# Biodiversity Development Assessment Report

**60-62 Chisholm Avenue, Avalon Beach**

*By Ecological Consultants Australia Pty Ltd TA*

*Kingfisher Urban Ecology and Wetlands*

**Updated April 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 Nada Herman c/o Andy Lehman Design to provide a **Biodiversity Development Assessment Report** for a proposal at 60-62 Chisholm Ave, Avalon Beach within the Northern Beaches Council Local Government Area (LGA).

**Trigger for a formal BDAR under the BC Act 2016:**

While the proposal does not trigger the clearing threshold, the proposal triggers BOS entry requirements as the impact area is located within the mapped Biodiversity Values Area.

**Stage 1: Biodiversity Assessment**

- On-ground survey took place in June 2021 by Ecologist Luke Johnson.
- Data was gathered across a single BAM plot located in one vegetation zone at the site.
- 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.
- Targeted survey was conducted for *Genoplesium baueri* in March by Senior Ecologist Geraldene Dalby-ball. Refer to Appedix Vi for details.

**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 0.05ha within the 0.845ha site.
- Survey plot was within a vegetation community identified as Pittwater Spotted Gum Forest (PWSGF) (PCT1214).
- PWSGF is listed as an Endangered Ecological Community (EEC) under the NSW BC Act (2016).
- Vegetation onsite has been significantly altered such that the site does not reflect the natural structural attributes of the PWSGF.
- Vegetation is structurally and functionally average due to previous clearing onsite. Thus, the proposed development assessed in this BDAR is not expected to significantly contribute to loss of PWSGF.
- No threatened species were recorded during the site surveys or secondary targeted flora survey.

**Stage 3: Improving Biodiversity values**

- Delineation of work areas
- Vegetation clearing control measures
- 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 proposed development of the driveway and carport will have a direct impact approximate area of 0.05ha on Pittwater Spotted Gum Forest (PWSGF) (PCT1214). This vegetation has been significantly altered and degraded from its natural state.
- The site has been managed as a general gardening area for approximately 20 years. A majority of vegetation on site is dominated by Common ground fern (*Calochlaena dubia*) or has been planted by the property owner.
- The location of the driveway and carport have been designed to minimise and avoid impact on the surrounding vegetation. The driveway location allows for the development to avoid removal of boulders scattered throughout the site. The carport footprint is located in an area of low species diversity as it is dominated by Common Bracken and avoids impacts to major significant trees within the site.
- **Serious and irreversible impacts** (SII) have been assessed for the following: Pittwater Spotted Gum Forest EEC, *Chalinolobos dwyeri* and *Hygrocybe aurantipes* and it has been deemed that there will not be SII resulting from this proposal.
- **Impacts** have been assessed using the BAM calculations, as well as through observations in field work. The follow summary form the calculations apply:
    - Ecosystem credits are required for PWSGF community. The total number of ecosystem credits required is one (1).
    - Species credits are required for species (including *Chalinolobos dwyeri*, *Hygrocybe aurantipes* and *Diuris bracteata* The total number of species credits required is three (3).
    - The total cost to offset both ecosystem credits and species credits generated by this development is $6,513.68 inc GST.
- Alternatively, there are opportunities to retire the credits on the site and retain, for the long-term, areas of Pittwater Spotted Gum EEC and the species habitats that are associated with this community in this area.
- If approved measures to **minimise / mitigate** impacts including but not limited to; nest boxes, native species landscaping, regeneration of areas with resilience, delineation of works zones, weed removal, tree protection and fauna refuge zones will be used to reduce overall impacts associated with the development and increase habitat opportunities in the area.

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# Stage 1: Biodiversity Assessment

# 1 Introduction

Ecological Consultants Australia (ECA) has been contracted by Nada Herman c/o Andy Lehman Design to provide a **Biodiversity Development Assessment Report** for a proposal at 60-62 Chisholm Ave, Avalon Beach 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 1.1 - Site Administrative Information

| Category | Details |
|---|---|
| Title Reference (Lot/DP) | 2/-/DP1104192 |
| Area (ha) | 0.854 ha |
| Street Address | 60-62 Chisholm Avenue, Avalon Beach NSW 2107 |
| LGA | Northern Beaches Council |
| Land Zoning | E4: Environmental Living |


**Figure 1.1. Site of the proposed development. Source: SixMaps, 2021.**

## 1.2 Site history

The site consists of native bushland, landscaped garden and footpath associated with the residences at 60-62 Chisholm Avenue. Native vegetation on site is a mixture of conditions from good to poor due to previous modification and disturbance. The majority of the proposed impact area of the DA consist of cleared ground dominated by Common Ground Fern/ False Bracken. This area of the site has been significantly altered and degraded from its natural state.

## 1.3 Proposed actions

The proposed project involves the construction of a carport and associated driveway for 60 Chisholm Ave. This development also includes an inclinator from the carport to the residence. To facilitate the development vegetation removal and landscaping are proposed.

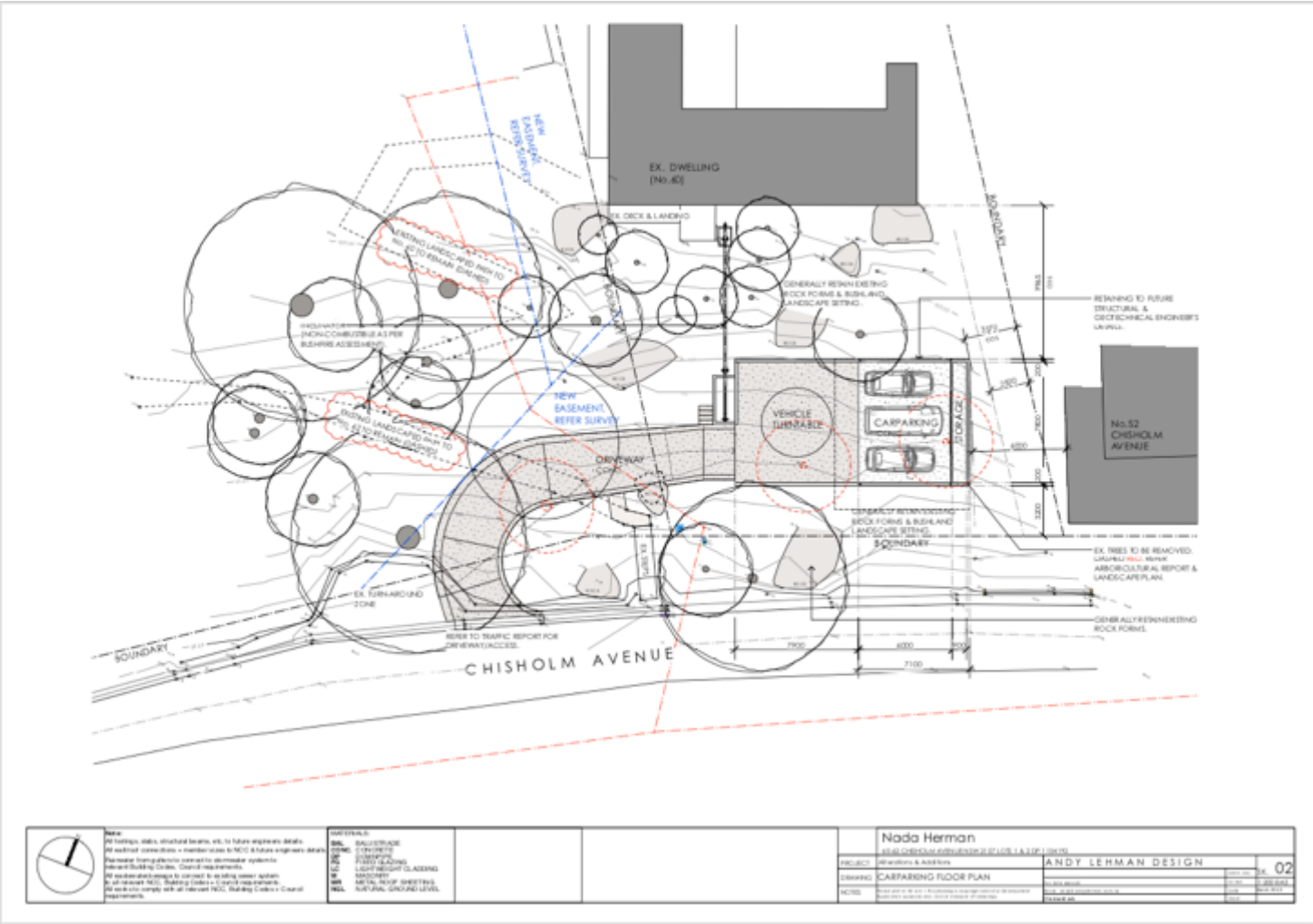


**Figure 1.2. Car Parking Floor Plan for the proposal at 60-62 Chisholm Ave, Avalon Beach. Source: Andy Lehman Design, March, 2022**

## 1.4 Sources of information used in the assessment

The following sources of information were used for this assessment:

- SeedMaps 2021
- SydneyMetroArea_v3.1_2016_E_VIS_4489 OEH (2016)
- BioNet DPIE (2021)
- Planning for Bush Fire Protection (PBP) NSW RFS 2019.
- Master Set_60 Chisholm Avenue. Andy Lehman Design, March, 2022.
- DA Landscape Plan. Volker Klemm Landscape Design, April 2021.
- Landscape Trees_60-62 Chisholm Avenue. Volker Klemm Landscape Design.
- Arboricultural Impact Assessment. Treeism Arboricultural Services, March 2021.
- Existing detailed survey_60-62 Chisholm Avenue. Clarke Dowdle & Associates, 10/09/2020.
- Overall Survey Revised_60-62 Chisholm Ave. Clarke Dowdle & Associates, 25/03/2021.
- Natural Environment Referral Response – Biodiversity. Northern Beaches Council, 19/05/2021.

## 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. The assessment type used in the BAM-C is Part 4 Developments (Small Area). The paddock tree assessment tool (appendix I – BAM (2017) was not used in this assessment. 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.

As there is no approved Koala Plan of Management for which this land applies. The State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2021 was considered. However, as the subject land is less than one hectare this development is therefore exempt from the SEPP (Koala Habitat Protection) 2021.

### 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

The site is zoned as “E4 Environmental Living” as identified in Pittwater LEP (2014) the aim of part 2, Environmental Living Objectives:

(a) To provide for low-impact residential development in areas with special ecological, scientific of aesthetic values.

(b) To ensure that residential development does not have an adverse effect on those values.

(c) To provide for residential development of low density and scale integrated with the landform and landscape.

(d) To encourage development that retains and enhances riparian and foreshore vegetation and wildlife corridors

The proposal will include revegetation areas and biodiversity strategies which will satisfy and contribute to the objectives of part 2, in the Pittwater LEP. Mitigation measures are outlined in section 10 of this report.

## 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 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 (Table 1.2). Area clearing thresholds are determined by minimum lot size and guidelines outlined in BAM (OEH 2017) (figure 1.3).

Table 1.2. Minimum lot size and threshold.

| Minimum lot size | **Less than 1 ha** |
|---|---|
| Threshold for clearing, above which the BAM and offsets scheme apply | **0.25 ha** |
| Impact area | **0.05 ha** |

**Area clearing threshold**

The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).

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

**Figure 1.3 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.

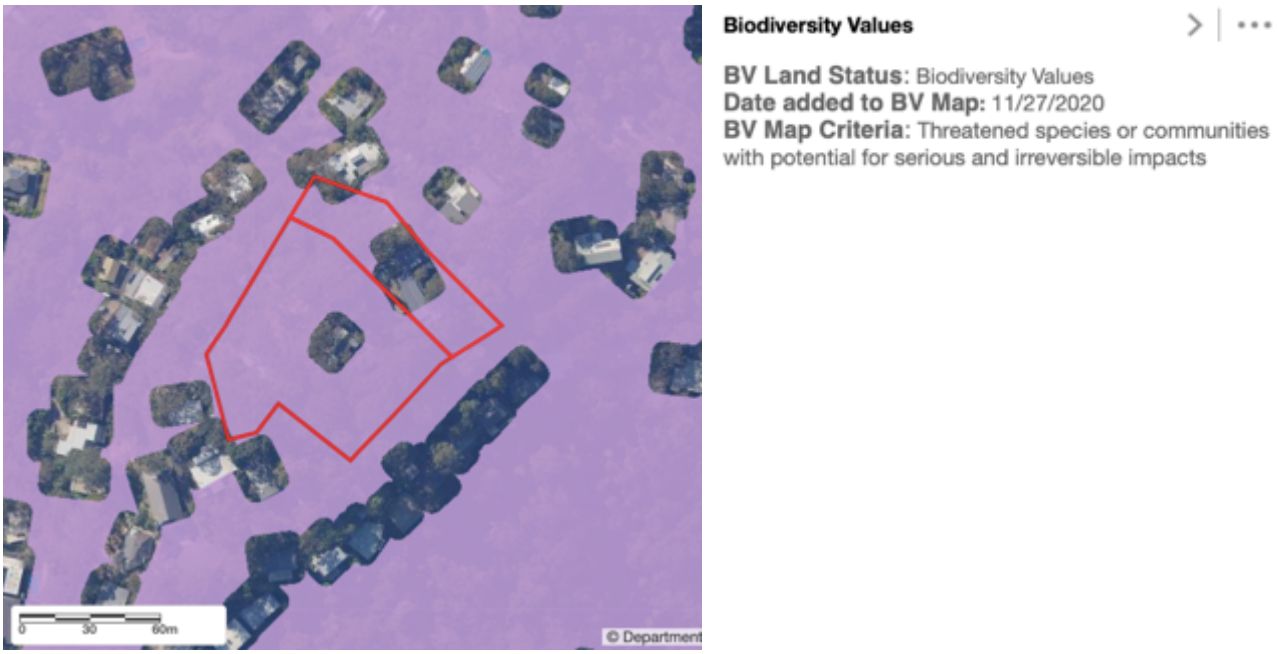


**Figure 1.4. Biodiversity Map – Site in red. Source: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap 2021**

# 2 Landscape features and site context

The site is located within the E4 – Environmental Living Zone and consists of a mix of native and exotic vegetation. The surrounding properties are made up of similar context of low density residential dwellings situated amongst patches of native bushland.

Table 2.1 - Site Biodiversity Information

| Category | Details |
|---|---|
| Interim Biogeographic Regionalisation for Australia (IBRA) | Sydney Basin |
| IBRA Sub Region | Cumberland |
| 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/streams are located within the site or adjacent land. |
| Wetlands | N/A |
| Connectivity features | Vegetation on site is connected to adjoining bushland via trees and inconsistent structural layers. |
| 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, 2020). |

| | |
|---|---|
| | Watagan is categorised by rolling to very steep hills on fine-grained Narrabeen Group sediments. Local relief 60–120 m, slopes >25%. Narrow, convex crests and ridges, steep colluvial side slopes, occasional sandstone boulders and benches |

**Figure 2.1. Blue circle showing mapped vegetation within 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_2016_E_VIS_4489 DPIE (2021), identified one plant community type (PCT) within site. The PCT is identified as; *Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion (PCT 1214).*

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

| NSW PCT Code | NSW PCT Name | BC Act 2016 | EPBC Act 1999 |
|---|---|---|---|
| 1214 | Pittwater Spotted Gum Forest | Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion<br>State Conservation: Endangered Ecological Community (EEC) | Not Listed |

### 3.1.1 Field Survey

The field survey assisted in verifying the distribution and quality of vegetation at the site. Pittwater Spotted Gum Forest (PWSGF) (PCT1214) is mapped across the site via SydneyMetroArea_v3.1_2016_E_VIS_4489 DPIE (2021).

Approximately 50% of the vegetation onsite has been previously disturbed. The mid stratum is primarily absent within site boundaries. The ground stratum has been highly disturbed in order to provide a footpath and cleared area for the dwellings front garden, with much of the site dominated by *Pteridium esculentum*.

Vegetation has been assessed as Pittwater Spotted Gum Forest (PWSGF) (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**

Plot is per the BAM Method with 20x20 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

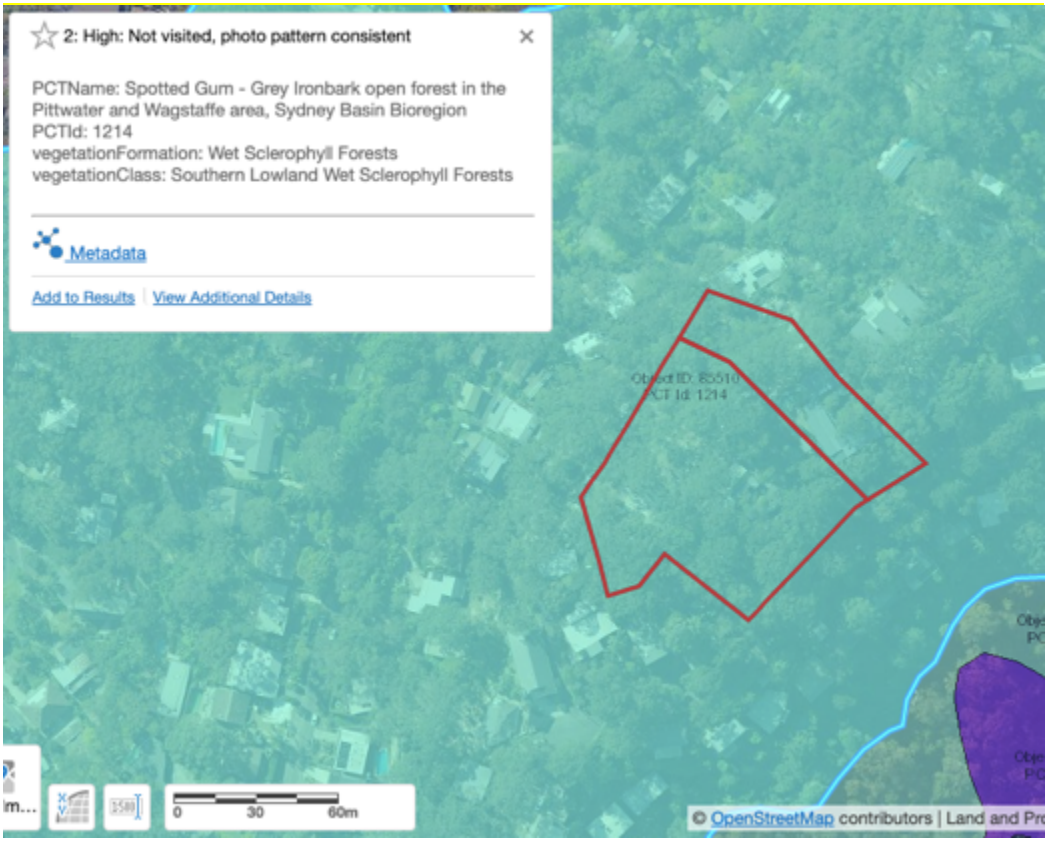


**Figure 3.1. Subject site within mapped vegetation surrounding the property SydneyMetroArea_v3.1_2016_E_VIS_4489. Source: SEED Maps, 2021.**

### 3.1.2 Site Photos

Included are photos of management zones and the condition of vegetation at the site.

Image 3.2. Location of the proposed driveway access point and vegetation zone one.

Image 3.3. Location of proposed carport and vegetation zone two.

Plate 1. Canopy and vegetation within zone 1

Plate 2. Proposed driveway location and management zone 1

Plate 3. Mix of native and weed species within zone 1

Plate 4. Stag (dead tree) in zone 1

Plate 5. Vegetation Zone 2 view from footpath

Plate 6. Vegetation Zone 2 view from Chisholm Avenue

# 4 Threatened Species

## 4.1 Flora and Flora Field Survey

No threatened flora or fauna species were identified during Kingfisher 2021 field survey.

### 4.1.1 Opportunistic Flora and Fauna survey methods

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

### 4.1.2 Diurnal Bird Surveys

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

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

However, it is unlikely that threatened avifauna would use the impact area for breeding purposes, due to lack of optimal breeding habitat (suitable hollows, suitable waterways). Justification for species exclusion in the BAM-C can be found in appendix I. Searches and call playback was not conducted for forest owls.

### 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. One large dead tree with potential hollows was identified within the site. However, upon closer inspection from eye level the tree is not considered to host viable habitat due to the poor quality of the stag. This is proposed to be removed to accommodate the driveway entrance.

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

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 | | 4 |
| Euphorbiaceae | *Chamaesyce psammogeton* | Sand Spurge | E1 | | 7 |
| Orchidaceae | ***Cryptostylis hunteriana*** | **Leafless Tongue Orchid** | V,P,2 | V | 1 |
| Myrtaceae | *Eucalyptus camfieldii* | Camfield's Stringybark | V | V | 7 |
| Myrtaceae | ***Eucalyptus nicholii*** | **Narrow-leaved Black Peppermint** | V | V | 4 |
| Orchidaceae | ***Genoplesium baueri*** | **Bauer's Midge Orchid** | E1,P,2 | E | 1 |

| Family | Scientific Name | Common Name | NSW status | Comm. status | Records |
|---|---|---|---|---|---|
| Proteaceae | *Grevillea caleyi* | Caley's Grevillea | E4A,3 | CE | 51 |
| Myrtaceae | *Kunzea rupestris* | | V | V | 1 |
| Malvaceae | *Lasiopetalum joyceae* | | V | V | 1 |
| Proteaceae | *Macadamia integrifolia* | Macadamia Nut | | V | 7 |
| Orchidaceae | ***Microtis angusii*** | **Angus's Onion Orchid** | E1,P,2 | E | 50 |
| Proteaceae | ***Persoonia hirsuta*** | **Hairy Geebung** | E1,P,3 | E | 5 |
| Thymelaeaceae | *Pimelea curviflora var. curviflora* | | V | V | 1 |
| Myrtaceae | ***Rhodamnia rubescens*** | **Scrub Turpentine** | E4A | | 31 |
| Myrtaceae | ***Syzygium paniculatum*** | **Magenta Lilly Pilly** | E1 | V | 16 |
| Elaeocarpaceae | *Tetratheca glandulosa* | | V | | 17 |

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

## 4.3 Threatened Fauna - Desktop

A total of 57 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 bold in the table below. 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 | 36 |
| Amphibia | *Litoria aurea* | Green and Golden Bell Frog | E1,P | V | 2 |
| Amphibia | ***Pseudophryne australis*** | **Red-crowned Toadlet** | V,P | | 49 |

| Class | Scientific Name | Common Name | NSW Status | Comth. Status | No. of records |
|---|---|---|---|---|---|
| Aves | ***Anthochaera phrygia*** | **Regent Honeyeater** | E4A,P | CE | 37 |
| Aves | *Ardenna carneipes* | Flesh-footed Shearwater | V,P | J,K | 1 |
| Aves | *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | V,P | | 2 |
| Aves | *Burhinus grallarius* | Bush Stone-curlew | E1,P | | 50 |
| Aves | *Callocephalon fimbriatum* | Gang-gang Cockatoo | V,P,3 | | 1 |
| Aves | *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V,P,2 | | 77 |
| Aves | *Dasyornis brachypterus* | Eastern Bristlebird | E1,P,2 | E | 1 |
| Aves | *Diomedea exulans* | Wandering Albatross | E1,P | E | 2 |
| Aves | *Diomedea gibsoni* | Gibson's Albatross | V,P | V | 1 |
| Aves | *Esacus magnirostris* | Beach Stone-curlew | E4A,P | | 1 |
| Aves | *Glossopsitta pusilla* | Little Lorikeet | V,P | | 8 |
| Aves | *Haematopus fuliginosus* | Sooty Oystercatcher | V,P | | 7 |
| Aves | *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V,P | | 42 |
| Aves | *Hieraaetus morphnoides* | Little Eagle | V,P | | 4 |
| Aves | *Hirundapus caudacutus* | White-throated Needletail | P | V,C,J,K | 8 |
| Aves | *Ixobrychus flavicollis* | Black Bittern | V,P | | 1 |
| Aves | *Lathamus discolor* | Swift Parrot | E1,P,3 | CE | 15 |
| Aves | *Lophoictinia isura* | Square-tailed Kite | V,P,3 | | 3 |
| Aves | *Macronectes giganteus* | Southern Giant Petrel | E1,P | E | 1 |

| Class | Scientific Name | Common Name | NSW Status | Comth. Status | No. of records |
|---|---|---|---|---|---|
| Aves | *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subspecies) | V,P | | 1 |
| Aves | *Neophema pulchella* | Turquoise Parrot | V,P,3 | | 1 |
| Aves | *Ninox connivens* | Barking Owl | V,P,3 | | 21 |
| Aves | *Ninox strenua* | Powerful Owl | V,P,3 | | 447 |
| Aves | *Numenius madagascariensis* | Eastern Curlew | P | CE,C,J,K | 8 |
| Aves | *Onychoprion fuscata* | Sooty Tern | V,P | | 1 |
| Aves | *Pandion cristatus* | Eastern Osprey | V,P,3 | | 6 |
| Aves | *Petroica boodang* | Scarlet Robin | V,P | | 1 |
| Aves | *Ptilinopus regina* | Rose-crowned Fruit-Dove | V,P | | 3 |
| Aves | *Ptilinopus superbus* | Superb Fruit-Dove | V,P | | 2 |
| Aves | *Thalassarche cauta* | Shy Albatross | V,P | V | 3 |
| Aves | *Thalassarche chrysostoma* | Grey-headed Albatross | P | E | 1 |
| Aves | *Thalassarche melanophris* | Black-browed Albatross | V,P | V | 1 |
| Aves | *Tyto novaehollandiae* | Masked Owl | V,P,3 | | 4 |
| Mammalia | ***Cercartetus nanus*** | **Eastern Pygmy-possum** | V,P | | 276 |
| Mammalia | ***Chalinolobus dwyeri*** | **Large-eared Pied Bat** | V,P | V | 16 |
| Mammalia | *Dasyurus maculatus* | Spotted-tailed Quoll | V,P | E | 5 |
| Mammalia | ***Falsistrellus tasmaniensis*** | **Eastern False Pipistrelle** | V,P | | 2 |
| Mammalia | *Isoodon obesulus obesulus* | Southern Brown Bandicoot (eastern) | E1,P | E | 31 |

| Class | Scientific Name | Common Name | NSW Status | Comth. Status | No. of records |
|---|---|---|---|---|---|
| Mammalia | *Micronomus norfolkensis* | Eastern Coastal Free-tailed Bat | V,P | | 12 |
| Mammalia | *Miniopterus australis* | Little Bent-winged Bat | V,P | | 43 |
| Mammalia | *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V,P | | 70 |
| Mammalia | *Myotis macropus* | Southern Myotis | V,P | | 17 |
| Mammalia | ***Petauroides volans*** | **Greater Glider** | P | V | 1 |
| Mammalia | ***Petaurus norfolcensis*** | **Squirrel Glider** | V,P | | 5 |
| Mammalia | *Phascolarctos cinereus* | Koala | V,P | V | 76 |
| Mammalia | *Pseudomys novaehollandiae* | New Holland Mouse | P | V | 9 |
| Mammalia | *Pteropus poliocephalus* | Grey-headed Flying-fox | V,P | V | 123 |
| Mammalia | *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V,P | | 1 |
| Mammalia | *Scoteanax rueppellii* | Greater Broad-nosed Bat | V,P | | 7 |
| Mammalia | *Vespadelus troughtoni* | Eastern Cave Bat | V,P | | 1 |
| Reptilia | *Caretta caretta* | Loggerhead Turtle | E1,P | E | 4 |
| Reptilia | *Chelonia mydas* | Green Turtle | V,P | V | 9 |
| Reptilia | *Eretmochelys imbricata* | Hawksbill Turtle | P | V | 3 |
| Reptilia | *Varanus rosenbergi* | Rosenberg's Goanna | V,P | | 22 |

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

## 4.4 Endangered populations

Two (2) endangered populations have been recorded to occur within 10km of the site. Table 4.3 below displays the populations. It is unlikely that the *Koala* and *Squirrel Glider on Barrenjoey Peninsula population* would be exclusively dependent upon vegetation within the site. Therefore, the development is not expected to significantly impact the endangered population. The development may marginally reduce areas of

potential foraging habitat, thus planting of native species associated with the PWSGF vegetation community is planned to retain maximum foraging value of the site.

Table 4.3. Endangered populations observed in previous ecological surveys within a 10km radius of the study site. NSW DPIE Bionet 2021.

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

**Likelihood of occurrence**

See Appendix I for a 'Rationale for Likelihood of Occurrence', which outlines why species have been retained or omitted from BAM calculations. Reasons for inclusion or removal are based on species habitat preferences, site investigations, species survey, Bionet records and expert opinion. During the survey, none of the above threatened species were observed on-site. Marginal foraging habitat for several species is present onsite. Thus, all predicted species were retained in the BAM-C and two 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. The whole of the site is considered one vegetation zone. This zone has been divided into two management zones; Complete vegetation removal within the footprint of the carport and driveway; and Landscaping zone around the footprint of the development.

Future vegetation integrity (F-VI) scores in the BAM-C.

The complete vegetation removal management zones have a F-VI score of 0.

Due to the small area of impact at the site data for the BAM-C was gathered across one BAM Plot.

**Vegetation Zone**

This zone consists of the entire impact area of the development. This zone contains a mix of Eucalypt, Casuarina, Corymbia and Elaeocarpus canopy species and is dominated by Common ground fern/false Bracken (*Calochlaena dubia*). This area contains large boulders, the development and landscaping has been designed to sit amongst these to retain rock formations. Vegetation is mapped and identified as PWSGF. Common exotic weed species are present throughout, however in low abundance. The vegetation zone has been divided into two management zones within the BAM-C. This will reflect the future actions; complete vegetation removal (200m$^2$) and Landscape Zone (300m$^2$).

**Table 5.1 Current vegetation integrity scores for management zones on site.**

| PCT | Management Zone | Area (ha) | Current vegetation integrity score | Future Vegetation Integrity Score (F-VI_ |
|---|---|---|---|---|
| 1214 (PWSGF) | One (Complete Vegetation Removal) | 0.02 | 25.6 | 0.0 |
| 1214 (PWSGF) | Two (Landscaping Zone) | 0.03 | 25.6 | 16.6 |
| **Total** | | **0.05** | | |

***Note: Management zones in 5.1/5.2 have not been amended with the updated site plans (March 2022) as the changes are considered minor. The impact to vegetation and areas are consistence across both versions of plans.***

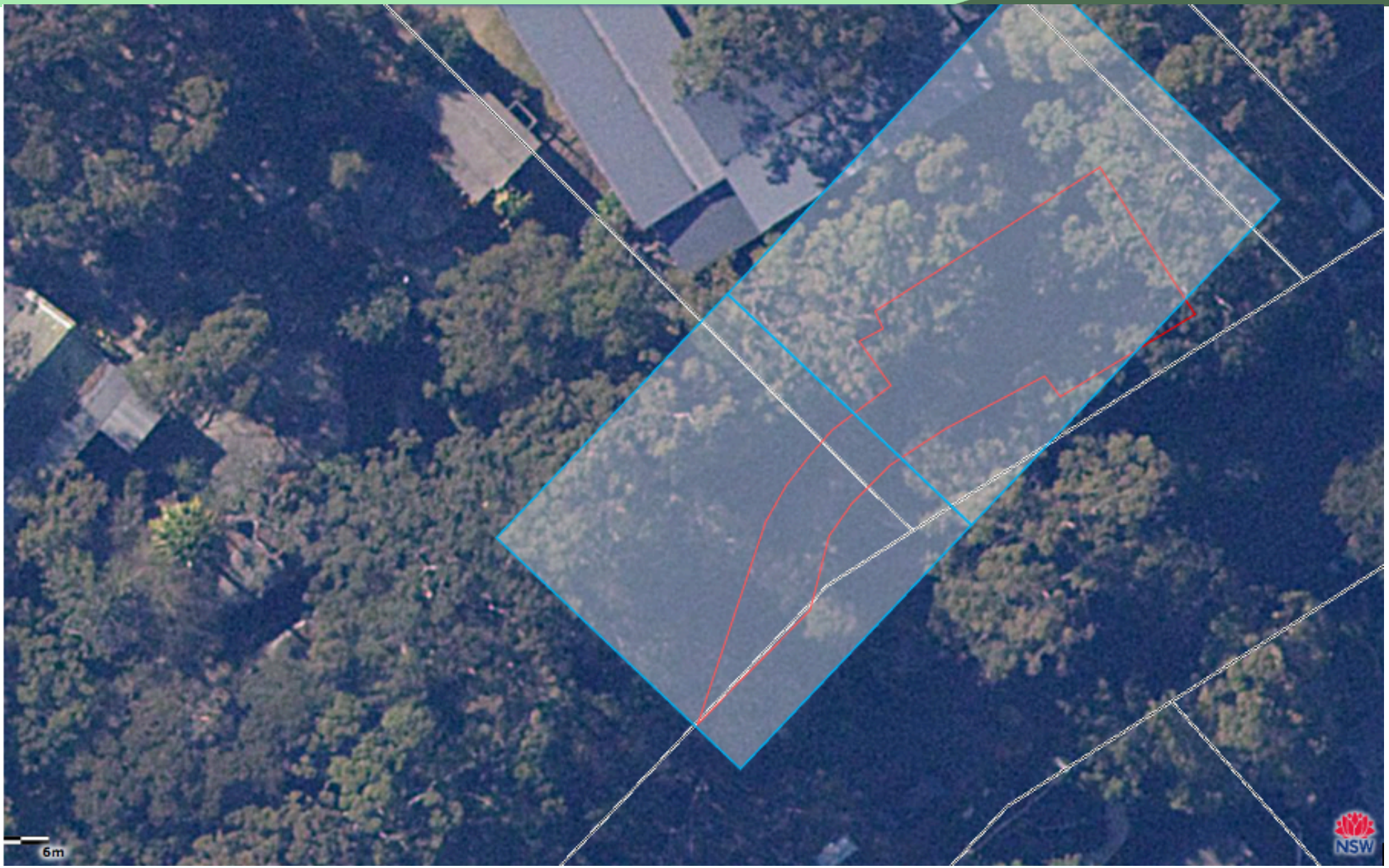


Figure 5.1. Vegetation zone is consistent across the whole of the site and BAM plot locations on site.

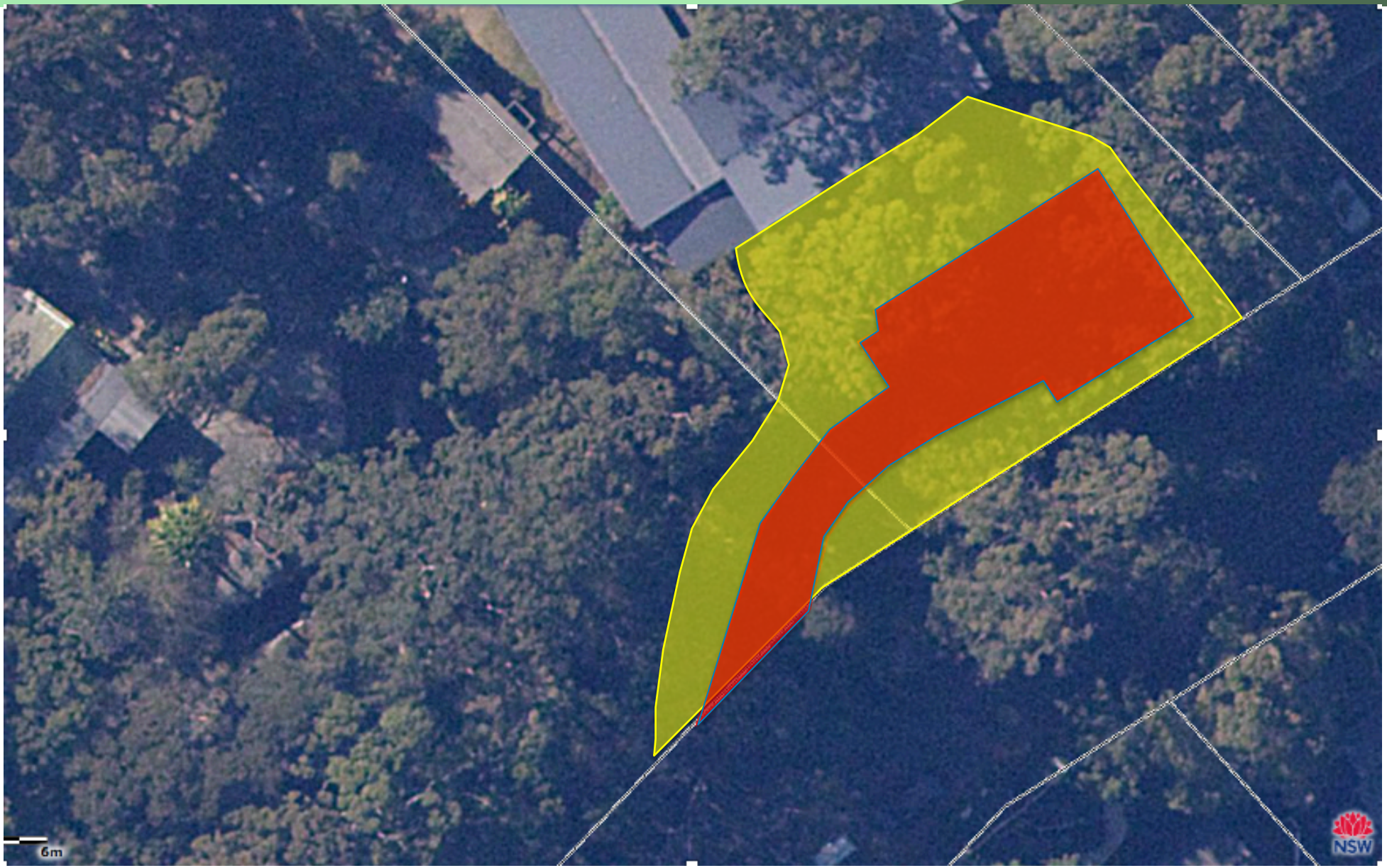


Figure 5.2. Management zones on site. Red = Complete vegetation removal. Yellow = Landscaping Zone

Species and Ecosystem Credits

The cost to offset both ecosystem credits and flora credits generated by this development is $5,277.20 ( 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.

### 5.1.1 Ecosystem Credit Species derived from BAM

The development and associated works generated one (1) ecosystem credit for the site. This is a reflection of the size of the site and disturbed 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 | 1 | $3,690.56 |
| | | | | | | | Subtotal (excl. GST) | | **$3,690.56** |
| | | | | | | | | GST | **$369.06** |
| | | | | | | | | **Total ecosystem credits (incl. GST)** | **$4,059.62** |

**Figure 5.3. Ecosystem credit summary from the BAM calculator.**

### 5.1.2 Species Credit Species derived from BAM

The development and associated works generated xx ecosystem credits for three (3) different species including; *Hygrocybe aurantipes, Diuris bracteata* and the Large-eared pied bat (*Chalinolobus dwyeri*).

In total the cost to offset the species credits generated will be $2,454.06 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 included in appendix V.

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 |
| 20036 | ***Diuris bracteata*** (Diuris bracteata) | Endangered | $865.08 | 20.6900% | $80.00 | 1 | $1,124.07 |
| 10418 | ***Hygrocybe aurantipes*** (Hygrocybe aurantipes) | Vulnerable | $43.25 | 20.6900% | $80.00 | 1 | $132.20 |
| | | | | | | Subtotal (excl. GST) | **$2,230.96** |
| | | | | | | GST | **$223.10** |
| | | | | | | **Total species credits (incl. GST)** | **$2,454.06** |

**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.  rationale tableDPIE.

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 "8.1.2 BAM Candidate Species for Further Assessment".

The species credits generated in this BDAR were generated in the areas of "complete vegetation removal" and not Landscaping Zone (Management zone 2). The vegetation zone was divided into these areas as the activities within the proposed landscaping 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

*Vegetation Disturbance*

Disturbance (Indirect loss / impact) will be 300m$^2$ as a result of the proposed landscaping plan that encompasses the driveway and carport.  Vegetation will be modified in the Landscaped areas.  Landscaping proposed is to remove dominant ground vegetation in the form of soft Bracken and replace with locally native ground species, some ground and midstory species are planned to be kept, retaining some values of the PWSGF (see Appendix VI Landscape plan). Vegetation condition in the proposed landscape areas ranges from good to poor. Areas around boulders and outside of the easily accessible gardening are in good condition with a mix of species associated with PWSGF. The majority of this vegetation will remain as it outside of the development footprint and located within close proximity to boulders planned to be retained within the site. Are beneath the inclinator are dominated by ferns, vegetation within this area is planned to be replaced with locally native species.

Species diversity in the landscape areas can remain post development, however the abundance of ferns will be reduced.

*Vegetation Loss*

Direct loss of vegetation will be 200m$^2$ for the proposed driveway and carport.

Vegetation condition in the impact area ranges from poor to good condition. The area of direct loss is in generally good condition.  Areas of landscaping within the development site is degraded due to the location of the footpath and stairs. The garden area of the footprint (approximately 50%) consists of degraded vegetated areas dominated by ferns. The remaining 50% of the direct impact area outside of the gardening/mown section consists of good condition vegetation with a number of PWSGF associated species.

# 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 mould) 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. 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 9. 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** |
| *Hygrocybe aurantipes* | Hygrocybe aurantipes | | | | **X** |
| Pittwater Spotted Gum Forest (PWSGF) (PCT1214). | Pittwater Spotted Gum Forest (PWSGF) (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. These trees are expected to be removed, resulting in a further loss of marginal foraging habitat. Alterations and degradation of habitat onsite pre BDAR would have caused a greater disruption to the species than the proposed development.

Foraging habitat will be lost, however it is expected that the trees are not significantly contributing towards the long-term survival of the species, as it is considered to be marginal habitat, only to be used occasionally or opportunistically. It is expected that the local population of 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.

- ***Hygrocybe aurantipes***

Habitat disturbance and removal is considered a key threatening process for this species. This species is highly susceptible to changes in water quality, weed encroachment and inappropriate fire regimes. The species is known to occur within 10km of the site. Whilst the site is not considered ideal habitat for the species, lack of knowledge on habitat requirements and general awareness are contributing to its risk of extinction.

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

Pittwater Spotted Gum Forest (PWSGF) 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 0.05ha within the 0.854ha properties. Vegetation on site has been significantly altered such that the site does not reflect the natural structural attributes of PWSGF. Vegetation marginally reflects attributes of the PWSGF community, this is primarily due historical actions on site including clearing, gardening, APZ management. A majority of vegetation on site is regrowth or has been planted by the property owner. Common ground fern is dominant across the site and inhibiting the natural regeneration within the site.

Thus, the proposed development is not expected to significantly contribute to loss of PWSGF 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).

- ***Hygrocybe aurantipes***

It has been determined that a significant portion (approximately 200m$^2$) of the site is not considered optimal habitat for this species as it has been previously disturbed and lacks key habitat requirements associated with the species due to the impact of footpaths and gardened landscaped areas. Approximately 300m$^2$ of the site may form potential habitat for the species. This area is planned to be landscaped with locally native plantings and ongoing weed removal will maintain potential habitat for this species into the future.

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

The proposal is expected to have a negligible impact upon PWSGF as core habitat for PWSGF will not be removed. A maximum of 200m$^2$ of the vegetation proposed for removal is in average condition and it is unlikely that the original vegetation community would recover without assistance. Approximately 300m$^2$ is proposed to be altered for landscaping purposes. The majority of the landscaped vegetation will be retained while areas impacted will be recreated with native species planting.

The location of the driveway and carport have been selected in order to minimise the impact on the surrounding vegetation community. The driveway avoids rock boulders and outcrops and the carport is situated on land that has low species diversity as it dominated by common ground fern (*Calochlaena dubia*) that undergoes consistent brush cutting. The Landscape design also minimises the removal of local native species, replacing areas of common bracken with species selected from the PWSGF plant 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 any of 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, while there will be alterations and works in the foraging habitat, the species will not be placed at risk of a serious or irreversible impact.

- ***Hygrocybe aurantipes***

Optimal habitat for the species does not currently exist on site. The removal of 200m$^2$ of vegetation for the footprint of the driveway and carport are considered an irreversible impact, however it is currently expected the species is not utilising this are due to management practices. The impacts to the remaining area of potential habitat for the species will also be impacted, however the proposed development is not expected to significantly contribute to the loss habitat and there extinction for the species *Hygrocybe aurantipes*. The species has been retained in the BAM-C calculator due to its allusive nature and undetermined geographical constraint.

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

The proposed development assessed in this BDAR is not expected to significantly contribute to loss of PWSGF. This is due to:

i) The small area being removed 200m$^2$ and 300m$^2$ modified. It is noted that this area will be an irreversible impact though it is not considered significant.

ii) The landscape area being retained as PWSGF species (with reduced ferns). This area although modified is considered irreversible in terms of impact with over 70% assumed to be representative of PWWGF within 12 months post building.

iii) The surrounding area has intact PWSGF and the loss of 200m$^2$ and modification of 300m$^2$ is less than 0.02% of the current extent.

iv) The vegetation onsite includes areas of good and poor condition. Vegetation within the development footprint is both structurally and functionally below benchmark condition due to historic and current management actions on site.

Thus it is unlikely that this proposal would place PWSGF 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 BDAR where prescribed impact is addressed. |
|---|---|---|---|---|---|
| Karst, caves, crevices, cliffs or other geologically significant feature | No | N/A | N/A | N/A | N/A |
| Rocks | Yes | Sandstone boulders scattered throughout | Negligible | N/A | 8.1.3 |
| Human made structure | Yes | House within the development site | Negligible | N/A | N/A |
| Non-native vegetation | Yes | Scattered throughout | Negligible | N/A | 10.1.2 |

# 10 Recommendations

### 10.1.1 Wildlife corridor/ Revegetation

Pittwater Spotted Gum Forest (PWSGF) species community list. Species plantings will 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 should be selected in consultation with an ecologist for the greatest ecological outcome.

Shrub and ground covers will also increase the habitat area for other wildlife including small insectivores and insectivorous birds. Such actions will increase biodiversity within the site and the immediate landscape. A legible version of the proposed landscape plan for the development is available in Appendix VI.


Figure 10.1. Landscape Plan for 60-62 Chisholm Avenue. Volker Klemm Landscape Design 2021

***Note:** ***The Landscape Plan (Volker Klemm Landscape Design, April 2021) is supported with the following amendment. The six (6) Corymbia hybrids (Corymbia summer beauty and Corymbia summer red) currently selected for planting within the site are to be replaced with two (2) Corymbia maculata, two (2) Eucalyptus umbra and two (2) Eucalyptus paniculata, to reflect locally indigenous native vegetation within the site and surrounding landscape.***

### 10.1.2 Weed management

Whilst the site hosts minimal weeds, 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*.

### 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

An ecologist should be on call during vegetation clearing to ensure no fauna are harmed as a result of clearing.

### 10.1.5 Tree Protection

Tree protection will be consistent with the Tree Survey. Main trees to be managed are trees within close proximity to building works NB: see final tree survey for details and tree numbers.

### 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 VII.

### 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 0.05 ha on Pittwater Spotted Gum Forest (PWSGF) (PCT1214). Approximately 50% of vegetation has been significantly altered and degraded from its natural state and this area is proposed for construction of the driveway and carport footprint. The remaining vegetation onsite has been significantly altered such that the site does not reflect the natural structural attributes of PWSGF. The combination of minimal vegetation removal and landscaping with native ground species will reduce the impact to biodiversity in this area. The grand total cost to offset both ecosystem credits and species credits generated by this development is $6,513.68.

The following recommendations will be required to reduce the potential impact on biodiversity within the site as a result of the proposed development.

- Delineation of work areas.
- Vegetation clearing control measures
- A vegetation management plan for the property (VMP) would direct the long-term management of PWSGF within the property. This VMP would cover: weed management, native seed collection and preservation of habitat. *Note. As an option to the VMP. Similar outcomes would be achieved by ecologist reviewing the landscape plan such that the species and management is appropriate.
- Installation of two Micro-bat nest boxes.

# 12 Appendices

Following is the list of Appendices

**Appendix I – Rationale for Likelihood of Occurrence**

**Appendix II – Key Weed Removal Methods**

**Appendix III – Bushland Hygiene Protocols for Phytophthora (Hornsby Council Recommendations)**

**Appendix IV – Bam-C Summary Reports**

**Appendix V – Species Polygon**

**Appendix VI – Targeted threatened species survey for *Genoplesium baueri* (Bauer's Midge Orchid)**

**Appendix VII – Landscape Plan for 60-62 Chisholm Avenue. Volker Klemm Landscape Design 2021**

## 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, approximately 50% of the vegetation within the impact area has been previously cleared 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 site (or specific management zones) has been included below for each Candidate Species for the BDAR.

A list of Predicted species is within the BAM-C summary report in Appendix IV.

**Table 12.2. Potential Species Credit Species generated by the BAM-C, all the following species were candidate threatened species for the site. All BAM-C predicted species were retained.**

| Scientific Name | Common Name | Habitat/ Geographic Constraints | Retained in BAM Calculator | Reason for Inclusion or Removal |
|---|---|---|---|---|
| **Flora** | | | | |
| *Diuris bracteata* | *Diuris bracteata* | Dry sclerophyll woodland and forest with a predominantly grassy understorey. For over 100 years *Diuris bracteata* was known only from the original collection made near Gladesville in northern Sydney. | No | Currently under commonwealth status this species is considered to be extinct.<br>Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. |

| Scientific Name | Common Name | Habitat/ Geographic Constraints | Retained in BAM Calculator | Reason for Inclusion or Removal |
|---|---|---|---|---|
| | | | | The site has been significantly altered and degraded from its natural state. It has a history of clearing, and on-going disturbance. Ground vegetation is not predominantly grass rather dominated by ferns.<br><br>Additionally, the species was not recorded during site surveys and previously recorded species outside of Gladesville were considered to be incorrectly identified. Species is not present and is unlikely to be present on the subject land. No further assessment is required. |
| *Genoplesium baueri* | Bauer's Midge Orchid | Grows in dry sclerophyll forest and moss gardens over sandstone. | No | Likelihood of occurrence for the species is moderate. Approximately 50% of the site is considered not suitable for habitat. Habitat is substantially degraded such that the species is unlikely to utilise area.<br><br>Areas outside of ongoing gardening may form suitable habitat for the species. Senior ecologist Geraldene Dalby-Ball is familiar with the local area and specifically the site vegetation for over 10 years. Throughout multiple site visits over that time has not identified the species during flora surveys |

| Scientific Name | Common Name | Habitat/ Geographic Constraints | Retained in BAM Calculator | Reason for Inclusion or Removal |
|---|---|---|---|---|
| | | | | within the site and is therefore been excluded from the BAM-C. |
| *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. | Yes | Likelihood of occurrence for the species is moderate. Approximately 50% of the site is substantially degraded such that the species is unlikely to utilise area.<br>Areas of suitable habitat are may be present within the site boundaries that have not been significantly altered or undergoing disturbance through brush cutting or gardening. |
| *Rhodamnia rubescens* | *Scrub Turpentine* | Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by | No | Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area.<br>Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded |

| Scientific Name | Common Name | Habitat/ Geographic Constraints | Retained in BAM Calculator | Reason for Inclusion or Removal |
|---|---|---|---|---|
| | | Myrtle Rust. Myrtle Rust affects all plant parts. | | from its original state. A dense coverage of ferns is prohibiting growth of native vegetation. Further decreasing the chances of the species being present within the site boundaries.<br>Additionally, 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. |

| Scientific Name | Common Name | Habitat/ Geographic Constraints | Retained in BAM Calculator | Reason for Inclusion or Removal |
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| **Fauna** | | | | |
| *Calyptorhynchus lathami* | Glossy Black-Cockatoo | Lives in coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where casuarinas (or sheoaks), its main food trees, are common. Glossy black-cockatoos occasionally eat seeds from eucalypts, angophoras, acacias and hakeas, as well as eating insect larvae. | Foraging – Yes<br>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 |

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| | | | | foraging habitat for the species in the form of canopy vegetation.<br>The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints as per the BAM-C. Species not recorded during site survey. No further assessment or consideration is required. |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. | Yes – Further assessment | There is a moderate/high likelihood of occurrence for the species. There are Bionet recordings on site. The site presents habitat for the species in the form of foraging opportunities of invertebrates within the canopy.<br>Species not recorded during site survey although assumed present. |
| *Callocephalon fimbriatum* | Gang-gang Cockatoo | In spring and summer the Gang-gang Cockatoo (GGC) generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in | Foraging – Yes<br>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. |

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| | | dry forest in coastal areas and often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. | | The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints as per the BAM-C. Species not recorded during site survey. No further assessment or consideration is required. |
| *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<br>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.<br>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 | Foraging – Yes<br>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 |

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| | | 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. | | the BAM-C. The site presents foraging habitat for the species.<br>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<br>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.<br>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. |
| *Ninox connivens* | Barking Owl | Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland | Foraging – Yes | There is a moderate likelihood of occurrence. It is expected that the species |

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| | | areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as *Acacia* and *Casuarina* species, or the dense clumps of canopy leaves in large *Eucalypts*. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (*Eucalyptus camaldulensis*), White Box (*Eucalyptus albens*), (Red Box) *Eucalyptus polyanthemos* and Blakely's Red Gum (*Eucalyptus blakelyi*). Breeding occurs during late winter and early spring. | Breeding - No | 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.<br>The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints including; hollows greater than 20 cm diameter and greater than 4m above the ground, as per the BAM-C.<br>Limited habitat opportunities for the species present on site. Site would not be considered optimal habitat for the species. No further assessment or consideration is required. |
| *Ninox strenua* | Powerful Owl | The species requires large tracts of forest or woodland, however fragmented landscapes can contribute to their range. Breeds in forests and woodlands but may forage in open areas. Mainly preys upon medium sized arboreal mammals. Requires tree hollows for breeding. | Foraging – Yes<br>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. |

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| | | | | The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints including; hollows greater than 20 cm diameter as per the BAM-C.<br>Limited habitat opportunities for the species present on site. Site would not be considered optimal habitat for the species. No further assessment or consideration is required. |
| *Phascolarctos cinereus* | Koala | Inhabit eucalypt woodlands and forests. Feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. | Foraging – No<br>Breeding - No | There is a low likelihood of occurrence. It is unlikely that the species would use the site for foraging due to the degraded nature of habitat. Thus, the species was excluded as a Predicted threatened species (Ecosystem credits) in the BAM-C. Nor would the development site be considered breeding habitat for the species. Site would not be considered optimal habitat for the species. No further assessment or consideration is required. |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | Occurs within tall sclerophyll forests and woodlands, heath, swamp subtropical and temperate rainforests, and urban areas. Occurs within 20km of a significant food source. May be found close to gullies and | Foraging – Yes<br>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 |

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| | | water within vegetation with a dense canopy. | | the BAM-C. The site presents foraging habitat for the species.<br>The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints including; Breeding Camps, as per the BAM-C.<br>Limited breeding habitat opportunities for the species present on site. Site would not be considered optimal habitat for the species. No further assessment or consideration is required. |
| *Tyto novaehollandiae* | Masked Owl | Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Habitat for this species is also widespread throughout the dry eucalypt forests of the tablelands, western slopes and the undulating wet-dry forests of the coast. Optimal habitat includes an open understorey and a mosaic of sparse (grassy) and dense (shrubby) ground cover on gentle terrain. Roosts in hollows in live or occasionally dead eucalypts; dense foliage in gullies; and caves. Nest in old hollow eucalypts, live or dead, in a variety of topographic positions, with hollows greater than 40 cm wide and greater than 100 cm deep. Hollow | Foraging – Yes<br>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.<br>The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints including; hollows greater than 20 cm diameter as per the BAM-C.<br>Limited habitat opportunities for the species present on site. Site would not be considered optimal habitat for the species. |

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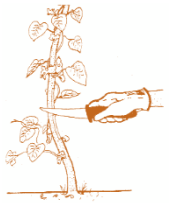
| | | entrances are at least 3 m above ground, in trees of at least 90 cm diameter at breast height. A specialist predator of terrestrial mammals, particularly native rodents. Home range has been estimated as 400-1000 ha according to habitat productivity. | | No further assessment or consideration is 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<br>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.<br>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.<br><br>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<br><br>Weed Bags |
| Crowning  | Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning.<br><br>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<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br>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 (Hornsby Council Recommendations)

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

Contact Hornsby Bushcare if you require any refills or replacements of your Phytophthora Kits on 9484 3677 or bushcare@hornsby.nsw.gov.au

## Facts about Phytophthora

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

### *Symptoms including Dieback*

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

Initial symptoms of Phytophthora include; wilting, yellowing and retention of dried foliage, loss of canopy and dieback. Infected roots blacken and rot and are therefore unable to take-up water and nutrients.

Severely infected plants will eventually die. Symptoms can be more obvious in summer when plants may be stressed by drought. If you suspect that Phytophthora is on your site, please contact the Bushcare team to collect a soil sample to be lab tested. This is usually done in the warmer months where conditions are optimum for the disease.

### *Infection*

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

## 12.4 Appendix IV– BAM –C; Reports and Data (Updated April 2022)

### 12.4.1 Payment Report.

# Biodiversity payment summary report

| Assessment Id | Payment data version | Assessment Revision | Report created |
|---|---|---|---|
| 00026813/BAAS19008/21/00026814 | | 1 | 22/04/2022 |

| Assessor Name | Assessor Number | Proposal Name | BAM Case Status |
|---|---|---|---|
| Geraldene Susan Dalby-Ball | BAAS19008 | 60-62 Chisholm Avenue | Finalised |

| Assessment Type | Date Finalised | BOS entry trigger |
|---|---|---|
| Part 4 Developments (Small Area) | 22/04/2022 | BOS Threshold: Biodiversity Values Map |

## PCT list

| Price calculated | PCT common name | Credits |
|---|---|---|
| Yes | **1214** - Pittwater Spotted Gum forest | 1 |

## Species list

| Price calculated | Species | Credits |
|---|---|---|
| Yes | ***Chalinolobus dwyeri*** (Large-eared Pied Bat) | 1 |
| Yes | ***Hygrocybe aurantipes*** (Hygrocybe aurantipes) | 1 |
| Yes | ***Diuris bracteata*** (Diuris bracteata) | 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 | 1 | $3,690.56 |

| | |
|---|---|
| Subtotal (excl. GST) | **$3,690.56** |
| GST | **$369.06** |
| **Total ecosystem credits (incl. GST)** | **$4,059.62** |

## 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 |
| 10418 | ***Hygrocybe aurantipes*** (Hygrocybe aurantipes) | Vulnerable | $43.25 | 20.6900% | $80.00 | 1 | $132.20 |
| 20036 | ***Diuris bracteata*** (Diuris bracteata) | Endangered | $865.08 | 20.6900% | $80.00 | 1 | $1,124.07 |

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# Biodiversity payment summary report

| | | |
|---|---|---|
| | Subtotal (excl. GST) | **$2,230.96** |
| | GST | **$223.10** |
| **Total species credits (incl. GST)** | | **$2,454.06** |
| | **Grand total** | **$6,513.68** |

| Assessment Id | Proposal Name | Page 3 of 3 |
|---|---|---|
| 00026813/BAAS19008/21/00026814 | 60-62 Chisholm Avenue | |

### 12.4.2 Credit Summary Report.

# BAM Credit Summary Report

## Proposal Details

| | | |
|---|---|---|
| Assessment Id | Proposal Name | BAM data last updated * |
| 00026813/BAAS19008/21/00026814 | 60-62 Chisholm Avenue | 24/11/2021 |
| Assessor Name | Report Created | BAM Data version * |
| Geraldene Susan Dalby-Ball | 22/04/2022 | 50 |
| Assessor Number | BAM Case Status | Date Finalised |
| BAAS19008 | Finalised | 22/04/2022 |
| Assessment Revision | Assessment Type | BOS entry trigger |
| 1 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

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# BAM Credit Summary Report

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pittwater Spotted Gum forest** | | | | | | | | | | | | |
| 1 | 1214_Good | Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion | 24.6 | 15.0 | 0.05 | PCT Cleared - 71% | High Sensitivity to Potential Gain | Endangered Ecological Community | Not Listed | 2.00 | TRUE | 1 |
| | | | | | | | | | | | **Subtotal** | **1** |
| | | | | | | | | | | | **Total** | **1** |

## Species credits for threatened species

| Vegetation zone name | Habitat condition (Vegetation Integrity) | Change in habitat condition | Area (ha)/Count (no. individuals) | Sensitivity to loss (Justification) | Sensitivity to gain (Justification) | BC Act Listing status | EPBC Act listing status | Potential SAII | Species credits |
|---|---|---|---|---|---|---|---|---|---|
| ***Chalinolobus dwyeri / Large-eared Pied Bat ( Fauna )*** | | | | | | | | | |
| 1214_Good | 15.0 | 15.0 | 0.02 | | | Vulnerable | Vulnerable | True | 1 |
| | | | | | | | | **Subtotal** | **1** |
| ***Diuris bracteata / Diuris bracteata ( Flora )*** | | | | | | | | | |
| 1214_Good | 15.0 | 15.0 | 0.02 | | | Endangered | Extinct | True | 1 |
| | | | | | | | | **Subtotal** | **1** |
| ***Hygrocybe aurantipes / Hygrocybe aurantipes ( Fungi )*** | | | | | | | | | |
| 1214_Good | 15.0 | 15.0 | 0.02 | | | Vulnerable | Not Listed | True | 1 |
| | | | | | | | | **Subtotal** | **1** |

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Proposal Name
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### 12.4.3 Predicted species report.

# BAM Predicted Species Report

## Proposal Details

| | | |
|---|---|---|
| Assessment Id | Proposal Name | BAM data last updated * |
| 00026813/BAAS19008/21/00026814 | 60-62 Chisholm Avenue | 24/11/2021 |
| Assessor Name | Report Created | BAM Data version * |
| Geraldene Susan Dalby-Ball | 22/04/2022 | 50 |
| Assessor Number | Assessment Type | BAM Case Status |
| BAAS19008 | Part 4 Developments (Small Area) | Finalised |
| Assessment Revision | BOS entry trigger | Date Finalised |
| 1 | BOS Threshold: Biodiversity Values Map | 22/04/2022 |

* 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 |

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# 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 |
|---|---|---|

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Proposal Name: 60-62 Chisholm Avenue

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### 12.4.4 Candidate species report

# BAM Candidate Species Report

## Proposal Details

| | | |
|---|---|---|
| Assessment Id<br>00026813/BAAS19008/21/00026814 | Proposal Name<br>60-62 Chisholm Avenue | BAM data last updated *<br>24/11/2021 |
| Assessor Name<br>Geraldene Susan Dalby-Ball | Report Created<br>22/04/2022 | BAM Data version *<br>50 |
| Assessor Number<br>BAAS19008 | Assessment Type<br>Part 4 Developments (Small Area) | BAM Case Status<br>Finalised |
| Assessment Revision<br>1 | Date Finalised<br>22/04/2022 | BOS entry trigger<br>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***<br>Large-eared Pied Bat | Yes (assumed present) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Diuris bracteata***<br>Diuris bracteata | Yes (assumed present) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

# BAM Candidate Species Report

| | | |
|---|---|---|
| ***Genoplesium baueri***<br>Bauer's Midge Orchid | No (surveyed) | ☐ Jan ☐ Feb ☑ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |
| ***Hygrocybe aurantipes***<br>Hygrocybe aurantipes | Yes (assumed present) | ☐ Jan ☐ Feb ☐ Mar ☐ Apr<br>☐ May ☐ Jun ☐ Jul ☐ Aug<br>☐ Sep ☐ Oct ☐ Nov ☐ Dec<br>☐ Survey month outside the specified months? |

## Threatened species Manually Added

None added

## Threatened species assessed as not on site

Refer to BAR for detailed justification

| Common name | Scientific name | Justification in the BAM-C |
|---|---|---|
| Large Bent-winged Bat | Miniopterus orianae oceanensis | Habitat constraints |
| Little Bent-winged Bat | Miniopterus australis | Habitat constraints |
| Regent Honeyeater | Anthochaera phrygia | Habitat constraints |
| Scrub Turpentine | Rhodamnia rubescens | Refer to BAR |
| 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<br>00026813/BAAS19008/21/00026814 | Proposal Name<br>60-62 Chisholm Avenue | BAM data last updated *<br>24/11/2021 |
| Assessor Name<br>Geraldene Susan Dalby-Ball | Assessor Number<br>BAAS19008 | BAM Data version *<br>50 |
| Proponent Names<br>Nada Herman | Report Created<br>22/04/2022 | BAM Case Status<br>Finalised |
| Assessment Revision<br>1 | Assessment Type<br>Part 4 Developments (Small Area) | Date Finalised<br>22/04/2022 |
| BOS entry trigger<br>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. | |

## 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 |
| **Hygrocybe aurantipes** / Hygrocybe aurantipes |

# BAM Biodiversity Credit Report (Like for like)

**Diuris bracteata** / Diuris bracteata

## Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

| PCT |
|---|
| No Changes |

Predicted Threatened Species Not On Site

| Name |
|---|
| No Changes |

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

| Name of Plant Community Type/ID | Name of threatened ecological community | Area of impact | HBT Cr | No HBT Cr | Total credits to be retired |
|---|---|---|---|---|---|
| 1214-Pittwater Spotted Gum forest | Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion | 0.1 | 1 | 0 | 1 |

# 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_Good | Yes | 1 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

## Species Credit Summary

| Species | Vegetation Zone/s | Area / Count | Credits |
|---|---|---|---|
| **Chalinolobus dwyeri** / Large-eared Pied Bat | **1214_Good** | 0.0 | 1.00 |
| **Diuris bracteata** / Diuris bracteata | **1214_Good** | 0.0 | 1.00 |
| **Hygrocybe aurantipes** / Hygrocybe aurantipes | **1214_Good** | 0.0 | 1.00 |

## Credit Retirement Options

Like-for-like credit retirement options

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

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# BAM Biodiversity Credit Report (Like for like)

| | | |
|---|---|---|
| **Diuris bracteata** / Diuris bracteata | Spp | IBRA subregion |
| | **Diuris bracteata /** Diuris bracteata | Any in NSW |
| **Hygrocybe aurantipes** / Hygrocybe aurantipes | Spp | IBRA subregion |
| | **Hygrocybe aurantipes /** Hygrocybe aurantipes | Any in NSW |

## 12.5 Appendix V – Species Polygon

Approximately 50% of the vegetation onsite has been previously disturbed (Orange Area). The canopy is discontinuous onsite with scattered canopy trees. The mid stratum is primarily absent within the orange shaded area. The ground stratum has been highly disturbed, with much of the site dominated by *Calochlaena dubia*. Vegetation onsite is displaying signs of natural regeneration although this is being hindered by current land management practices.

The species polygon covers the "suitable habitat areas". However, species credits generated in this BDAR were generated in the areas of "complete vegetation removal" and not Management Zone 2 (Landscaping Zone). The management zones were divided as the activities within proposed landscaping areas are not expected to become significantly degrade or remove breeding habitat features for the species credit species. This method is in accordance with the BAM Section 6.4 (steps 3 - 6). No optimal breeding habitat features were identified or obvious during the survey although they are expected. As such, several species have been assumed present**. The** two (2) species; *Hygrocybe aurantipes* and the Large-eared Pied Bat (*Chalinolobus dwyeri*) have been retained in the calculator. The species polygon below is appropriate for both species credit species generated in this BDAR.


Figure 12. The species polygon is appropriate for both species credit species generated in this BDAR.

## 12.6 Appendix VI – Targeted threatened species survey for *Genoplesium baueri* (Bauer's Midge Orchid)

Initial feedback from Northern Beaches council dated 13th November 2021 informed the homeowner that whilst the accredited assessor was familiar with the site and has conducted surveys in the past. The flora survey conducted as a part of this DA for the species *Genoplesium baueri* were conducted outside of the recommended survey period of February/March prescribed by the Threatened Biodiversity Data Collection (TBDC). Thus, additional surveys would need to be conducted inside the suitable survey period or credits would need to be retired for the species.

**Species information** (https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10875. Accessed April 2022.)

**Description**

A terrestrial orchid 6-15 cm high, fleshy, brittle, yellowish-green or reddish. Inflorescence sparse, 1-3 cm long, 1-6-flowered. Flowers approximately 15 mm across, green and red or wholly reddish. Dorsal sepal approximately 3.5 mm long, 4 mm wide; lateral sepals linear to lanceolate, 9-10 mm long, approximately 1.5 mm wide, widely divergent. Petals approximately 3 mm long, 1.5 mm wide, striped. Labellum approximately 4 mm long, approximately 2.5 mm wide, margins incurved; callus raised, of 2 linear, curved lobes extending about halfway to the labellum apex.

**Distribution**

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

**Habitat**

Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.

**Survey Method**

Senior Ecologist Geraldene Dalby-ball conducted a targeted survey for *Genoplesium bauri on* the 10th of March, approximately 5 weeks after significant rain event in February. Systematic searches were conducted throughout the whole of the development site and surrounding property. A transact was created along the length of the proposed disturbance area and repeating this every 1 m. Walking along the transit looking under existing vegetation ferns etc for the presence of the orchids. See plate below for survey grid and site photos.


KINGFISHER
URBAN ECOLOGY | WETLANDS
0 5 10 15 20 m
Survey Route
Site Boundary
NSW Six Map


OF DRIVE















### Results

No *Genoplesium baueri* individuals were identified during the survey. Likewise, no other threatened flora or fauna species species were coincidently observed during the surveys. The site did contain Sydney Rock Orchid planted by the property owner, within the landscaped areas proposed to be retained. Areas of suitable habitat surrounding the development area were observed and surveyed with no identification of the targeted species.

## 12.7 **Appendix VII – Landscape Plan for 60-62 Chisholm Avenue. Volker Klemm Landscape Design 2021**


Note: *The Landscape Plan (Volker Klemm Landscape Design, April 2021) is supported with the following amendment. The six (6) Corymbia hybrids (Corymbia summer beauty and Corymbia summer red) currently selected for planting within the site are to be replaced with two (2) Corymbia maculata, two (2) Eucalyptus umbra and two (2) Eucalyptus paniculata, to reflect locally indigenous native vegetation within the site and surrounding landscape.*

# 13 Expertise of authors

## Geraldene Dalby-Ball
## DIRECTOR

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.

### 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 through 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