessments of impacts to trees within the property. This resulted in the possible retention of Trees T1 and T4 under the recommendations/conditions outlined in section 10.1.5 below.

10 Recommendations

10.1.1 Wildlife corridor/ Revegetation

Pittwater Spotted Gum Forest (PSGF) species community list. Species plantings should aim to restore maximum diversity at the site. This will provide greater foraging and nesting habitat for native species and will deliver greater biodiversity gain outcomes. These species have been selected in consultation with an ecologist for the greatest ecological outcome.

This can be implemented whilst also ensuring the areas satisfy bushfire protection requirements. Such measures will also increase habitat connectivity of the surrounding landscape. Shrub and ground covers will also increase the habitat area for other wildlife including small insectivorous and insectivorous birds. Planting of threated flora species within revegetation areas is also proposed. Kingfisher Landscape Plan, updated 2022 identifies the proposed location for revegetation activities. Such actions will increase biodiversity within the site and the immediate landscape.

10.1.2 Weed management

Low impact bushland regeneration methods should be utilised to meet weed control performance criteria in all areas of remnant native vegetation, to prevent unnecessary impacts to native vegetation and disturbance to soil. Low impact bush regeneration methods include the manual removal of herbaceous weeds and their propagules by hand and with hand tools. 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 seeds.

10.1.3 Delineation of work areas

During construction, impacts to the site and adjacent vegetation should be minimised by the delineation of works zones. Access to the site would be best restricted to the development footprint only. An environmental exclusion zone is proposed for vegetation outside work areas.

10.1.4 Vegetation clearing control measures

Pre-clearance inspection is required prior to vegetation removal to reduce the likelihood of injuring fauna. If results of the pre-clearance survey indicate the possibility of fauna within vegetation to be removed, an ecologist of fauna handler must be on site during vegetation clearing.

10.1.5 Tree Protection

Tree protection will be consistent with the AIA and Tree Protection plan, Vertical Tree Management, 2022. Main trees to be managed are trees within close proximity to building works NB: see below for details and tree numbers.

- Tree 1 - The site arborist must be present during demolition and excavation within the Tree protection Zone. Excavation shall not exceed the existing footprint of the existing structures. Furthermore, tree sensitive engineering pier footings must be used within the TPZ. For structural support footings the location must be verified via root mapping. Non-destructive excavation is required in addition to certification by the site arborist. The tree is recommended to be retained.

- Tree 3 - The tree is recommended to be retained.

- Tree 4 - The garage retaining wall has a setback of 2.2m from the centre of the tree. This results in a 32% major incursion of the TPA & SRZ.

  To be able to consider retention of the tree. It is suggested that non-destructive root mapping and subsequent report be undertaken to verify the number, size and direction of tree roots..

Figure 10.1 Tree Protection Recommendations. Extract from AIA, Vertical Tree Management, 2022

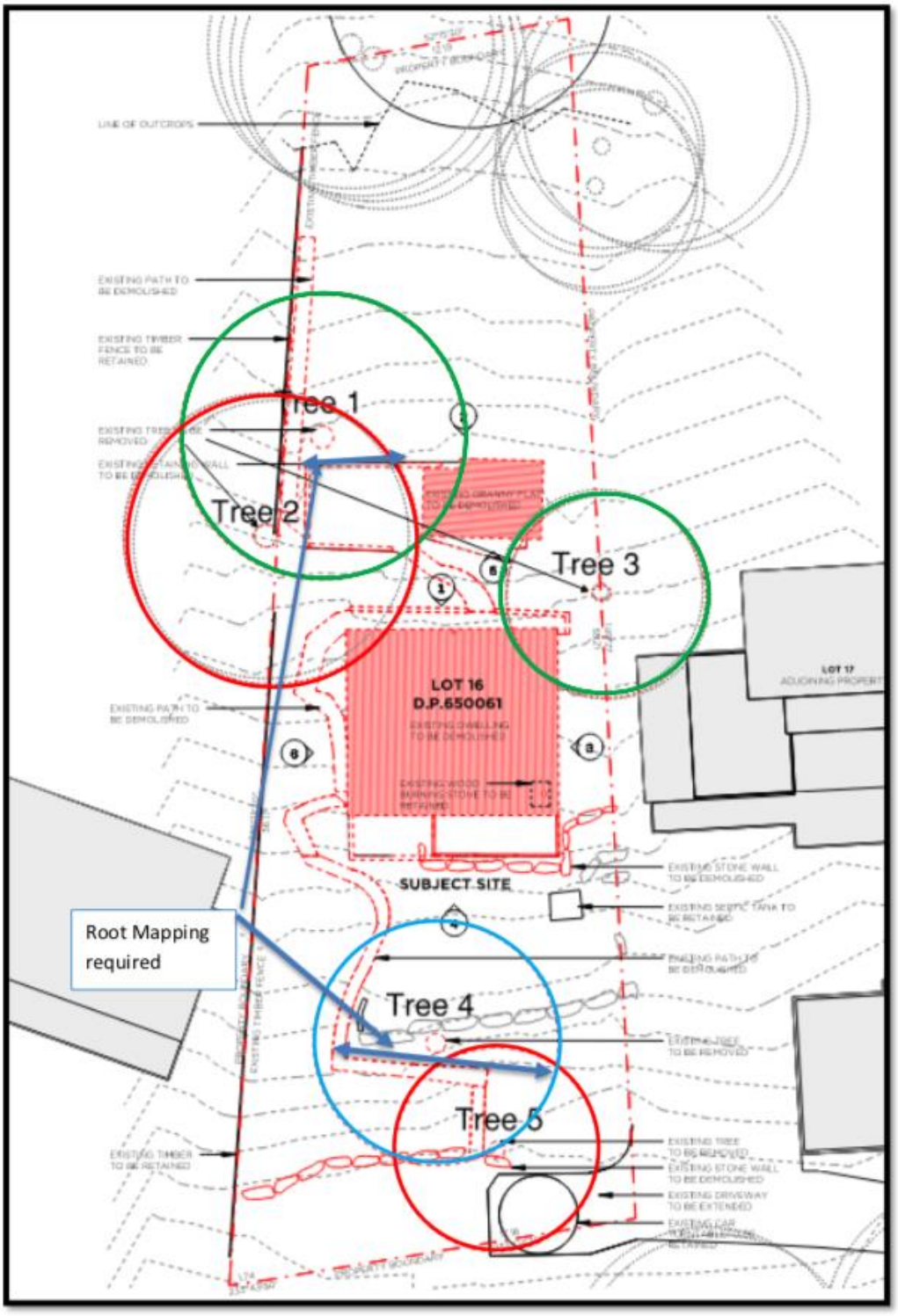


Figure 4 - Existing Site Plan – Trees retained – Green, Remove – red, Further investigation – blue.

Figure 10.2 Tree Protection Plan. Extract from AIA, Vertical Tree Management, 2022

10.1.6 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 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. For key weed photo guide see Appendix II.

10.1.7 Native Seed Collection

Any native trees or shrubs being removed for the construction works should be checked for seeds during removal works. If seeds are present, they should be collected and used off-site, location to be determined with council.

10.1.8 Nest boxes

Installation of a 2 nest boxes designed for microbats should be added to the site to increase roosting opportunities in the area.

Image from: nestboxes.com.au

10.1.9 Pathogen prevention

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

11 Conclusions

The proposed development will have an approximate impact area of 0.06ha on Pittwater Spotted Gum Forest (PSGF) (PCT1214). This vegetation has been significantly altered and degraded from its natural state. Vegetation onsite has been significantly altered such that the site does not reflect the natural structural attributes of PSGF. The total cost to offset both ecosystem credits and species credits generated by this development is $1,072.16 (including GST) assuming payment will be made into the Biodiversity Conservation Fund.

12 Appendices

12.1 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.

Table 12.1. Potential Species Credit Species generated by the BAM-C, all the following species were candidate threatened species for the site. All BAM-C predicated species were retained.

Scientific Name	Common Name	Habitat/ Geographic Constraints	Retained in BAM Calculator	Reason for Inclusion or Removal
Flora				
Diuris bracteata	*Diuris bracteata*	For over 100 years *Diuris bracteata* was known only from the original collection made near Gladesville in northern Sydney. The complete absence of records for most of the 20th Century resulted in this species being listed as 'presumed extinct' on Part 4 of Schedule 1 of the Threatened Species Conservation	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area.

		Act 1995. This listing status was updated in 2005 to Endangered under the Act after several specimens were found in the Sydney Basin (Duffy's Forest, Mount White and Kulnura). In recent years, however, these specimens are considered to have been incorrectly identified and are considered to be *Diuris platichila* (Peter Weston May 2013). The species is considered to be extinct, though the listing status under the *Biodiversity Conservation Act 2016* does not yet reflect this status.		Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded from its original state. A dense coverage of exotic grasses is prohibiting growth of native vegetation. Further decreasing the chances of the species being present within the site boundaries. The species was not recorded during site surveys and no recording on Bionet within 10 Km radius. Species is not present and is unlikely to be present on the subject land. No further assessment required.
Rhodamnia rubescens	Scrub Turpentine	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m above sea level in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded from its original state. A dense coverage of exotic grasses is prohibiting growth of native vegetation. Further decreasing the

		This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.		chances of the species being present within the site boundaries. Additionally, targeted surveys were conducted. The species was not recorded during site surveys. Species is not present and is unlikely to be present on the subject land. No further assessment required.
Genoplesium baueri	Bauer's Midge Orchid	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone.	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded from its original state. A dense coverage of exotic grasses is prohibiting growth of native vegetation. Further decreasing the chances of the species being present within the site boundaries. The species was not recorded during site surveys. Species is not present and is unlikely to be present on the subject land. No further assessment required.

		Flowers February to March.		
Hygrocybe aurantipes	*Hygrocybe aurantipes*	Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded from its original state. A dense coverage of exotic grasses is prohibiting growth of native vegetation. Further decreasing the chances of the species being present within the site boundaries. The species was not recorded during site surveys. Species is not present and is unlikely to be present on the subject land. No further assessment required.
Fauna				
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-	YES (assumed present)	There is a moderate likelihood of occurrence for the species. Previously recorded sightings on Bionet atlas have been sighted within 10km's of the site. The site presents marginal habitat for the species in the form of foraging

		elevation dry open forest and woodland close to these features.		opportunities from eucalyptus and other flowering natives. Whilst no hollows recorded on site. Species utilise cracks and caves in cliff faces for roosting habitat. These features are likely to exist within 2km of the site.
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. sideroxylon,* and White Box ^. 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.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents marginal foraging habitat for the species in the form of canopy vegetation. The development site does not contain areas of important breeding habitat for the species, as per the DPIE BV map. Habitat constraints in BAM-C are based on this BV map and as such, Habitat constraints are N/A. Species not recorded during site survey. No further assessment or consideration is required.

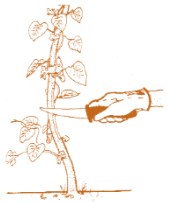
Miniopterus australis	Little Bent-winged Bat	Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share 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.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents foraging habitat for the species. The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints including; Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding, as per the BAM-C. No further assessment or consideration is required.
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.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents foraging habitat for the species. The development site would not be considered breeding habitat for the

				species. The impact area lacks key Habitat constraints including; Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding, as per the BAM-C. No further assessment or consideration is required.
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.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents marginal foraging habitat for the species in the form of canopy vegetation. The development site does not contain areas of important breeding habitat for the species, as per the DPIE BV map. Habitat constraints in BAM-C are based on this BV map and as such, Habitat constraints are N/A. Species not recorded during site survey. No further assessment or consideration is required.

12.2 Appendix II– 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.

Technique	Method	Equipment
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 plants 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.

Technique	Method	Equipment
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. Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.	Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and 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.

Images provided by Dragonfly Environmental

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.

12.3 Appendix III– Bushland Hygiene Protocols for Phytophthora

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.
- And, 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.

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.

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.

12.4 Appendix IV– BAM –C; Reports and Data

12.4.1 Payment Report.

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00029296/BAAS19008/21/00029297		6	23/02/2022

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Geraldene Susan Dalby-Ball	BAAS19008	918 Barrenjoey Rd Palm Beach	Finalised

Assessment Type	Date Finalised	BOS entry trigger
Part 4 Developments (Small Area)	23/02/2022	BOS Threshold: Biodiversity Values Map

PCT list

Price calculated	PCT common name	Credits
Yes	**1214** - Pittwater Spotted Gum forest	0

Species list

Price calculated	Species	Credits
Yes	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	1

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

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Pittwater	**1214** - Pittwater Spotted Gum forest	Yes	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	18.83%	$120.18	1.5516	$3,690.56	0	$0.00

Subtotal (excl. GST)	**$0.00**
GST	**$0.00**
Total ecosystem credits (incl. GST)	**$0.00**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10157	***Chalinolobus dwyeri*** (Large-eared Pied Bat)		$741.31	20.6900%	$80.00	1	$974.69

Subtotal (excl. GST)	**$974.69**

Assessment Id
00029296/BAAS19008/21/00029297

Proposal Name
918 Barrenjoey Rd Palm Beach

Biodiversity payment summary report

	GST	$97.47
Total species credits (incl. GST)		**$1,072.16**
	Grand total	**$1,072.16**

Assessment Id	Proposal Name	Page 3 of 3
00029296/BAAS19008/21/00029297	918 Barrenjoey Rd Palm Beach	

12.4.2 Credit Summary Report.

NSW GOVERNMENT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00029296/BAAS19008/21/00029297	918 Barrenjoey Rd Palm Beach	24/11/2021
Assessor Name	Report Created	BAM Data version *
Geraldene Susan Dalby-Ball	23/02/2022	50
Assessor Number	BAM Case Status	Date Finalised
BAAS19008	Finalised	23/02/2022
Assessment Revision	Assessment Type	BOS entry trigger
6	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	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

NSW GOVERNMENT

BAM Credit Summary Report

Pittwater Spotted Gum forest											
1	1214_Classname1	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	12.6	12.6	0.06	PCT Cleared - 71%	High Sensitivity to Potential Gain	Endangered Ecological Community	Not Listed	2.00	TRUE	0
											Subtotal	**0**
											Total	**0**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
1214_Classname1	10.0	10.0	0.02			Vulnerable	Vulnerable	True	1
								Subtotal	**1**

Assessment Id
00029296/BAAS19008/21/00029297

Proposal Name
918 Barrenjoey Rd Palm Beach

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12.4.3 Predicted species report.

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00029296/BAAS19008/21/00029297	918 Barrenjoey Rd Palm Beach	24/11/2021
Assessor Name	Report Created	BAM Data version *
Geraldene Susan Dalby-Ball	23/02/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS19008	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
6	BOS Threshold: Biodiversity Values Map	23/02/2022

* 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	1214-Pittwater Spotted Gum forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1214-Pittwater Spotted Gum forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	1214-Pittwater Spotted Gum forest
Eastern Osprey	Pandion cristatus	1214-Pittwater Spotted Gum forest
Gang-gang Cockatoo	Callocephalon fimbriatum	1214-Pittwater Spotted Gum forest
Glossy Black-Cockatoo	Calyptorhynchus lathami	1214-Pittwater Spotted Gum forest
Grey-headed Flying-fox	Pteropus poliocephalus	1214-Pittwater Spotted Gum forest
Koala	Phascolarctos cinereus	1214-Pittwater Spotted Gum forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	1214-Pittwater Spotted Gum forest
Little Bent-winged Bat	Miniopterus australis	1214-Pittwater Spotted Gum forest

BAM Predicted Species Report

Little Eagle	Hieraaetus morphnoides	1214-Pittwater Spotted Gum forest
Little Lorikeet	Glossopsitta pusilla	1214-Pittwater Spotted Gum forest
Masked Owl	Tyto novaehollandiae	1214-Pittwater Spotted Gum forest
New Holland Mouse	Pseudomys novaehollandiae	1214-Pittwater Spotted Gum forest
Powerful Owl	Ninox strenua	1214-Pittwater Spotted Gum forest
Regent Honeyeater	Anthochaera phrygia	1214-Pittwater Spotted Gum forest
Rosenberg's Goanna	Varanus rosenbergi	1214-Pittwater Spotted Gum forest
Scarlet Robin	Petroica boodang	1214-Pittwater Spotted Gum forest
Spotted-tailed Quoll	Dasyurus maculatus	1214-Pittwater Spotted Gum forest
Swift Parrot	Lathamus discolor	1214-Pittwater Spotted Gum forest
Varied Sittella	Daphoenositta chrysoptera	1214-Pittwater Spotted Gum forest
White-throated Needletail	Hirundapus caudacutus	1214-Pittwater Spotted Gum forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1214-Pittwater Spotted Gum 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

12.4.4 Candidate species report

NSW GOVERNMENT

BAM Candidate Species Report

Proposal Details

Assessment Id 00029296/BAAS19008/21/00029297	Proposal Name 918 Barrenjoey Rd Palm Beach	BAM data last updated * 24/11/2021
Assessor Name Geraldene Susan Dalby-Ball	Report Created 23/02/2022	BAM Data version * 50
Assessor Number BAAS19008	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Finalised
Assessment Revision 6	Date Finalised 23/02/2022	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?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

NSW GOVERNMENT

BAM Candidate Species Report

Common name	Scientific name	Justification in the BAM-C
Bauer's Midge Orchid	Genoplesium baueri	Habitat degraded
Diuris bracteata	Diuris bracteata	Habitat degraded
Hygrocybe aurantipes	Hygrocybe aurantipes	Habitat degraded
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat degraded
Little Bent-winged Bat	Miniopterus australis	Habitat degraded
Regent Honeyeater	Anthochaera phrygia	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat constraints

12.4.5 Biodiversity Credit Report (Like for Like)

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00029296/BAAS19008/21/00029297	918 Barrenjoey Rd Palm Beach	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Geraldene Susan Dalby-Ball	BAAS19008	50
Proponent Names	Report Created	BAM Case Status
Matt Goodman	23/02/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
6	Part 4 Developments (Small Area)	23/02/2022
BOS entry trigger	* 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.	
BOS Threshold: Biodiversity Values Map		

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	1214-Pittwater Spotted Gum forest

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

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
1214-Pittwater Spotted Gum forest	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	0.1	0	0	0

BAM Biodiversity Credit Report (Like for like)

1214-Pittwater Spotted Gum forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion This includes PCT's: 1214, 1589	-	1214_Classname1	No	0	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	**1214_Classname1**	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

Assessment Id: 00029296/BAAS19008/21/00029297

Proposal Name: 918 Barrenjoey Rd Palm Beach

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NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

12.5 Field Sheets and Data

Species	Native/ Exotic	Growth code	Cover %	Abund
Glochidion ferdinandi (Cheese Tree)	Native	Tree	2	1
Eucalyptus. Piperita	Native	Tree	2	1
Corymbia gummifera	Native	Tree	2	1
Eucalyptus umbra	Native	Tree	2	1
*Livistotona australis (*Cabbage-tree Palm*)*	Native	Other	2	2
Pittosporum undulatum	Native	Shrub	1	3
Macrozammia communis	Native	Other	1	3
Calochlaena dubia (Soft Bracken)	Native	Other	1	50
*Pteridium esulatum (*Common Bracken*)*	Native	Fern	5	200
Hydrocotyle bonariensis	Native	Forb	1	500
Smilax australis	Native	Other	1	20
Exotic/Weed Species				
Ricinus communis	HTE	n/a	1	40
Ivy	Exotic	n/a	2	50
Ehrharta erecta	HTE	n/a	2	1000
Ginger lilly	Exotic	n/a	5	1000
Asparagus fern	HTE	n/a	10	1000

Code	Sum Value	Total Native Cover %
Tree	4	8
Shrub	1	1
Grass	0	0
Forb	1	1
Fern	1	5
Other	4	5
High Threat Exotic Cover		13%

13 Expertise of authors

With over 20 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and on-ground 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.

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

Luke Johnson

ECOLOGIST

Luke is a passionate ecologist who has experience across both the government and private sectors to deliver sustainable environmental outcomes. He has contributed to projects with major construction contractors and has been able to deliver creative environmental solutions on time and within budget.

Luke's passion for fauna was discovered though volunteer work handling microbats in Victoria. Those skills have been honed through the work with ECA as a fauna spotter during vegetation clearing activities in NSW.

As an undergraduate student, he interned with the Bureau of Meteorology to conduct research identifying traditional ecological knowledge of severe weather events in communities in the Pacific.

He has exceptional customer communication skills and builds long lasting professional relationships with his clients. He has a working knowledge of current NSW and Commonwealth environmental legislation. He is also competent in the practical application of flora and fauna surveying and monitoring techniques.

Key Projects Include:

- Monitoring of Endangered Species, various locations of NSW and VIC
- Fauna spotter during vegetation clearing
- Conducted environmental impact assessments for state infrastructure projects and Department of Defence
- Passion for traditional ecological knowledge including researching for the Bureau of Meteorology's COSPAC program

SPECIALISATIONS

- Urban and landscape ecology
- Environmental Impact Assessments (EIA)
- Flora and Fauna Assessments
- Habitat tree assessment, marking and mapping
- GIS mapping
- Fauna spotting

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. *2020-present*
- **Environmental Consultant,** Hibbs & Associates. *2019-2020*
- **Field Ecologist,** Biosis 2018-2019
- **Volunteer,** Microbat box monitoring and handling including assisting in tagging

QUALIFICATIONS AND MEMBERSHIPS

- Bachelor of Environmental Management and Ecology, Victoria University
- First aid certificate
- Asbestos awareness training
- WHS General Induction of Construction Industry NSW White Card