Biodiversity Development Assessment Report

30 Herbert Ave, Newport NSW 2106

By Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands

August 2022

About this document

Copyright Statement©

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.

Document Control Sheet	
Title:	Biodiversity Development Assessment Report 30 Herbert Ave, Newport NSW 2106
Version:	Final
Author:	Myrna Calumpong, Geraldene Dalby-Ball and Jessica Miranda
Date:	August 2022
File location:	C:\Users\Geraldene\Dropbox\ECA 4 Projects\2 Projects\2021-2022\BDAR\ 30 Herbert Ave, Newport
Distribution:	Sean Herrington c/o Serenescapes Landscape Designs Pty Ltd p: +61 29986 2157 e: ben.danks@serenescapes.com.au

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

Executive Summary

Introduction

Ecological Consultants Australia (ECA) has been contracted by Serenescapes Landscape Designs Pty Ltd to provide a **Biodiversity Development Assessment Report** for a proposal at 30 Herbert Ave, Newport NSW 2106 within the Northern Beaches Council Local Government Area (LGA).

Trigger for a formal BDAR under the BC Act 2016:

Under Part 7 (s7.9), Biodiversity assessment for State significant development or infrastructure.

Stage 1: Biodiversity Assessment

- On-ground survey took place in June 2022 by Senior Ecologist Geraldene Dalby-Ball.
- Data was gathered across one BAM plots located in the area of greatest native integrity and diversity.
- Flora and fauna observations were recorded on-site using binoculars and physical examination. Notes, photos and samples of flora species were taken to assess ecological health and value of the site.
- Bionet searches were performed for flora, fauna and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.

Results

Stage 2: Impact Assessment

- The impact calculations were made based on there being direct impacts to vegetation from the proposed development. The impact area and/or areas of modification has been calculated as 0.05 ha within the 0.135 ha site.
- Survey plot 1 was within the planted garden vegetation with remnant canopy.
  Plot 1 was mostly located within the proposed development footprint and assessed as vegetation community Pittwater Spotted Gum Forest PSGF (PCT1214). It also included the most substantial tree on the site.
- PSGF 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 PSGF.
- Vegetation is structurally and functionally poor due to previous clearing onsite. Thus, the proposed development assessed in this BDAR is not expected to significantly contribute to loss of PSGF.
- No threatened species were recorded during the site surveys.

Mitigation Measures

- Delineation of work areas
- Vegetation clearing control measures
- Weed Management and removal
- Native seed collection
- Preservation of habitat
- Nest boxes
- Native species landscaping includes canopy tree planting

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

Conclusions and Recommendations

- The proposed development will have an approximate impact area of 0.05ha on Pittwater Spotted Gum Forest (PSGF) (PCT1214). This vegetation has been significantly altered and degraded from its natural state.
- The site has been managed as a residential garden with lawn and exotics for an extended time (over 50yrs on NearMap), habitat fragmentation and on-going disturbance, via nearby development and fragmentation of the canopy to individual trees.
- The total cost to offset both ecosystem credits and species credits generated by this development is $5131.78 (including GST), assuming payment will be made into the Biodiversity Conservation Fund. This is for 1 credit Pittwater Wagstaff Spotted Gum Forest and 1 credit Large-eared Pied Bat.
- Measures including but not limited to; nest boxes, native species landscaping, delineation of works zones, weed removal, tree protection and fauna refuge zones should all be used to mitigate any impacts associated with the proposal and increase habitat opportunities in the area.

Table E1 Impacts that require an offset – ecosystem credits

Vegetation zone	PCT	TEC/EC	Impact area (ha)	Number of ecosystem credits required
1214	Pittwater Spotted Gum forest	yes	0.05ha	1

Table E2 Impacts That require an offset – species credits

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
Large-eared Pied Bat	*Chalinolobus dwyeri*	0.05ha	1

Table of Contents

Stage 1: Biodiversity Assessment

1 Introduction

1.1 Site information and general description

1.1.1 Development overview

Ecological Consultants Australia (ECA) has been contracted by Serenescapes Landscape Designs Pty Ltd to provide a **Biodiversity Development Assessment Report** for a proposal at 30 Herbert Ave, Newport NSW 2106 within the Northern Beaches Council Local Government Area (LGA).

[SELECT LEGISLATIVE PATHWAY FOR THE DEVELOPMENT OR ACTIVITY. USE LIST BELOW]

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

1.1.2 Location

The Subject Site (the "Site") is the area of direct and likely indirect impacts and is defined as the whole of the proposed development. Refer to Figures 1.1 and 1.2.
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)	1/-/DP 214956
Total Site Area (ha)	1350m^2
Street Address	30 Herbert Ave, Newport NSW 2106
LGA	Northern Beaches Council
Land Zoning	C4: Environmental Living

Figure 1.1. Site Map. Source: SixMaps Aug 2022

Figure 1.2. Location Map. Source Near Map Aug 2022

1.2 Site history

The site is within the Homelands of the Garimaigal People. This area has a rich habitat and continues to be important to the People of this area. Native vegetation of PSGF would have grown on the site and surrounds. Ongoing modification and disturbance has resulted in loss of shrubs species completely and retention of some canopy (Spotted Gums and Grey Gum) and small patches of native grasses.
The vegetation on site consists of cleared open space with garden landscaped areas. A mix of exotic and native canopy species are present. Arboriculture assessment report is to also be consulted. Exotic species are dominant across the site and current management practices are preventing the recovery of the original plant community with the exception of some patches of grasses.

1.3 Proposed actions

The proposed development include:

- Vegetation removal within the proposed plan design (see figure 1.5)
- Construction of a new access to the back side of the house (dotted outline in figure 1.4).
- Integrated open space and landscaping to provide outdoor learning and support well-being.

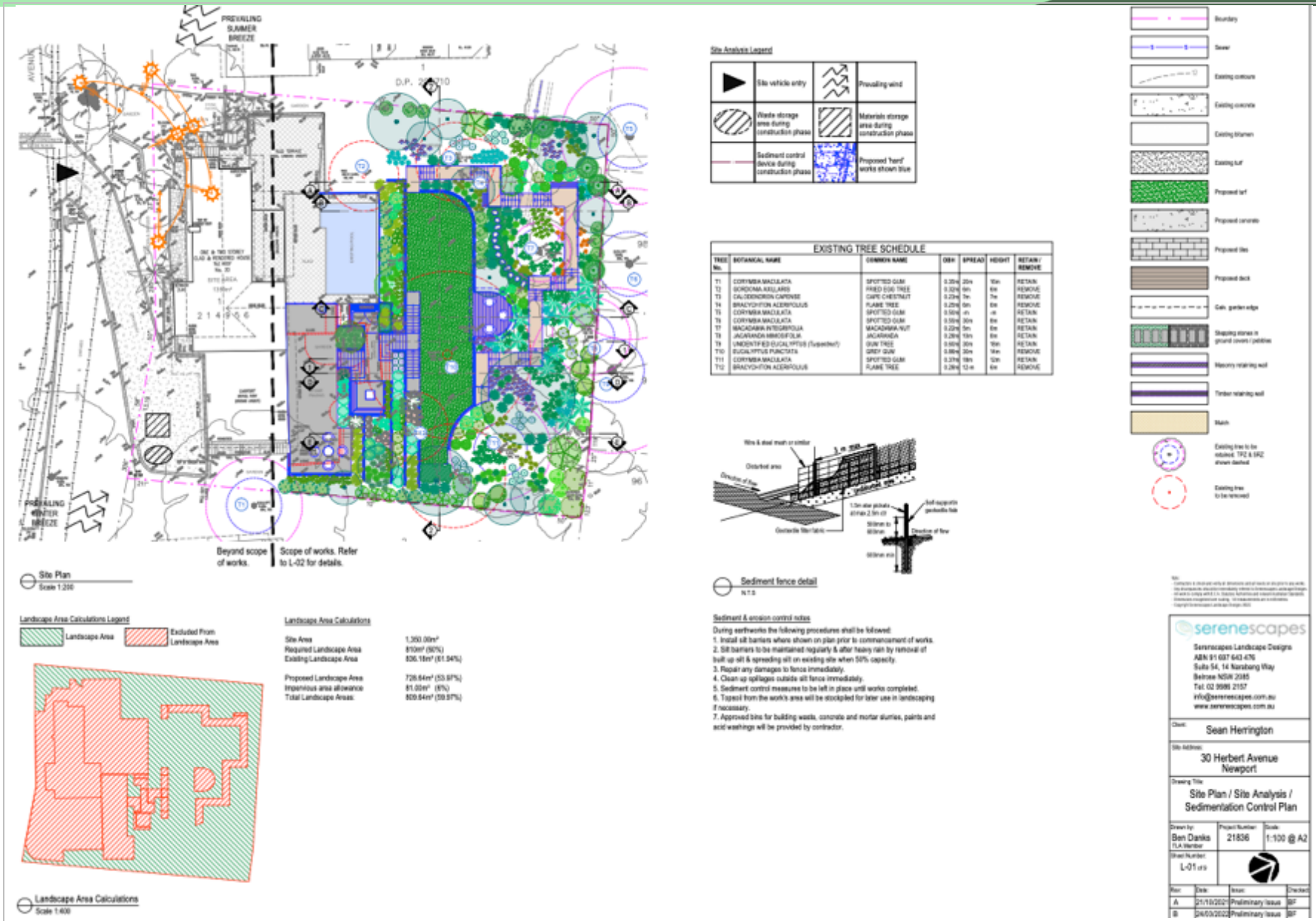


Figure 1.3. Site Plan/Analysis/Sedimentation Control Plan. Source: Serenescapes Landscape Designs 10/05/2022 DA Issue C

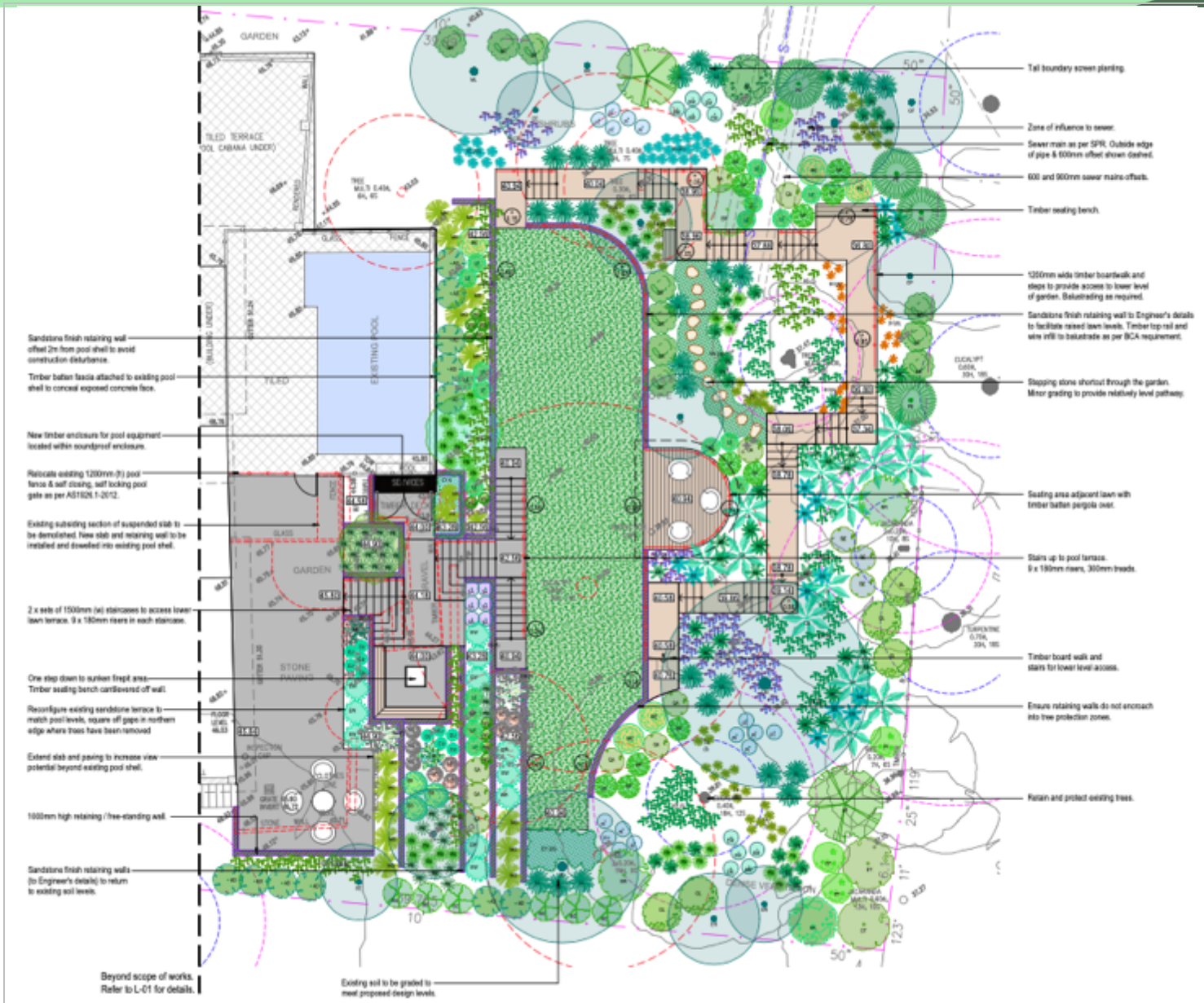


Figure 1.4. Detail Plan. Source: Serenescapes Landscape Designs 10/05/2022 DA Issue C

Figure 1.5 Area assessed as proposed impacted/landscaping (pink) – in addition to the current built area.

1.4 Sources of information used in the assessment

The following sources of information were used for this assessment:

- SeedMaps 2022
- SixMaps 2022
- SydneyMetroArea_v3.1_E-VIS_4489 OEH (2016)
- BioNet DPIE (2022)
- Planning for Bush Fire Protection (PBP) NSW RFS 2019
- Near Map high resolution imagery for before and after works
- DA Set – 30 Herbert Avenue Newport. Serenescapes Landscape Designs, 10/05/2022 DA Issue C.

1.5 Legislative context and statutory requirements

1.5.1 NSW Environmental Planning and Assessment Act 1979

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

1.5.2 NSW Biodiversity Conservation Act 2016 and associated documents

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

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

1.5.3 Biodiversity Offsets Scheme Entry

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

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 0.25ha (2500m^2).
Area clearing thresholds are determined by minimum lot size and guidelines outlined in BAM (OEH 2020) (Figure 1.7).

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

Minimum lot size	**700m^2**
Threshold for clearing, above which the BAM and offsets scheme apply	**0.25ha**
Impact area	**0.05ha**

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

Biodiversity Values Map

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

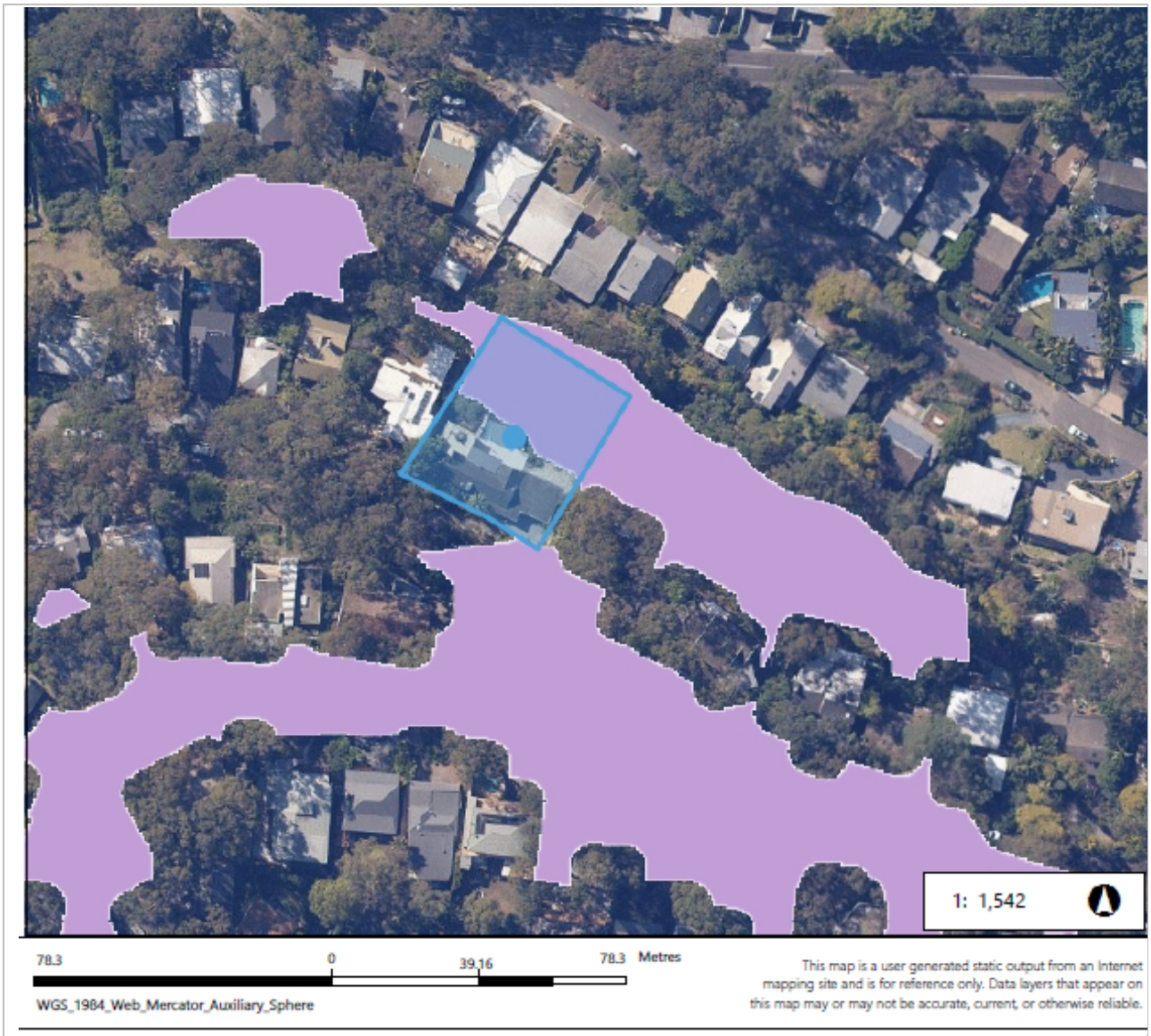


Figure 1.8. Biodiversity Values Map. Source: DPIE Aug 2022.

1.5.4 NSW State Environmental Planning Policy Koala Habitat Protection 2021.

The State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2021 does not apply. The subject land is smaller than one hectare and the land is not identified on the Koala Development Application Map (DPIE, 2020).

A separate Koala Assessment Report has not been conducted however the Endangered Population on the Barrenjoey Peninsula has been considered in this BDAR.

The site was considered not likely to provide core koala habitat nor is suitable/core habitat within the site proposed to be irreversibly impacted.

The assessment should assist the consent authority in determining any potential impacts on the species. This assessment addresses aspects of criteria outlined in the Koala Habitat Protection Guideline (DPIE, 2020) as detailed by the State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2021.

1.5.5 Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

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

- world heritage properties;
- national heritage places;
- Ramsar wetlands;
- nationally threatened species and communities;
- migratory species protected under international agreements;
- the Commonwealth marine environment; and
- nuclear actions.

The Commonwealth Government has published Significant Impact Guidelines (DE 2013) to assist in the determination of whether an action is likely to have a significant impact on a matter of NES. The proposal will significantly impact any MNES.

1.5.6 Pittwater Local Environmental Plan (KLEP) 2014

The site is identified as “biodiversity” on the Terrestrial Biodiversity Map as published by Pittwater Council. (Map Identification Number: 6370_COM_BIO_017_010_20140217).
As identified in PLEP (2014) the aim of part 7, clause 7.6 is to maintain terrestrial, riparian and aquatic biodiversity by—

(a) protecting native fauna and flora, and
(b) protecting the ecological processes necessary for their continued existence, and
(c) encouraging the conservation and recovery of native fauna and flora and their habitats.

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

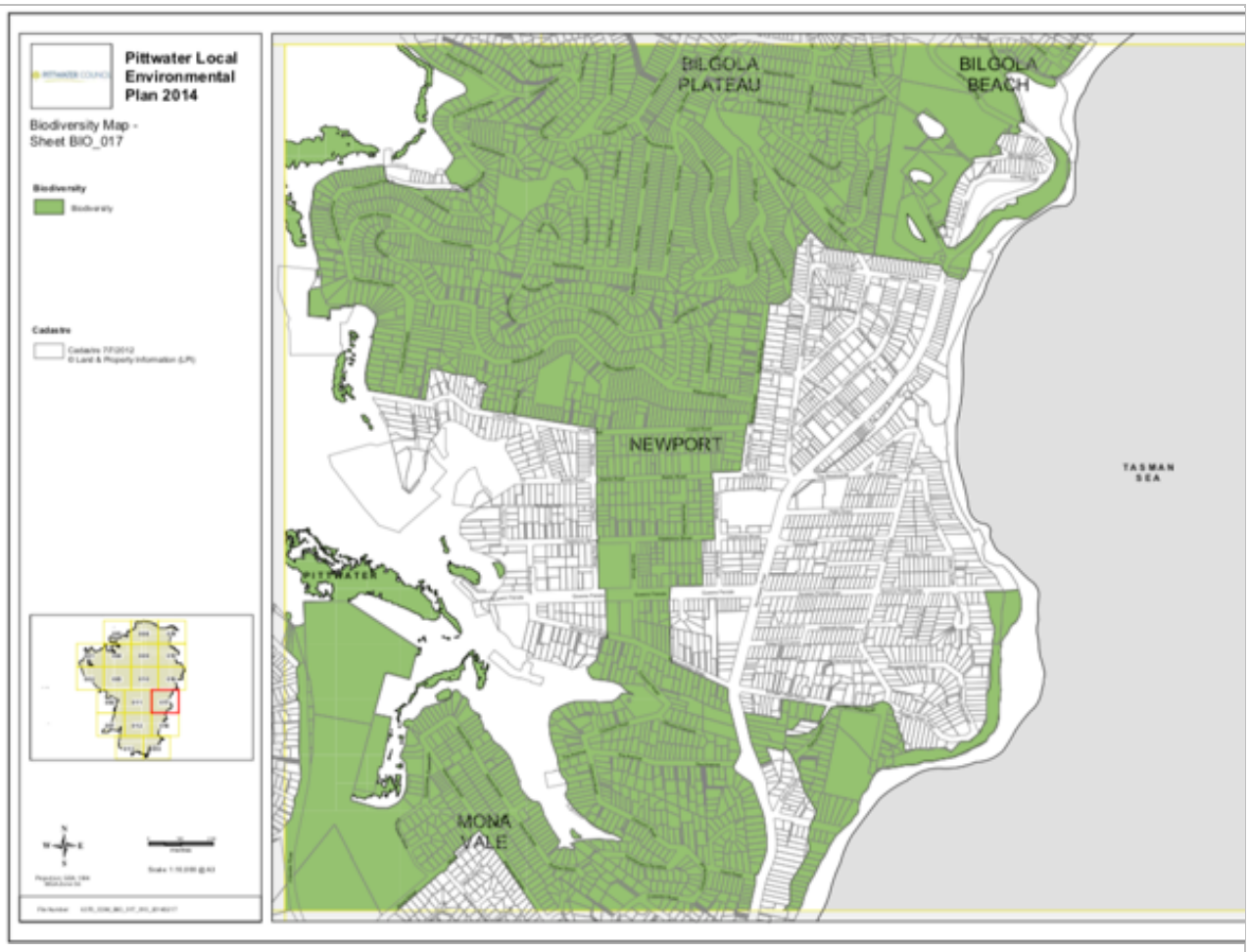


Figure 1.9. The site is situated on “Biodiversity” on the Terrestrial Biodiversity Map as published by NB Council.

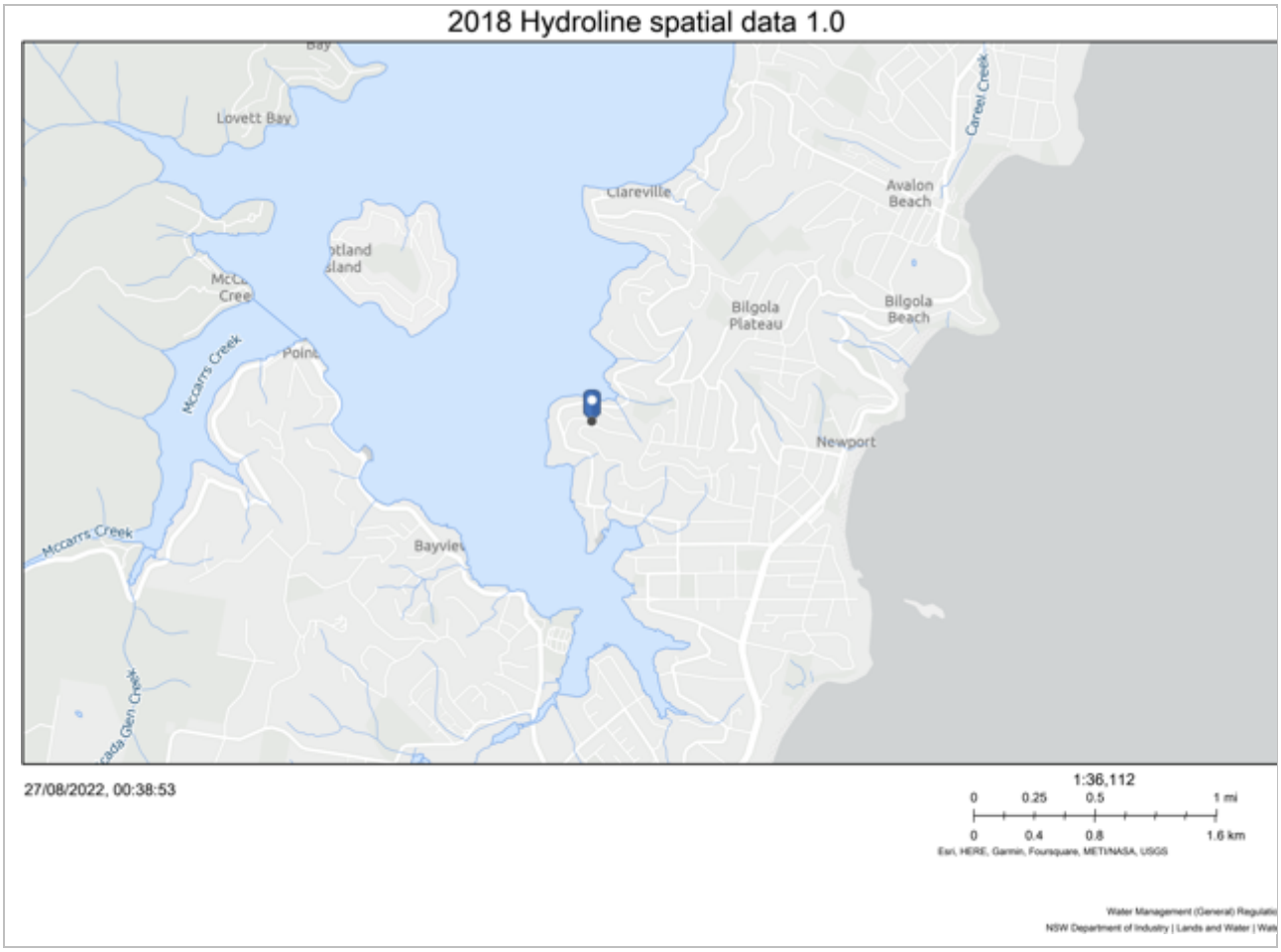
3 Landscape features and site context

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

Table 2.1. Site Biodiversity Information

Category	Details
Interim Biogeographic Regionalisation for Australia (IBRA)	Sydney Basin
IBRA Sub Region	Pittwater
NSW Landscape 	Belrose Coastal Slopes - Bsl 
Landscape features (Refer to Figure 2.1)	
Rivers and streams	No rivers or streams are located within the site of the surrounding lots.
Wetlands	No wetlands occur within the site or within proximity to the proposed development.
Connectivity features	Vegetation on site is connected to adjoining bushland via patches of remnant/exotic trees and inconsistent structural layers. Currently native remnant and provides minimal connectivity between patches of mature canopy species. However the area is generally reasonably linked via canopy – that eventually reaches National Park (Kuringai) so while the contacts are thin in places there still is a level of habitat connectivity.
Areas of geological significance and soil hazard features	No
Areas of Outstanding Biodiversity Value identified under the BC Act	No

Geology and Soil	"Watagan" is the identified soil landscape for the site as per eSpade2.0 (DPIE, 2021). Watagan soil landscapes are categorized by very steep hills on fine-grained Narrabeen Group sediments. Local relief 60–120 m, slopes >25%. Narrow, convex crests and ridges, steep colluvial sideslopes, occasional sandstone boulders and benches. Soils–shallow to deep (30–200 cm) Lithosols/Siliceous Sands (Uc1.24) and Yellow Podzolic Soils (Dy3.21, Dy3.41, Dy4.11) on sandstones; moderately deep (100–200 cm) Brown Podzolic Soils (Db1.11), Red {Podzolic Soils (Dr2.21) and Gleyed Podzolic Soils (Dg2.21) on shales.



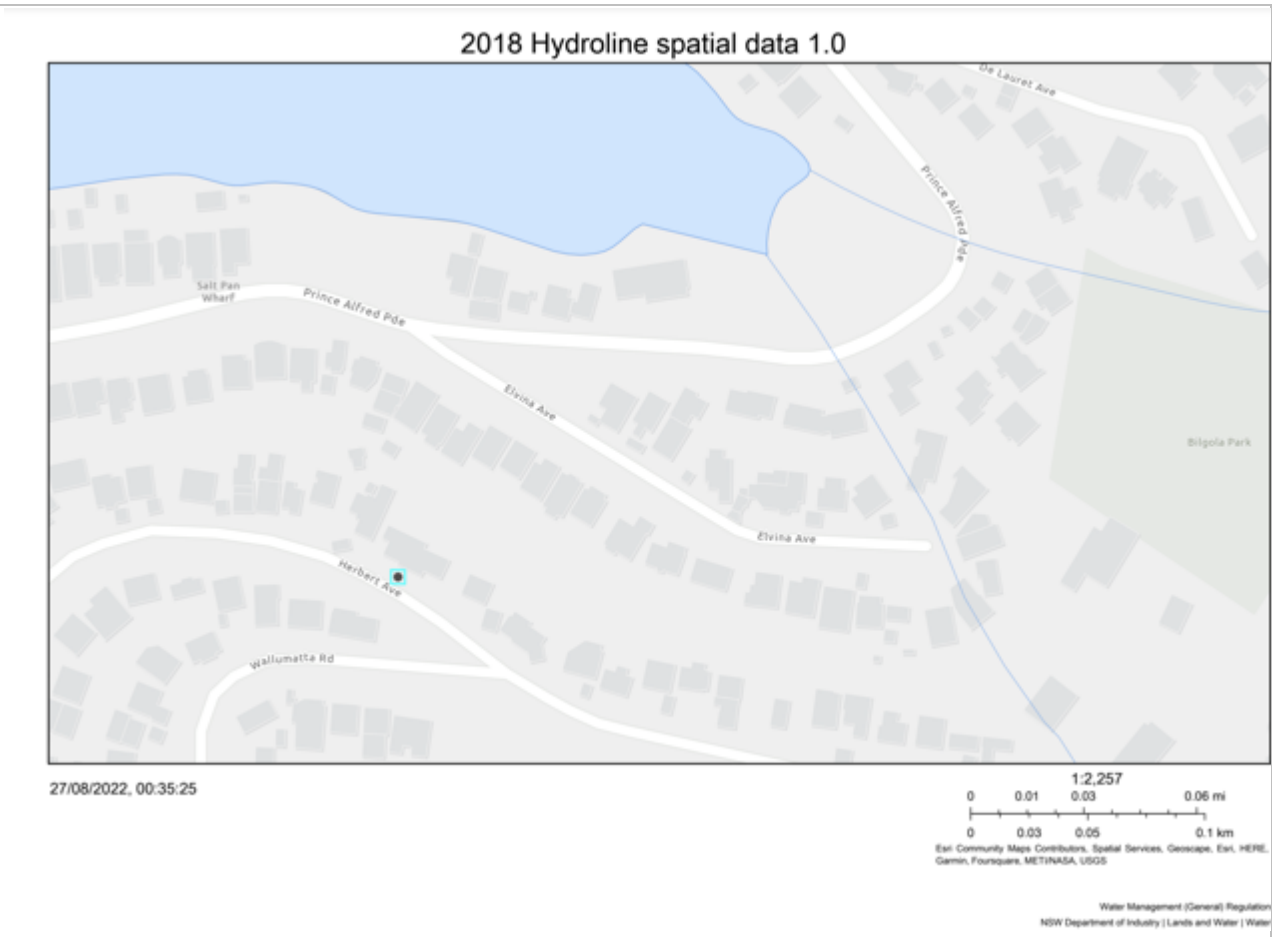


Figure 2.1. Hydrolines Mapping within 1500m Buffer of the site. Data Source: NSW Government Spatial Data, Hydrolines. NB no waterways on the site or immediate surrounds. The estuary is 180m at its closest point.

3.1 Native Vegetation Cover

Native vegetation occurs across a range of conditions throughout the assessment area. Native vegetation is mapped in Figure 2.2.

Figure 2.2 Location Map Native vegetation cover within 1500m buffer around the site. Seedmap, 2022.

Table 2.2. Native vegetation cover in the assessment area

Assessment area (ha)	1,038ha
Total area of native vegetation cover (ha)	228
Percentage of native vegetation cover (%)	22%
Class (0-10, >10-30, >30-70 or >70%)	>10-30%

4 Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation extent and plant community types

4.1.1 Mapped Native Vegetation Extent

A review of the most up-to-date vegetation mapping, NSW State Vegetation Type Map: Plant Community Types (2022) and has identified one (1) plant community type (PCT) within site. The PCT is identified as; *Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area* (PCT1214).

Table 4.1. Vegetation community synonyms as per NSW and Commonwealth legislation.

NSW PCT Code	NSW PCT Name	BC Act 2016	EPBC Act 1999	Estimated Percentage Cleared
1214	*Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area*	*Pittwater Wagstaff Spotted Gum Community EEC*	NA	90%

4.1.2 Field survey

The field survey assisted in verifying the distribution and quality of vegetation at the site. Pittwater Spotted Gum Forest (PSGF) (PCT1214) is mapped across the site via *The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489.*
Approximately 95% of the vegetation onsite has been previously disturbed. The canopy is discontinuous onsite with scattered canopy trees. The naïve mid stratum is largely absent within site boundaries. The ground stratum has been highly disturbed, with much of the site dominated by exotic turf grasses and patches of native grasses and forbs.

The Scientific Committee's final determination for PSGF includes a stand of Remnant PSGF trees can meet the definition for PSGF. Therefore, vegetation in this zone has been assessed as a part of the PSGF EEC in the BAM-C. See section 5 for a description of vegetation zones and the impact assessment.

4.1.3 Changes to mapped vegetation extent

Mapping is accurate given that canopy trees in turf are part of the EEC determination. Canopy on site is native upper canopy or planted NSW (not PWSGF) species.

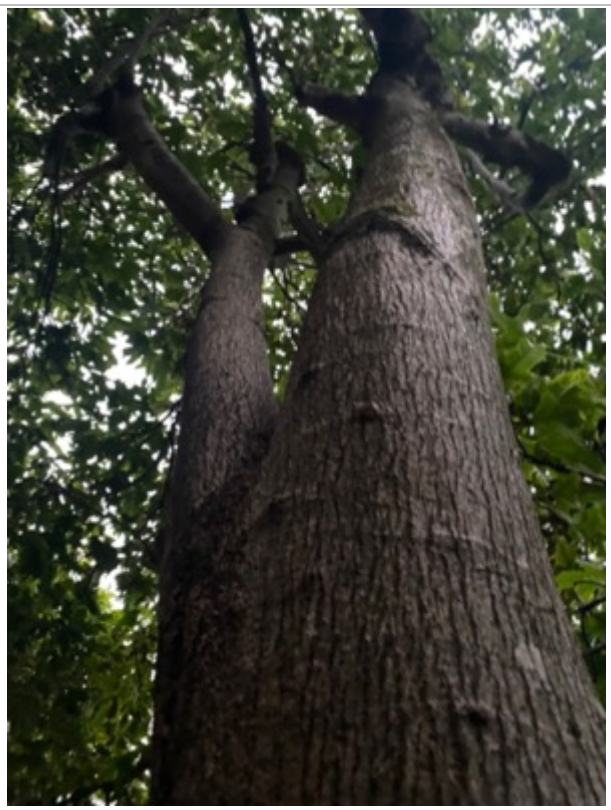
4.1.4 Areas that are not native vegetation

Exotic vegetation is largely outside the area mapped as EEC and exists as plantings.

4.1.5 Site Photos

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

Plate 1 and 2. African Olive



Plates 3 and 4. Brachychiton

Plate 5. Grey Gum

Plate 7. Native grasses under Morning Glory

Plate 8. Spotted Gum included in the BAM calcualtions

Plate 9. Cyperus sp. (native)

Plate 10.Kidney Weed (native) *Dichondra reapens*

Plate 11. Canopy of Spottted Gums – separate and unlike how they are in an intact forest.

Plate 12. Neighbouring property (~8m of transect) included in the 1000m for trees, logs, plots. Not in the 20x20 plot.

Plate 13. Spotted gum in neighbouring yard included in 1000m

4.2 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. One vegetation zone is present and is the one management zones.

Future vegetation integrity (F-VI) scores in the BAM-C.
Species diversity will increase in the area of PSGF natives as these are now recommended in the Landscape plan joining this application.

The assessment was based on the complete vegetation removal in the management zone. The one plot indicated the vegetation has a F-VI score of 0 down from 24.5
Data for the BAM-C was gathered from the one BAM plot and this was an overestimation of the condition.

4.2.1 Stratification and plot dimensions

Plot was as per the BAM Method with 20 x 20 (400m^2) for assessing structure and composition. The (1000m^2) area included the easily accessibly properties around the site. All had remnant Canopy of Spotted Gum, and other species native to NSW, and these have been included to assess function. See Figure 4.6 and the 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

4.2.2 Patch size

[Vegetation Zone One (Building Footprint and landscaping)
Patch size class was set at 100ha+.
Zone one is the area proposed for the new build footprint and landscaping (that includes native species) and would require vegetation removal (mostly exotics and turf) to facilitate the development. This area has undergone previous clearing and development. Currently this zone consists of:

- Cleared ground with exotic turf and remnant native grasses and forbs;

- Landscaped garden dominated by exotic species and cultivated natives;
- Planted mature native canopy *E. maculata* and *E. punctata* are present with Spotted Gums being dominant these are throughout the garden and proposed for removal. Native ground cover surviving in exotic turf approximately 50m^2

The poor structural diversity is reflected in the low vegetation integrity score. Prior to development would have once likely consisted full strata PWSGF.

Table 4.2. Current vegetation zones and patch size.

PCT	Vegetation Zone	Area (Ha)	Patch Size Class
1218 (PSGF)	One – Building / Landscape Footprint (Figure 3.1)	0.05	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha

Table 4.3. Vegetation zone condition scores

Zone ID	Composition Condition	Structure Condition	Function Condition	Vegetation Integrity Score	Hollow Bearing Trees Present?
1	23.4	36.4	17.2	24.5	0

Figure 4.1 Impact Area of native Vegetation Building/landscape footprint.

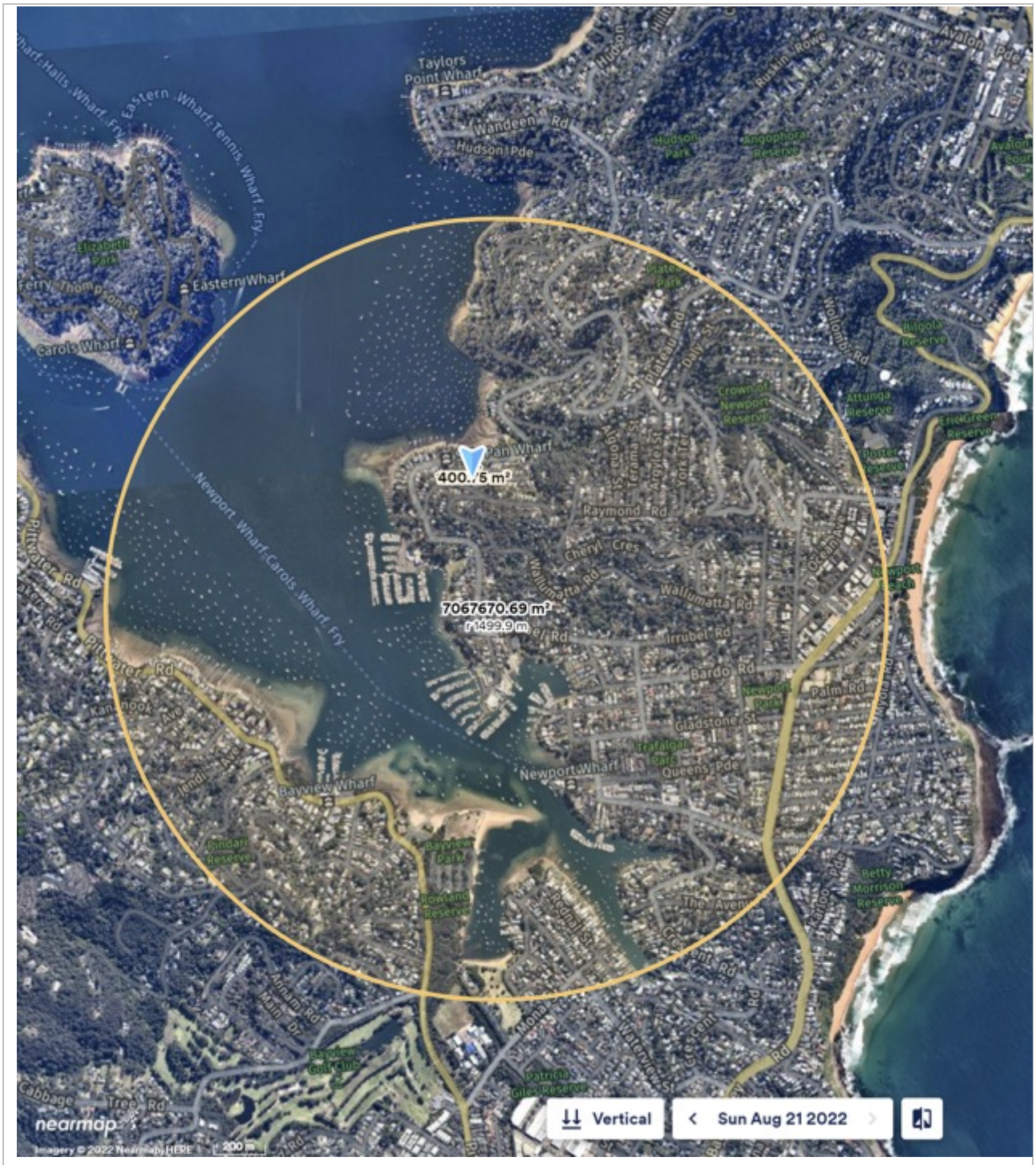


Figure 4.2 Fragmented vegetation across the surrounding landscape (see also Figure 3.5)

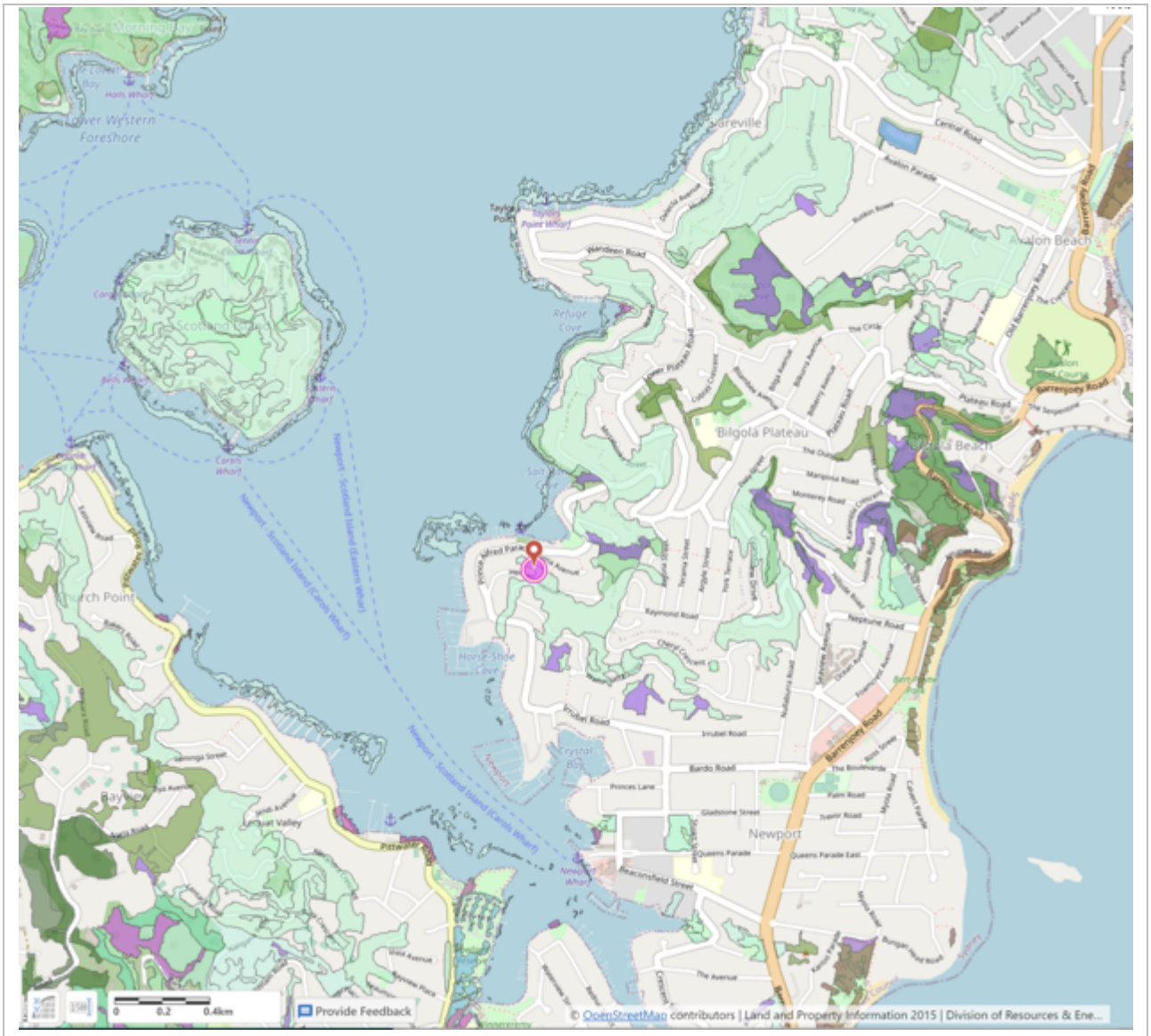


Figure 4.3 Previously mapped PCT. PSGF pale green-blue. The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489

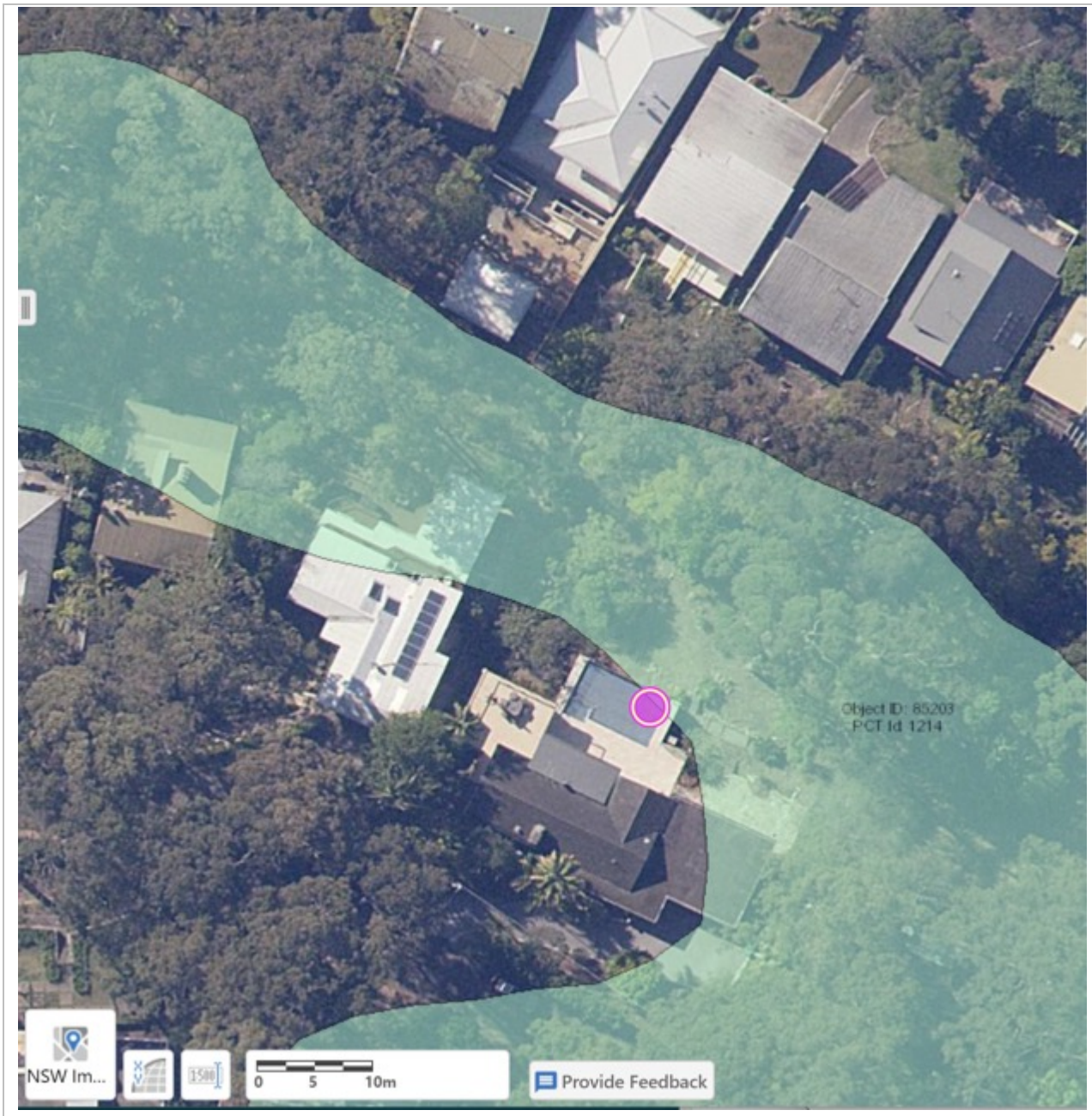


Figure 4.4 Extract from SEED has the area of proposed works mapped as PSGF.

Ground truthing shows the area mapped as PSGF includes existing built form and has canopy species of PSGF present. The vegetation condition map in Figure 3.5 shows the area.

Figure 4.5 Current vegetation condition onsite.

Native canopy x1 and turf (yellow), Patches of native grasses (green), Canopy (with turf or exotics (apricot) and Exotic shrubs (red).

4.6 Plot and transect location. 1000m2 pink and 400m2 blue.

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

5 Threatened Species

4.1 Flora and Flora Field Survey

No threatened flora or fauna species were identified during Kingfisher 2022 field surveys. The author, having lived in the area over 30 years, is aware of Powerful Owls and microbats in the local vicinity particularly at the end of Riverview Road.

5.1.1 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.

5.1.2 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). JuPSGFication for species exclusion in the BAM-C can be found in appendix I. Searches and call playback was not conducted for forest owls and no individuals were observed on site.

5.1.3 Microbats

The impact area hosts marginal foraging habitat for threatened microbat species which are identified in the BAM calculator for the site. All microbat species have been retained in the BAM calculator for foraging purposes. The site survey for microbats primarily focused on their breeding habitat requirements such as caves, outcrops, hollows and other features which microbat species may use for breeding purposes.
It has been concluded that while microbat species may use the site for foraging purposes they are unlikely to use the site for breeding purposes due to lack of optimal breeding opportunities within the impact area. Therefore, impact assessment on microbat breeding habitat has been excluded from the BAM assessment.

5.1.4 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.

5.1.5 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.

5.1.6 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.

5.1.7 Koala assessment summary

The proposal is unlikely to have a significant impact on the Koala or areas of critical habitat for the species. It is unlikely that the species would occur on site due to the degraded nature of vegetation and habitat, as such, there is a low likelihood of occurrence for the species.
Desktop (Bionet, ALA) and on-ground surveys were conducted to determine the presence / absence of the species. The on-ground survey also contributed to information regarding habitat availability within the site. Direct observation surveys for the species were generally opportunistic in nature, however no individuals were observed on site. Indirect survey methods including scat and scratching's searches (outlined in DotE; 2014) were conducted. No evidence of the species was found on site.

4.2 Threatened Flora - Desktop

A total of 18 threatened flora species have been recorded within 10km of the study site according to BioNet records. These species are currently listed as vulnerable or endangered under state and/or commonwealth legislation (see Table 4.1). The vulnerable and endangered species to focus on-site searches for can be seen in Table 4.1 below highlighted in bold. This is based on likelihood of occurrence.

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

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		6
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue Orchid	V,P,2	V	1
Ericaceae	*Epacris purpurascens* var. *purpurascens*		V		1
Myrtaceae	*Eucalyptus camfieldii*	Camfield's Stringybark	V	V	7

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	4
Orchidaceae	*Genoplesium baueri*	Bauer's Midge Orchid	E1,P,2	E	1
Proteaceae	*Grevillea caleyi*	Caley's Grevillea	E4A,3	CE	53
Myrtaceae	*Kunzea rupestris*		V	V	1
Malvaceae	*Lasiopetalum joyceae*		V	V	1
Proteaceae	***Macadamia integrifolia***	**Macadamia Nut**		V	5
Orchidaceae	*Microtis angusii*	Angus's Onion Orchid	E1,P,2	E	52
Proteaceae	*Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	5
Thymelaeaceae	*Pimelea curviflora* var. *curviflora*		V	V	1
Myrtaceae	***Rhodamnia rubescens***	**Scrub Turpentine**	E4A	CE	32
Myrtaceae	***Syzygium paniculatum***	**Magenta Lilly Pilly**	E1	V	16
Elaeocarpaceae	*Tetratheca glandulosa*		V		18

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

4.3 Threatened Fauna - Desktop

A total of 53 threatened fauna species have been recorded within 10km of the study site according to BioNet records. These species are currently listed as vulnerable or endangered under state and/or commonwealth legislation (see Table 4.2). The vulnerable and endangered species to focus on-site searches for can be seen in Table 4.2 below highlighted in bold. This is based on likelihood of occurrence.

Table 4.2. Threatened fauna observed in previous ecological surveys within a 10km radius of the study site. NSW DPIE Bionet 2022.

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Amphibia	*Heleioporus australiacus*	Giant Burrowing Frog	V,P	V	33
Amphibia	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	2
Amphibia	*Pseudophryne australis*	Red-crowned Toadlet	V,P		47
Aves	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	CE	39
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

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Aves	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		2
Aves	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		77
Aves	*Daphoenositta chrysoptera*	Varied Sittella	V,P		3
Aves	*Diomedea exulans*	Wandering Albatross	E1,P	E	2
Aves	*Esacus magnirostris*	Beach Stone-curlew	E4A,P		1
Aves	***Glossopsitta pusilla***	**Little Lorikeet**	V,P		9
Aves	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		7
Aves	***Haliaeetus leucogaster***	**White-bellied Sea-Eagle**	V,P		43
Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		4
Aves	*Hirundapus caudacutus*	White-throated Needletail	P	V,C,J,K	9
Aves	***Ixobrychus flavicollis***	**Black Bittern**	V,P		7
Aves	*Lathamus discolor*	Swift Parrot	E1,P,3	CE	17
Aves	*Lophoictinia isura*	Square-tailed Kite	V,P,3		4
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		28
Aves	***Ninox strenua***	**Powerful Owl**	V,P,3		477
Aves	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	8
Aves	***Pandion cristatus***	**Eastern Osprey**	V,P,3		16
Aves	*Petroica boodang*	Scarlet Robin	V,P		2
Aves	***Ptilinopus regina***	**Rose-crowned Fruit-Dove**	V,P		3
Aves	***Ptilinopus superbus***	**Superb Fruit-Dove**	V,P		4
Aves	*Rostratula australis*	Australian Painted Snipe	E1,P	E	3
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		396

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Mammalia	***Chalinolobus dwyeri***	**Large-eared Pied Bat**	V,P	V	19
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	7
Mammalia	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		3
Mammalia	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	E1,P	E	20
Mammalia	***Micronomus norfolkensis***	**Eastern Coastal Free-tailed Bat**	V,P		20
Mammalia	***Miniopterus australis***	**Little Bent-winged Bat**	V,P		59
Mammalia	***Miniopterus orianae oceanensis***	**Large Bent-winged Bat**	V,P		91
Mammalia	***Myotis macropus***	**Southern Myotis**	V,P		31
Mammalia	*Petaurus norfolcensis*	Squirrel Glider	V,P		7
Mammalia	***Phascolarctos cinereus***	**Koala**	V,P	E	74
Mammalia	*Pseudomys novaehollandiae*	New Holland Mouse	P	V	9
Mammalia	***Pteropus poliocephalus***	**Grey-headed Flying-fox**	V,P	V	136
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		2
Reptilia	*Caretta caretta*	Loggerhead Turtle	E1,P	E	3
Reptilia	***Chelonia mydas***	**Green Turtle**	V,P	V	10
Reptilia	*Varanus rosenbergi*	Rosenberg's Goanna	V,P		26

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

5.2 Endangered population

Two (2) endangered populations have been recorded to occur within 10km of the site. Table 5.3 below displays the populations. Koala records in this area – in SEED are form 1986 and 1973. No records in the past 20 years. The author lives in this area and can confirm no Koala sightings in this time period.

Table 5.3. Endangered population observed in previous ecological surveys within a 10km radius of the study site. NSW DPIE Bionet 2022.

Scientific Name	Common Name	NSW status	Comm. status	Records
Petaurus norfolcensis	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1

Scientific Name	Common Name	NSW status	Comm. status	Records
Phascolarctos cinereus	Koala in the Pittwater Local Government Area	E2,V,P	E	74

Likelihood of occurrence

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

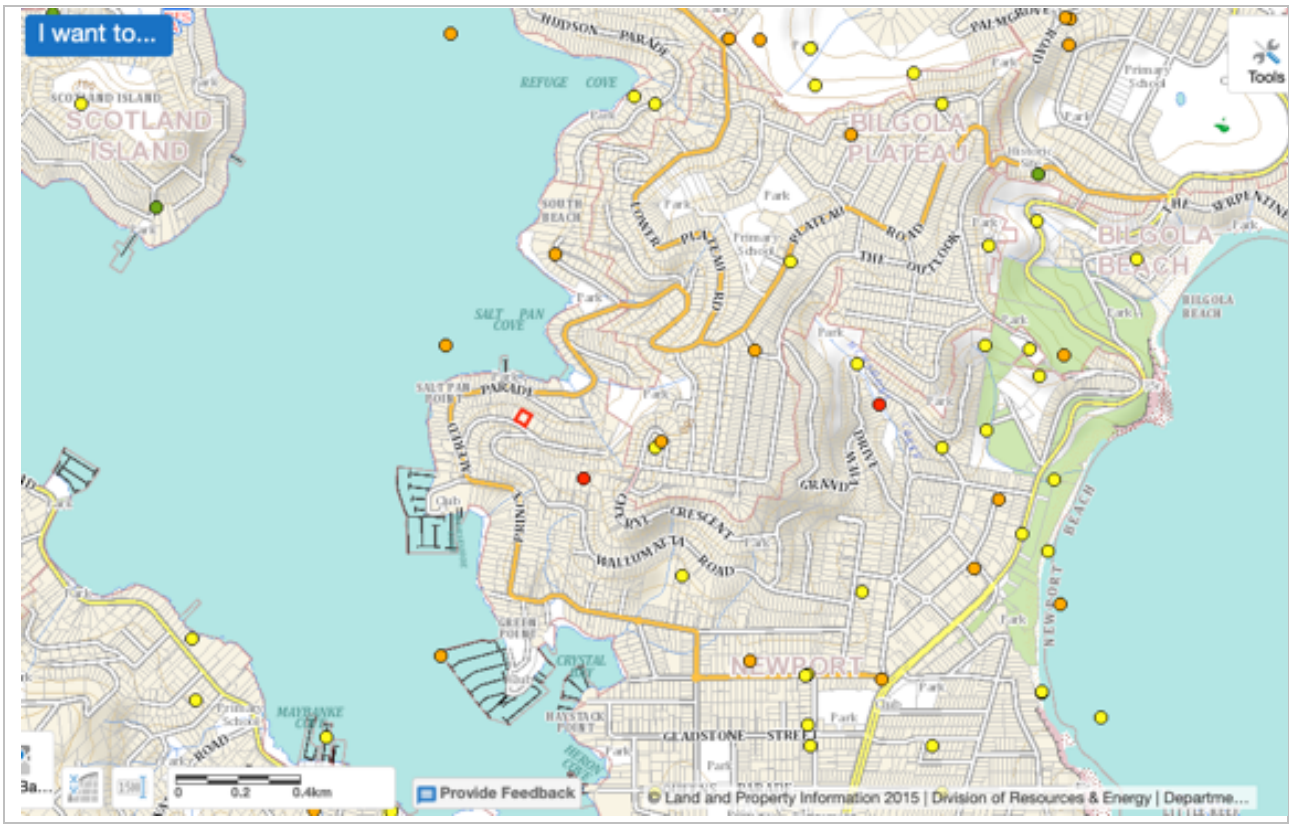
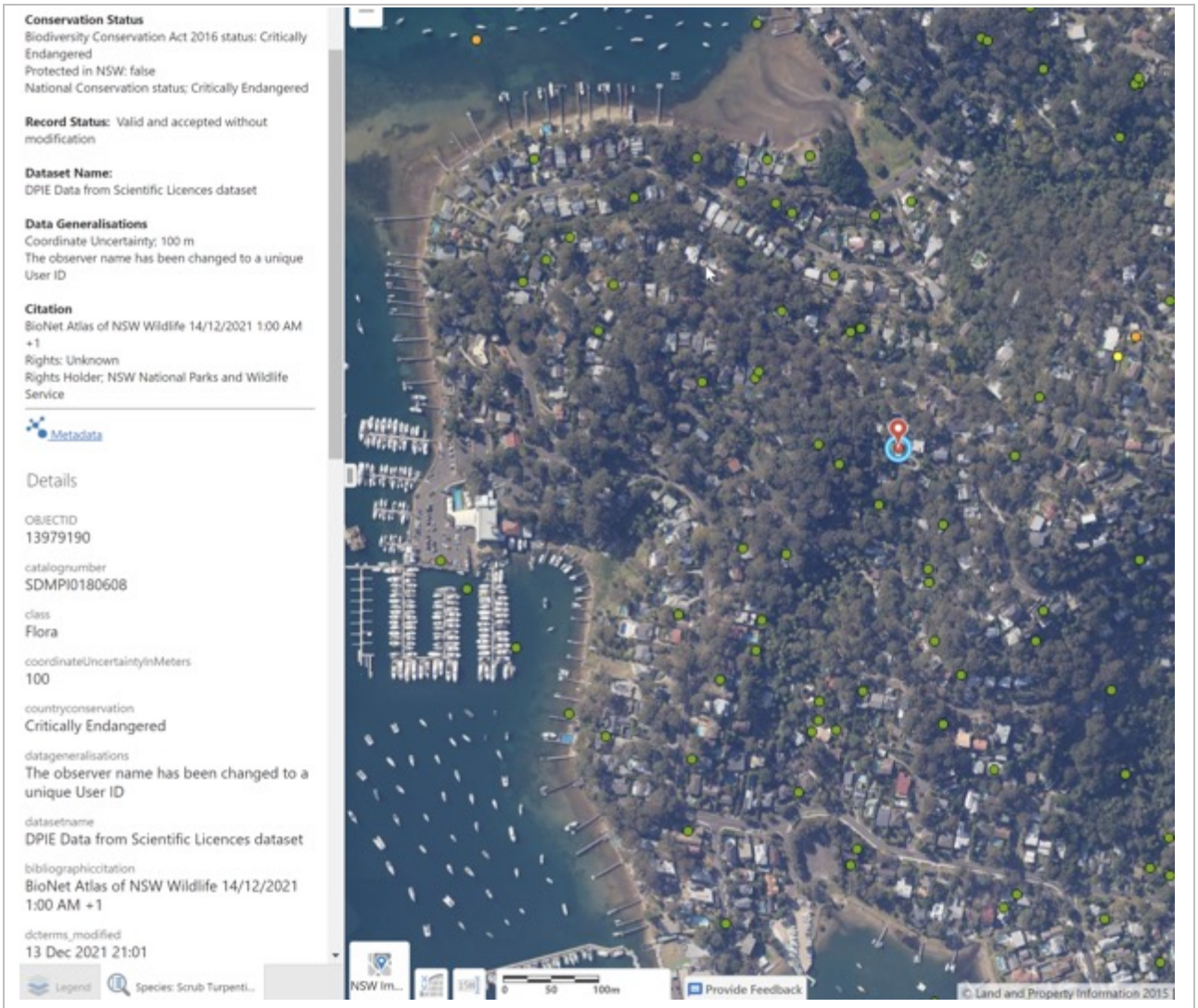
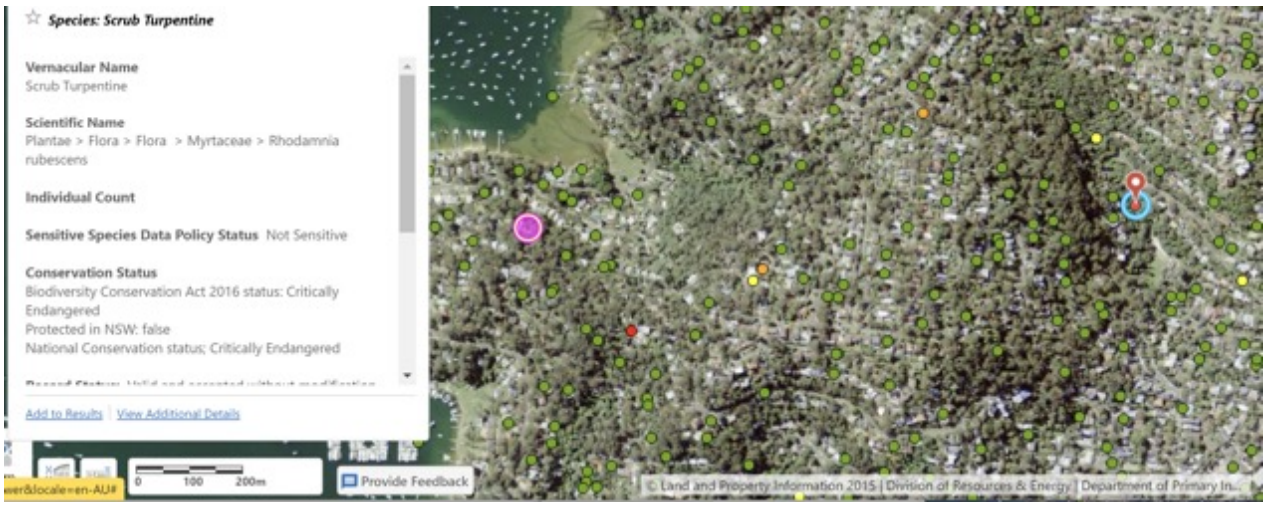
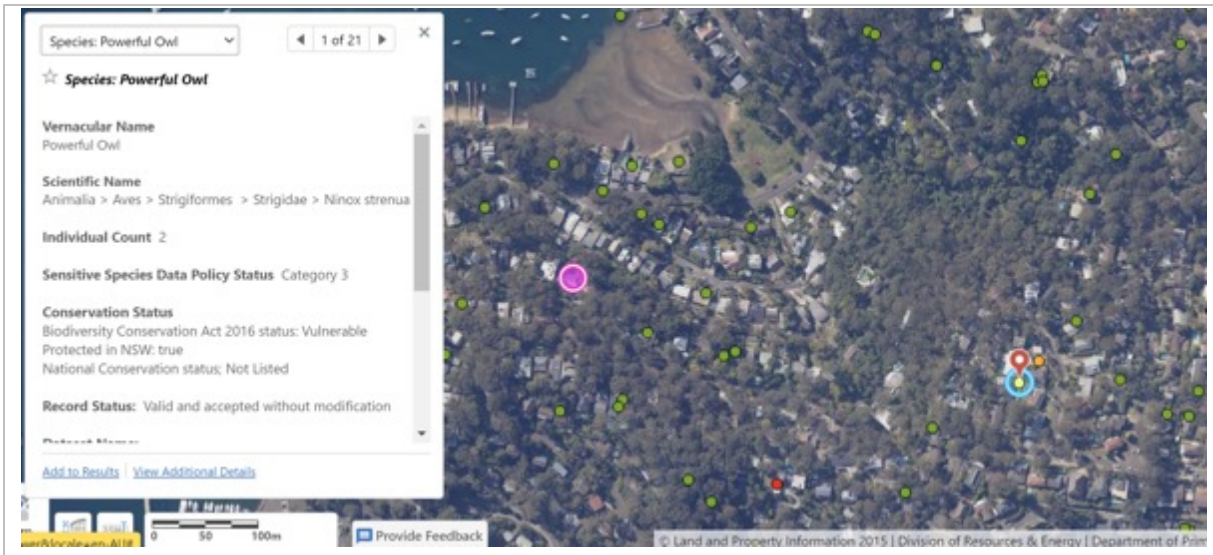


Figure 4.1. Threatened Bionet species sighted around the site. Source: SEED 2022.



Scrub Turpentine is the closest threatened plant (~300m away and 700m).





Powerful Owl (record is older than latest known 2022 sighting. Orange dot next to this is Koala sighting (1986)

Stage 2: Impact Assessment

6 Efforts to Avoid and Minimise

6.1 Consideration of Alternatives

6.1.1 'Do Nothing' Scenario

Do nothing would not save the Grey Gum as, according the Arborist Report, it has a fungal infection that makes it unsafe to leave in situ. See Arborist report for details. If nothing was done the existing home would remain as is and the landscaping would not be done. Landscaping as proposed, to include native species, including PWSG community will create more biodiversity than on site now. Planting PWSG species could occur with or without development however landscaping and the extensions are coupled in this DA.

6.1.2 Alternative Locations within site

The block is a single residential size and there is not many options for an extension. Up a level on road side, or towards road (not practical as this is the drive and this road must have off street parking. So the only way for an extension in the direction proposed.

As noted the Grey Gum is proposed for removal without this extension. Other trees have been removed from this location, with permission, since 2009 due to recommendations for Arborists and / or storm events.

Alternatives include converting all non-built areas to 100% PWSGF and extracting and translocation the native grasses to someone in the area (road reserve future up the road or at SaltPan Cove would be OK).

6.1.3 Proposed Location and Design

The proposed location is as shown in plans included earlier. There is built form and landscaping.

7 Direct Impacts

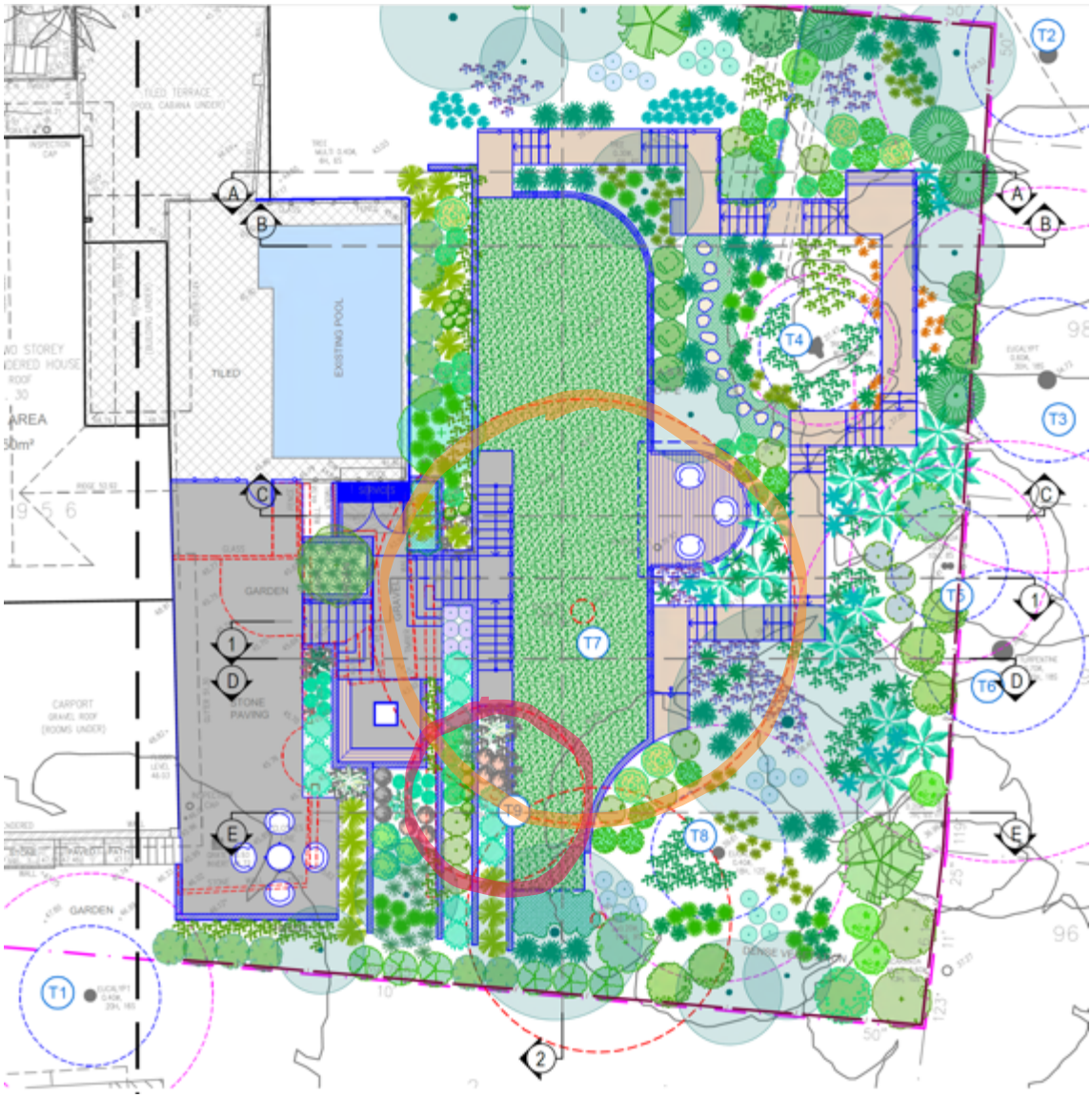
7.1 Vegetation disturbance and Loss

7.1.1 Vegetation Zone 1 (Building and Landscape footprint)

A total of 0.05 ha of vegetation (including exotic turf and weed areas) within the building and landscape footprint (Vegetation Zone 1). As discussed in Section 5 vegetation in this area consists of landscaped gardens and turfed lawn with native canopy. Ground vegetation is dominated by exotic ornamental species with a mix of local and non-local native species throughout and patches of native grass.

This mid story is degraded and exotic turf grasses dominate the ground layer. Burning the exotic grass would stimulate the soil seed bank and retrain the patches of native grass. Unlikely to be practical in this setting such that the original vegetation community is unlikely to recover. Areas of potential habitat for PSGF will be lost, although the site has been subject to vegetation removal and modification for the previous 100 years.

Direct includes the removal of 2 trees. Grey Gum and an NSW native, not local, Flame Tree. See Arborist summary table below.



EXISTING TREE SCHEDULE						
TREE No.	BOTANICAL NAME	COMMON NAME	DBH	SPREAD	HEIGHT	RETAIN / REMOVE
T1	CORYMBIA MACULATA	SPOTTED GUM	0.35m	20m	16m	RETAIN
T2	CORYMBIA MACULATA	SPOTTED GUM	0.50m	-m	-m	RETAIN
T3	CORYMBIA MACULATA	SPOTTED GUM	0.55m	30m	8m	RETAIN
T4	MACADAMIA INTEGRIFOLIA	MACADAMIA NUT	0.22m	5m	6m	RETAIN
T5	JACARANDA MIMOSIFOLIA	JACARANDA	0.28m	10m	8m	RETAIN
T6	UNIDENTIFIED EUCALYPTUS	GUM TREE	0.60m	30m	18m	RETAIN
T7	EUCALYPTUS PUNCTATA	GREY GUM	0.86m	30m	14m	REMOVE
T8	CORYMBIA MACULATA	SPOTTED GUM	0.37m	18m	12m	RETAIN
T9	BRACYCHITON ACERIFOLIUS	FLAME TREE	0.28m	12-m	6m	REMOVE

Table 7.1. Trees proposed for removal in Vegetation Zone 1 Development footprint.

8 Indirect Impacts

8.1.1 Canopy exposure through fragmentation

Additional exposure of the already fragmented canopy and this may reduce the overall integrity of this area of canopy PWSGF. Planting canopy species as part of the landscape will assist, albeit ~80yrs for the trees to be of comparable size to the average Spotted Gums. Large old trees, such as the Grey Gum, have only a scattered distribution and if the population drops to low there may a decrease in genetic diversity in population and subsequent weakening of the local gene pool.

8.1.2 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 works.

8.1.3 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.

8.1.4 Soil disturbance and erosion

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

8.1.5 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. Recommendations to maintain and improve water quality on site have been provided.

9 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

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

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

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

The BAM-C Credit report can be found in appendix IV.

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

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

The list of SAII entities identified by the document was accessed via;
https://www.environment.nsw.gov.au/topics/animals-and plants/biodiversity/biodiversity-offsets-scheme/serious-and-irreversible-impacts

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

Scientific Name	Common Name	Principles			
		1	2	3	4
Pittwater Spotted Gum Forest (PSGF) (PCT1214) .	Pittwater Spotted Gum Forest (PSGF) (PCT1214) .	**X**	**X**		
Chalinolobus dwyeri	Large-eared Pied Bat				**X**

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

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

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

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

The proposed development will have an approximate impact area of 0.05ha within the 15.6ha local patch of PSGF. Vegetation due to be impacted on site has been significantly altered such that the site does not reflect the natural structural attributes of PSGF as the area is used for footpath access and turfed garden. Vegetation marginally reflects attributes of the PWSG community, this is primarily due historical actions on site including; clearing, erosion, grazing and uncontrolled spread of exotic species. A majority of vegetation on site is regrowth. Exotic species are dominant across the site, current management and uses are preventing the recruitment of the original vegetation community.
Thus, the proposed development is not expected to significantly contribute to loss of PSGF due to the degraded nature of the site.

- **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). Optimal 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. Evidence of avoiding and mitigating of impacts is detailed in section 10.
The species is known to roost in caves, overhangs, cliffs and mud nests of the Fairy Martin (*Petrochelidon ariel).* None of these features were identified within the impact area. An opportunistic survey of the surrounds revealed that the site is not in close proximity to optimal roosting habitat. The species was retained and assumed present in the BAM-C as the species may occasionally visit the site to forage. The SAII threshold for SAII in the Bionet TBDC is 'Breeding habitat identified by survey'.
The impact area hosts marginal foraging habitat for microbats in the form of canopy cover and insect abundance. Trees are expected to be removed within the Accessway footprint, resulting in a further loss of marginal foraging habitat. Alterations and degradation of habitat on site pre BDAR would have caused a greater disruption to the species than the proposed development.
Foraging habitat will lost within the footprint, 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.

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

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

The proposal is expected to have a negligible impact upon PSGF as core habitat for PSGF will not be removed. The vegetation proposed for removal is in poor condition and it is unlikely that the original vegetation community would recover without assistance.
The proposal includes a potential habitat corridor along the drainage line and boundary which is to be revegetated using species selected from the PSGF planting list. Delineation of works areas and exclusion zones for all vegetation to remain have been recommended.

- **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.
Three 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).

9.1.4 Step four - Evaluate a serious and irreversible impact

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

The proposed development assessed in this BDAR is not expected to significantly contribute to loss of PSGF due to the poor condition of vegetation onsite. Vegetation is both structurally and functionally poor due to historical actions on site. The impact to PSGF vegetation will not be irreversible and post-construction bush regeneration management is recommended to ensure recovery of the impacted 0.05 ha and improve the surrounding PSGF vegetation. It is unlikely that this proposal would place PSGF at risk of extinction or cause a serious or 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 on site. The impact area hosts marginal foraging habitat for microbats in the form of canopy cover and insect abundance. Foraging habitat will lost within the dwelling footprint, however it is expected that the trees are not significantly contributing towards the long-term survival of the species, as it is considered to be marginal habitat, only to be used occasionally or opportunistically. It is expected that the proposal will not cause a disruption to the lifecycle to the Large eared pied bat (*Chalinolobus dwyeri*). Therefore, the species will not be placed at risk of a serious or irreversible impact.

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

9.2.1 Additional impact assessment provisions for threatened ecological communities at risk of an SAII

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

Measures taken to avoid and mitigate have been presented in Section 10 of this report.

2. The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including:

    a. **evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal).**

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

b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:

- **i. change in community structure**
- **ii. change in species composition**
- **iii. disruption of ecological processes**
- **iv. invasion and establishment of exotic species**
- **v. degradation of habitat, and**
- **vi. fragmentation of habitat**

The following extract provides details pertaining to the items in question 2 (b) above. NSW Threatened Species Scientific Committee, *Pittwater Spotted Gum Forest* Final Determinations.
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion is the name given to the ecological community characterised by the species assemblage listed in paragraph 2. Bioregions are as defined by Thackway and Cresswell (1995). A map of this version of the Interim Biogeographic Regionalisation of Australia is available at:
http://www.environment.nsw.gov.au/committee/ListofScientificCommitteeDeterminations.htm

The total extant area of Pittwater and Wagstaffe Spotted Gum Forest is c. 227 ha, (Bell and Stables 2012). This is equivalent to an area of occupancy of c. 88 km2 based on 2 x 2 km grid cells, the scale ecommended for assessing area of occupancy by IUCN (2010), and an extent of occurrence of c. 104 km2 (based on a minimum convex polygon, as recommended by IUCN 2010). The geographic distribution is therefore inferred to be highly restricted.

Approximately 33% of the remaining stands of the community are reserved, including c. 47 ha in Bouddi National Park and c. 3 ha in Brisbane Water National Park (Bell 2009). Thomas and Benson (1985) mapped c. 37 ha within Ku-ring-gai Chase National Park but this has not been substantiated in more recent studies. Within Pittwater local government area, c. 50 ha of the community occur in Council reserves (Bangalay Ecological & Bushfire and Eastcoast Flora Survey 2011), including Stapleton Park and McKay, Crown of Newport, and Angophora bushland reserves.

The structure of Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion was originally open-forest however, it now exists outside of reserves as woodland or remnant trees with few large stands remaining. Remnant trees may have particular ecological and genetic significance and may be important sources of propagation material for use in rehabilitation projects. The community has been extensively cleared, particularly in the Pittwater Local government area, and is threatened by further clearing for housing, bushfire mitigation and onsite wastewater disposal. The total reduction in geographic distribution of Pittwater and Wagstaffe Spotted Gum Forest

since European settlement is estimated to be c. 75% (Bell 2009, Bangalay Ecological & Bushfire and Eastcoast Flora Survey 2011, Bell and Stables 2012). The community is therefore inferred to have undergone a large reduction in geographic distribution. 'Clearing of native vegetation' is listed as a Key Threatening Process under the Threatened Species Conservation Act 1995.

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

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

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

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

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

c. evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the:

i. extent of occurrence

ii. area of occupancy, and

iii. number of threat-defined locations

note the following from the final determination:

Clause 17 Reduction in geographic distribution of ecological community
The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:
(b) a large reduction in geographic distribution.

Clause 18 Restricted geographic distribution of ecological community The ecological community's geographic distribution is estimated or inferred to be: (b) highly restricted, and the nature of its distribution makes it likely that the action of a threatening process could cause it to decline or degrade in extent or ecological function over a time span appropriate to the life cycle and habitat characteristics of the ecological community's component species.

N/a and note the following from the final determination:
The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:
(b) a large reduction in ecological function,
as indicated by any of the following:
(d) change in community structure,
(e) change in species composition,
(f) disruption of ecological processes,
(g) invasion and establishment of exotic species,
(h) degradation of habitat,
(i) fragmentation of habitat.

d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).

N/a

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

Does not indicate data is deficient.

4. In relation to the impacts from the proposal on the TEC at risk of an SAII, the assessor must include data and information on:

a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:

i. in hectares,

0.05ha

and

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

~0.002%. See section 6 and 7 for detailed impact assessment.

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

b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:

i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals

Isolated area of the TEC do not occur on site . The local patch of PWSGF is connected to surrounding TEC to the via mature canopy vegetation. Areas of native vegetation throughout the grounds and this is connected to surrounding bushland through scattered canopy trees and inconsistent structural layers.

Figure 4.3 Mapped PSGF within 500m of the construction footprint. Previously mapped PCT. PSGF pale green-blue. The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489

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

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

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

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

N/a see above.

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

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

Table 8.2. Vegetation Condition of the TEC

Veg Zone	Condition	Area	Composition score	Structure score	Function Score	VI score
1	poor	0.08	23.4	36.4	17.2	24.5

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

N/a PSGF remains at risk of SAII.

9.2.2 Additional impact assessment provisions for threatened species at risk of an SAII

1. The assessor is required to provide further information in the BDAR or BCAR for any species at risk of an SAII, including the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAII. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR or BCAR.

Actions taken to avoid and minimise have been provided in section 6 and the mitigation section.

2. The assessor must consult the TBDC and/or other sources to report on the current population of the species including:

a. evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:

i. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or

ii. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites

N/a

b. evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation)presented by:

- **i. an estimate of the species' current population size in NSW, and**
- **ii. an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and**
- **iii. where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations**

N/a

c. evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:

- **i. extent of occurrence**
- **ii. area of occupancy**
- **iii. number of threat-defined locations (geographically or ecologically distinct areas**
- **iv. in which a single threatening event may rapidly affect all species occurrences), and**
- **v. whether the species' population is likely to undergo extreme fluctuations**

N/a

d. evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:

- **i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site**
- **ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or**
- **iii. life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus)**

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

10 Prescribed Impact Assessment

The development will not significantly impact features outlined in table 9 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	Potential Threatened species or community using or dependent on feature	Section of the BAR where prescribed impact is addressed.
Karst, caves, crevices, cliffs or other geologically significant feature	No	N/A	N/A	N/A	N/A
Rocks	Yes	Landscaping rocks within the garden not in proposed development area	Negligible	N/A	N/A
Human made structure	Yes	House with no microbats living in it	Demolition of structure	Several Microbat Species	Section 8.1 and 9.1N/A
Non-native vegetation	Yes	Scattered throughout	Negligible	N/A	N/A

11 Impact Summary

11.1 Species and Ecosystem Credits

The grand total cost to offset both ecosystem credits generated by this development is $ $5131.78 (including GST) (including GST), assuming payment will be made into the Biodiversity Conservation Fund. A credit is a unit used to measure the impact of a development. Credits have a price and are traded by the Biodiversity Conservation Trust (BCT) under the Biodiversity Conservation Scheme (BOS). A credit may be created due to a number of factors including but not limited to, amount of vegetation removed, critical habitat removed and alteration of the landscape.

11.1.1 Ecosystem Credit Species derived from BAM

The development and associated works generated two ecosystem credits for the site. This is a reflection of the very poor vegetation integrity at the site. See below, Figure 10.1 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 10.1. Ecosystem credit summary from the BAM calculator.

Table 10.1. Ecosystem credit species and sensitivity to gain class

Ecosystem Credit Species	Sensitivity to Gain Class
Anthochaera Phrygia (Regent Honeyeater)	High
Artamus cyanopterus cyanopterus (Dusky Woodswallow)	Moderate
Callocephalon fimbriatum (Gang-gang Cockatoo)	Moderate
Calyptorhynchus lathami (Glossy Black Cockatoo)	High
Chthonicola sagittate (Speckled Warbler)	High
Daphoenositta chrysoptera (Varied Sitella)	Moderate
Dasyurus maculatatus (spotted-tailed Quoll)	High
Glossopsitta pusilla (Little Lorikeet)	High
Grantiella picta (Painted Honeyeater)	Moderate
Hieraaetus morphnoides (Little Eagle)	Moderate
Hirundapus caudacutus (White-throated Needletail)	High
Lathamus discolor (Swift Parrot)	Moderate
Lophoictinia isura (Square-tailed Kite)	Moderate
Melanodryas cucullate cucullate (Hooded Robin, south-eastern from)	Moderate
Melithreptus gularis gularis (Black-chinned Honeyeater, eastern subspecies)	Moderate
Micronomus norfolkensis (Eastern Coastal Free-tailed Bat)	High
Miniopterus australis (Little Bent-winged Bat)	High
Miniopterus orianae oceansis (Large Bent-winged Bat)	High
Neophema pulchella (Turquoise Parrot)	High
Ninox connivens (Barking Owl)	High
Ninox strenua (Powerful Owl)	High
Petroica boodang (Scarlet Robin)	Moderate
Petroica phoenicea (Flame Robin)	Moderate
Phascolarctos cinereus (Koala)	High
Pseudomys novaehollandiae (New Holland Mouse)	High
Pteropus poliocephalus (Grey0headed Flying Fox)	High
Saccolaimus flaventris (Yellow-bellied Shethtail-bat)	High
Tyto novaehollandiae (Masked Owl)	High
Varanus rosenbergi (Rosenberg's Goana)	High

11.1.2 Species Credit Species derived from BAM

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

In total the cost to offset the species credits generated will be $5,131.78 (including GST), assuming payment will be made into the Biodiversity Conservation Fund.

The individual credit price for each species can be seen below in figure 5.4. Species polygon was assessed as the whole of management zone 2.

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10157	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	Vulnerable	$741.31	20.6900%	$80.00	1	$974.69
						Subtotal (excl. GST)	$974.69
						GST	$97.47
						Total species credits (incl. GST)	**$1,072.16**
						Grand total	**$5,131.78**

Figure 10.2. Species credit summary from the BAM calculator.

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

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

The species credits generated in this BDAR were generated in the areas of "complete vegetation removal" and site "accessway widening". The two vegetation zones were divided into these areas as the activities within the accessway 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).

11.2 Impacts that do not need further assessment

The following impacts do not require further assessment for ecosystem credits (as per BAM Section 9.3(1-2).

Table 10.2. Impacts that do not require further assessment

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

None listed – intentionally

12 Mitigation Measures

12.1 Wildlife corridor/ Revegetation

The proposed development (extension and landscaping) is within patches of remnant vegetation. Native tree planting will assist the long-term retention of canopy.

Species plantings in landscape plan include locally native species as well as PWSG species. This will provide greater foraging and nesting habitat for native species and will deliver greater biodiversity gain outcomes than the current mid and ground story. The greatest ecological outcome is to recreate areas of of Pittwater Spotted Gum Forest (PSGF) community including native grasses and forbs.

Site boundary is being revegetated with species associated with PSGF plant community. Plate 11.1 identifies the proposed area wide locations for revegetation activities. NB: not covered int eh scope of these works. Such actions will increase biodiversity within the site and the immediate landscape.

Figure 11.1. Potential improvement to habitat corridor within the area. Near Map 2022.

NB: Spotted Gum and Grey Gum planting here would see the sustainability of the native canopy and habitat for Gliders, Koalas, Owls. Success is unlikely though given the existing residential area upslope and desire for water views. Tree planting should be encourage however as it will take 70+ years to get a tube-stock to a tree of the size the smallest of the current trees are.

12.2 Tree Protection

Tree protection will be consistent with the Tree Survey. NB: see final tree survey for details and tree numbers.

12.3 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). See Appendix II for further details. All weed management activities requiring the use of chemicals must be performed in accordance with the NSW *Pesticides Act 1999.*

12.4 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.

12.5 Vegetation clearing control measures

Prior to removing any vegetation or other habitat that has been approved for removal, the applicant must:

- Undertake a pre-clearing survey to delineate, map, and mark habitat-bearing trees and shrubs to be retained/removed and other fauna habitat features and determine the presence of any resident native fauna using nests, dreys, hollows, logs etc
- Supervise the clearance of trees and shrubs (native and exotic) and other habitat to capture, treat and/or relocate any displaced native fauna to an appropriate nearby location
- Remove sections of a tree containing a hollow or habitat prior to clearing and felling the tree.

12.6 Tree replacement ratio

Any trees removed are replaced at a ratio greater than 1:1 (for trees not covered by a biodiversity offset strategy) and considers that a tree replacement ratio of 4:1 minimum. 2 trees will be removed and 8 medium to large replacement trees will be planted.

12.7 Native seed collection

Prior to the removal of any local native vegetation from the site including PSGF seed from native trees and shrubs approved for removal is collected and it is propagated by a suitably qualified bush regenerator and used in the site plantings.

12.8 Native Species Landscaping

Landscape planting schedule includes a diversity of local provenance native species from PWSPG and other native vegetation community (or communities) that occur, or once occurred on the site. Exotic species are also included (non invasive ones). Species list from the landscape plan is included below and proposed areas.

PROPOSED PLANT SCHEDULE

KEY	BOTANICAL NAME	COMMON NAME	QTY	MATURE HEIGHT	POT SIZE
	TREES				
AF^	ACACIA FLORIBUNDA	SALLY WATTLE	2	5m	300mm
BA'	BANKSIA SERRATA	OLD MAN BANKSIA	1	5m	45Ltr
BI^	BANKSIA INTEGRIFOLIA	COAST BANKSIA	2	8m	45Ltr
CM^0	CORYMBIA MACULATA	SPOTTED GUM	1	35m	75Ltr
CP^*	CERATOPETALUM GUMMIFERUM	NSW XMAS BUSH	3	7m	300mm
CS*	CYATHEA AUSTRALIS	ROUGH TREE FERN	10	4m	200mm
DA'	DICKSONIA ANTARCTICA	SOFT TREE FERN	3	4m	200mm
DD	DRACAENA DRACO	DRAGON TREE	1	6m	100Ltr
ER^*	ELAEOCARPUS RETICULATUS	BLUEBERRY ASH	3	8m	45Ltr
GF^	GLOCHIDION FERDINANDI	CHEESE TREE	1	6m	45Ltr
LN	LAGERSTROEMIA INDICA 'NATCHEZ'	WHITE CREPE MYRTLE	1	6m	45Ltr
ML^	MELALEUCA LINARIIFOLIA	SNOW IN SUMMER	1	8m	200mm
OE	OLEA EUROPAEA	OLIVE TREE	1	6m	45Ltr
	SHRUBS				
AA'	ASPLENIUM AUSTRALASICUM	BIRDS NEST FERN	11	1m	200mm
AD'	ADENANTHOS 'SILVER STREAK'	WOOLLY BUSH	11	2m	140mm
AK	AGAVE SHARKSKIN	SHARKSKIN AGAVE	1	1m	200mm
BC^	BACKHOUSIA MYRTIFOLIA	GREY MYRTLE	6	3m	45Ltr
BE^	BANKSIA ERICIFOLIA	HEATH BANKSIA	3	3m	45Ltr
BR^	BANKSIA ROBUR	SWAMP BANKSIA	3	3m	200mm
CA*	CORREA ALBA	WHITE CORREA	12	1.5m	200mm
CU	CRASSULA 'BLUE BIRD'	BLUE BIRD JADE PLANT	10	0.7m	200mm
CC^	CALLISTEMON CITRINUS	CRIMSON BOTTLEBRUSH	1	3m	200mm
CY*	CHRYSOCEPHALUM APICULATUM	YELLOW BUTTONS	36	0.3m	140mm
DT^0	DODONAEA TRIQUETRA	COMMON HOP-BUSH	2	3m	200mm
EM^	ERIOSTEMON AUSTRALSIUS	PINK WAX FLOWER	10	2m	200mm
EW	EUPHORBIA WULFENII	MILKWEED SPURGE	11	1m	200mm
GL*	GREVILLEA LINEARIFOLIA	WHITE SPIDER FLOWER	5	3.0m	200mm
HA^0	HAKEA SERICEA	MOUNTAIN HAKEA	1	4.5m	200mm
KC	KALANCHOE 'COPPER SPOONS'	COPPER SPOONS	7	0.6m	140mm
KS	KALANCHOE 'SILVER SPOONS'	SILVER SPOONS	3	0.6m	140mm
LP'	LEPTOSPERMUM LAEVIGATUM 'FORESHORE'	DWARF COASTAL TEA-TREE	18	0.5m	200mm
ML^	MELALEUCA LINARIIFOLIA	SNOW IN SUMMER	1	8m	200mm
ME'	MELALEUCA LINARIIFOLIA 'CLARET TOPS'	CLARET TOPS	5	1.2m	200mm
MC^*	MACROZAMIA COMMUNIS	MACROZAMIA	15	1.0m	200mm
OP	OPUNTIA FICUS-INDICA 'BURBANK SPINELESS'	MICKEY MOUSE CACTUS	1	2m	200mm
PE^	PERSOONIA LINEARIS	NARROW-LEAVED GEEBUNG	4	3m	200mm
PI^	PIMELIA LINIFOLIA	RICE FLOWER	15	1.5m	140mm
PF^0	PULTENAEA FLEXILIS	GRACEFUL BUSH PEA	4	3m	200mm
SA	SEDUM 'AUTUMN JOY'	AUTUMN JOY	6	0.7m	140mm
SB	SALVIA 'SANTA BARBARA'	SALVIA	3	0.8m	200mm
SR'	SYZYGIUM AUSTRALE 'RESILIENCE'	RESILIENCE	10	5m	300mm
WF^*	WESTRINGIA FRUTICOSA	COASTAL ROSEMARY	11	1.5m	200mm
WG'	WESTRINGIA 'GREY BOX'	GREY BOX	11	0.5m	200mm
XA^*	XANTHORRHOEA MACRONEMA	GRASS TREE	3	3m	45Ltr
ZF	ZAMIA FURFURACEA	CARDBOARD PLANT	2	1m	200mm
	GRASSES / GROUND COVERS				
BS'	BLECHNUM GIBBUM 'SILVER LADY'	SILVER LADY FERN	14	1m	200mm
CG^	CARPOBROTUS GLAUCESCENS	PIG FACE	8	0.2m	140mm
CH^	CISSUS HYPOGLAUCA	KANGAROO VINE	18	-	140mm
CI'	CASUARINA GLAUCA 'COUSIN IT'	COUSIN IT	13	0.5m	140mm
DO^	DOODIA CAUDATA	RASP FERN	21	0.3m	140mm
DC^0*	DIANELLA CAERULEA	BLUE FLAX LILY	26	0.6m	140mm
DS'	DICHONDRA ARGENTEA 'SILVER FALLS'	SILVER FALLS	10	0.3m	140mm
FN^*	FICINIA NODOSA	KNOBBY CLUBRUSH	31	0.6m	140mm
HV*	HARDENBERGIA VIOLACEA	PURPLE CORAL PEA	14	0.2m	140mm
HS^	HIBBERTIA SCANDENS	CLIMBING GUINEA FLOWER	13	0.3	140mm
IC^	IMPERATA CYLINDRICA	BLADY GRASS	31	0.7	140mm
KR^	KENNEDIA RUBICUNDA	DUSKY CORAL PEA	5	0.3	140mm
LL^0*	LOMANDRA LONGIFOLIA	SPINY-HEADED MAT-RUSH	26	1m	140mm
MG	MISCANTHUS 'GRACILLIMUS'	FEATHER GRASS	10	2m	140mm
MH	MISCANTHUS 'HIAWATHA'	HIAWATHA FEATHER GRASS	4	2m	140mm
PK'	POA LABILLARDIERI 'ESKDALE'	ESKDALE	29	0.7m	140mm
SS	SENECIO SERPENS	BLUE CHALK STALKS	16	0.2m	140mm
TA^0	THEMEDA AUSTRALIS	KANGAROO GRASS	56	0.4m	140mm
VH*	VIOLA HEDERACEA	NATIVE VIOLET	72	0.1m	tubes

^ Denotes species selected from Pittwater Spotted Gum Forest threatened ecological plant community - (PSGF).
^0 Denotes species selected from Northern Beaches Council Native Plant Species Guide - Pittwater Ward - (NBNP).
* Denotes species selected from Shale Slopes plant communities as found within 'Native plants for your garden' publication (NBSS).
' Denotes native plant or cultivar.

Total plants:	689	(100%)
Native plants - PSGF:	179	(25.98%)
Native plants - NBNP:	148	(21.48%)
Native plants - NPSS:	149	(21.63%)
Other native plant/cultivar:	136	(19.74%)
Total locally native plants:	476	(69.09%)
Total native plants:	612	(88.82%)
Exotic plants:	77	(11.18%)

12.9 Replacement and installation of nest boxes

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

- provide details on the size, type, number, and location of nest boxes required – this would be based on the results of the pre-clearing survey
- install a minimum of 4 microbat boxes in the trees being retained
- install replacement nest boxes prior to any vegetation removal (preferably one month prior), to provide alternate habitat for hollow-dependent fauna displaced during clearing
- salvage and relocate the tree hollows approved for removal to appropriate locations on the same day the tree hollows are removed and prior to the release of any native fauna found using the tree hollows
- install other habitat features such as logs and bee hotels.

Image from: nestboxes.com.au

12.10 Monitoring of nest boxes

The installation and monitoring of the nest boxes would provide a great fauna habitat opportunity. Monitoring of the nest boxes should create as little disturbance as possible to the native fauna using the boxes.

It is recommended to prepares and implements a nest box monitoring program and a condition of consent is included to this effect and the program includes details on:

- the number of nest boxes to be monitored
- the GPS locations of the nest boxes
- the characteristics of all nest boxes to be monitored / the native fauna species that the boxes are designed for
- the duration and frequency of monitoring
- how the nest boxes are to be monitored (e.g., visual checks, installation of wildlife cameras which are motion activated)

The reporting program:

- nest box installation details (date installed, direction the box entrance faces, height above ground)
- the time of year, date and time that boxes are checked
- what was found in the nest box – the species and the number of individuals
- occupancy rates
- frequency of use
- pattern and timing of use
- maintenance needs

12.11 Reuse removed trees and hollows

The project will salvage and reuses any existing logs on the ground and native trees that are to be removed including hollows and tree trunks (greater than approximately 25-30cm in diameter and 2-3m in length)

and root balls are placed on the ground within the areas on-site that are to be replanted with local native species.

if the SSD project is not able to reuse all removed native trees, a condition of consent is included that the proponent consults with the local community restoration/rehabilitation groups, Landcare groups, and relevant public authorities including local councils, and Greater Sydney Local Land Services prior to any clearing commencing to determine if the removed trees can be re-used by others in habitat enhancement and rehabilitation work. This detail including consultation with the community groups and their responses should be documented.

12.12 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 the drainage channel. It is recommended that Bushland Hygiene Protocols be followed closely.

Table 11.1. Mitigation Measures and Responsibilities

Mitigation Measure	Stage	Frequency	Responsible
Tree Replacement Ratio	Post Construction	Initial planting with subsequent replacement planting for failed trees	/ Project Landscaper
Native Species Landscaping	Pre- construction phase Construction phase Post construction (ongoing)	Ongoing	/ Project Landscaper
Weed management	Pre- construction phase Construction phase Post construction (ongoing)	Weekly during active construction and monthly ongoing	Project ecologist/bush regenerator
Delineation of work areas	Pre- construction phase Construction phase	Installed during pre-construction	Site Supervisor/project ecologist
Tree protection	Pre- construction phase Construction phase	Installed during pre-construction	Project Arborist/ Project Ecologist
Native seed collection and propagation	Pre- construction phase	During clearing or at the discretion of the project ecologist	Project Ecologist/ bush regenerator
Replacement and installation of nest boxes	Pre- construction phase	Installed once and replaced every 5 years	Project Ecologist/
Nest box monitoring	Post construction phase (ongoing)	Annually	

Mitigation Measure	Stage	Frequency	Responsible
Reuse removed trees and hollows	During habitat removal phase	Once	Project Landscaper/
Pathogen prevention	Pre- construction phase Construction phase Post construction (ongoing)	Ongoing throughout each phase	Site Supervisor/ Project Ecologist/ bush regenerator

13 Conclusions

The proposed development will have an approximate impact area of 0.02 ha on Pittwater Spotted Gum Forest (PSGF) (PCT1214) a conservative area of 0.05ha was used in calculations. Vegetation onsite has been significantly altered such that the site does not reflect the natural structural attributes of PSGF.

The total cost to offset both ecosystem credits and species credits generated by this development is $5131.78 (including GST) assuming payment will be made into the Biodiversity Conservation Fund.

Using native species, as per the landscape plan (2022) will assist in bringing back locally native plant species and increase diversity. Species chosen will provide good habitat for pollinators and other native insects and food for microbats and Powerful Owl prey habitat.

14 Appendices

14.1 Appendix I – Rationale for Likelihood of Occurrence

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

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

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

Table 13.1. Potential Species Credit Species generated by the BAM-C, all the following species were candidate threatened species for the site. All BAM-C predicated species were retained.

Scientific Name	Common Name	Habitat/ Geographic Constraints	Retained in BAM Calculator	Reason for Inclusion or Removal
Flora				
Diuris bracteata	*Diuris bracteata*	For over 100 years *Diuris bracteata* was known only from the original collection made near Gladesville in northern Sydney. The complete absence of records for most of the 20th Century resulted in this species being listed as 'presumed extinct' on Part 4 of Schedule 1 of the Threatened Species Conservation Act 1995. This listing status was updated in 2005 to Endangered under the Act after several specimens were found in the Sydney Basin (Duffy's Forest, Mount White and Kulnura).	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded from its original state. A dense coverage of exotic weeds is prohibiting growth of native

		In recent years, however, these specimens are considered to have been incorrectly identified and are considered to be *Diuris platichila* (Peter Weston May 2013). The species is considered to be extinct, though the listing status under the *Biodiversity Conservation Act 2016* does not yet reflect this status.		vegetation. Further decreasing the chances of the species being present within the site boundaries. The species was not recorded during site surveys and no recording on Bionet within 10 Km radius. Species is not present and is unlikely to be present on the subject land. No further assessment required.
Rhodamnia rubescens	Scrub Turpentine	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m above sea level in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	No	Likelihood of occurrence for the species is moderate. The habitat and area are suitable and the nearest record is 300m away. Direct observation showed none of these plants on site or immediate neighbours. The species was not recorded during site surveys. Species is not present and is unlikely to be present on the subject land. No further assessment required.
Genoplesium baueri	Bauer's Midge Orchid	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded from its original state. A dense coverage of exotic grasses is prohibiting growth of native

		reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.		vegetation. Further decreasing the chances of the species being present within the site boundaries. The species was not recorded during site surveys. Species is not present and is unlikely to be present on the subject land. No further assessment required.
Hygrocybe aurantipes	*Hygrocybe aurantipes*	Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August	No	Likelihood of occurrence for the species is low. Habitat is substantially degraded such that the species is unlikely to utilise area. Areas of suitable habitat are not present within the site boundaries as the site has been significantly altered and degraded from its original state. A dense coverage of exotic grasses is prohibiting growth of native vegetation. Further decreasing the chances of the species being present within the site boundaries. The species was not recorded during site surveys. Species is not present and is unlikely to be present on the subject land. No further assessment required.
Fauna				
Chalinolobus dwyeri	Large-eared Pied Bat	Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-	Foraging – Yes, non accessible Breeding – No	There is a low likelihood of occurrence for the species. Previously recorded sightings on Bionet atlas have been sighted within 10km's of the site. The

		elevation dry open forest and woodland close to these features.		site presents marginal habitat for the species in the form of foraging opportunities from eucalyptus and other flowering natives. No hollows recorded on site. Species utilise cracks and caves in cliff faces for roosting habitat. Areas with these features are known to exist within the Pittwater, however the species has not been previously recorded on Scotland Island. It is likely the species is inhibited from the potential foraging habitat due to the surrounding bay. The proposed development is not considered to impact Large-eared Pied Bat. No further assessment 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 ˆ. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*. Return to home foraging sites on a cyclic basis depending on food availability.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents marginal foraging habitat for the species in the form of canopy vegetation. The development site does not contain areas of important breeding habitat for the species, as per the DPIE BV map. Habitat constraints in BAM-C are based on this BV map and as such, Habitat constraints are N/A. Species not recorded during site survey. No further

				assessment or consideration is required.
Miniopterus australis	Little Bent-winged Bat	Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats (*M. schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents foraging habitat for the species. The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints including; Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding, as per the BAM-C. No further assessment or consideration is required.
Miniopterus orianae oceanensis	Large Bent-winged Bat	Primarily roosts in caves but will utilise mine shafts, storm-water tunnels, buildings and other man-made structures. Forms colonies within a maternity cave and disperse within a 300km range. Forage in forested areas in the tree canopy.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents foraging habitat for the species. The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints including; Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding, as per the BAM-C.

				No further assessment or consideration is required.
Anthochaera phrygia	Regent Honeyeater	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. This species has been seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests.	Foraging – Yes Breeding - No	There is a moderate likelihood of occurrence. It is expected that the species may use the site for foraging and thus the species was retained as a Predicted threatened species (Ecosystem credits) in the BAM-C. The site presents marginal foraging habitat for the species in the form of canopy vegetation. The development site does not contain areas of important breeding habitat for the species, as per the DPIE BV map. Habitat constraints in BAM-C are based on this BV map and as such, Habitat constraints are N/A. Species not recorded during site survey. No further assessment or consideration is required.

14.2 Appendix II – Species Polygon

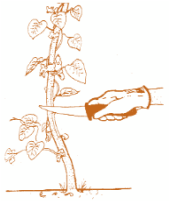
Figure 13.1 Shows the Large-eared Pied Bat and Pittwater Wagstaff Spotted Gum Forest Offset Polygon

Figure 13.1 Pink (500m^2) Large-eared Pied Bat and Pittwater Wagstaff Spotted Gum Forest Offset Polygon

14.3 Appendix II– Key Weed Removal Methods

Physical removal

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

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

Technique	Method	Equipment
Spot Spraying	Spot spraying involves spraying non-seeding annuals and grasses, and for regrowth of weeds once an area has been cleared or brushcut. Works to be carried out by a contractor with a current herbicide license. Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.	Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and all other required P.P.E.

Flame Weeding

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

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

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

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

Images provided by Dragonfly Environmental

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

14.4 Appendix IV– Bushland Hygiene Protocols for Phytophthora

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

Kit should contain: 1 bucket, 1 scrubbing brush, 1 spray bottle (metho 70% solution), 1 bottle tap water, 1 bottle methylated spirits.

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.

14.5 Appendix V – BAM-C Credit Reports

14.5.1 Payment Report.

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00034688/BAAS19008/22/00034689		0	25/08/2022

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Geraldene Susan Dalby-Ball	BAAS19008	30 Herbert Avenue Newport	Finalised

Assessment Type	Date Finalised	BOS entry trigger
Part 4 Developments (Small Area)	12/08/2022	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

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

NSW GOVERNMENT

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

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

Assessment Id
00034688/BAAS19008/22/00034689

Proposal Name
30 Herbert Avenue Newport

Page 2 of 3

NSW GOVERNMENT

Biodiversity payment summary report

	GST	$97.47
Total species credits (incl. GST)		$1,072.16
	Grand total	$5,131.78

Assessment Id	Proposal Name	Page 3 of 3
00034688/BAAS19008/22/00034689	30 Herbert Avenue Newport	

14.5.2 Credit Summary Report.

NSW GOVERNMENT

BAM Credit Summary Report

Proposal Details

Assessment Id 00034688/BAAS19008/22/00034689	Proposal Name 30 Herbert Avenue Newport	BAM data last updated * 16/06/2022
Assessor Name Geraldene Susan Dalby-Ball	Report Created 25/08/2022	BAM Data version * 54
Assessor Number BAAS19008	BAM Case Status Finalised	Date Finalised 12/08/2022
Assessment Revision 0	Assessment Type Part 4 Developments (Small Area)	BOS entry trigger BOS Threshold: Biodiversity Values Map

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

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

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

NSW GOVERNMENT

BAM Credit Summary Report

Pittwater Spotted Gum forest											
1	1214_Poor	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	23	23.0	0.07	Geographic Distribution	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	True	1
											Subtotal	**1**
											Total	**1**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
1214_Poor	23.0	23.0	0.07	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	True	1
								Subtotal	**1**

Assessment Id
00034688/BAAS19008/22/00034689

Proposal Name
30 Herbert Avenue Newport

14.5.3 Predicted species report.

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00034688/BAAS19008/22/00034689	30 Herbert Avenue Newport	16/06/2022
Assessor Name	Report Created	BAM Data version *
Geraldene Susan Dalby-Ball	25/08/2022	54
Assessor Number	Assessment Type	BAM Case Status
BAAS19008	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
0	BOS Threshold: Biodiversity Values Map	12/08/2022

* 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
Large Bent-winged Bat	Miniopterus orianae oceanensis	1214-Pittwater Spotted Gum forest
Little Bent-winged Bat	Miniopterus australis	1214-Pittwater Spotted Gum forest
Little Eagle	Hieraaetus morphnoides	1214-Pittwater Spotted Gum forest

BAM Predicted Species Report

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

14.5.4 Candidate species report

BAM Candidate Species Report

Proposal Details

Assessment Id 00034688/BAAS19008/22/00034689	Proposal Name 30 Herbert Avenue Newport	BAM data last updated * 16/06/2022
Assessor Name Geraldene Susan Dalby-Ball	Report Created 25/08/2022	BAM Data version * 54
Assessor Number BAAS19008	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 12/08/2022	BOS entry trigger BOS Threshold: Biodiversity Values Map

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

List of Species Requiring Survey

Name	Presence	Survey Months
Chalinolobus dwyeri Large-eared Pied Bat	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☑ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

BAM Candidate Species Report

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

14.5.5 Biodiversity Credit Report (Like for Like)

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00034688/BAAS19008/22/00034689	Proposal Name 30 Herbert Avenue Newport	BAM data last updated * 16/06/2022
Assessor Name Geraldene Susan Dalby-Ball	Assessor Number BAAS19008	BAM Data version * 54
Proponent Names Sean Herrington	Report Created 25/08/2022	BAM Case Status Finalised
Assessment Revision 0	Assessment Type Part 4 Developments (Small Area)	Date Finalised 12/08/2022
BOS entry trigger BOS Threshold: Biodiversity Values Map	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	Endangered Ecological Community	1214-Pittwater Spotted Gum forest

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

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

NSW GOVERNMENT

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_Poor	No	1	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Chalinolobus dwyeri / Large-eared Pied Bat	**1214_Poor**	0.1	1.00

Credit Retirement Options

Like-for-like credit retirement options

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

NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

Assessment Id	Proposal Name	Page 4 of 4
00034688/BAAS19008/22/00034689	30 Herbert Avenue Newport	

14.6 Appendix V– EPBC Act Considerations

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

Survey effort.
The author of the report is very familiar with the site and the surrounding areas having been here over 45 years. This includes a time when koalas were common to the more recent time with no confirmed sightings in this area for 20 years.

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

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

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Lead to a long-term decrease in the size of an important population of a species
There is a very low likelihood of occurrence for the species. It is unlikely that the species would occur on site due to the degraded nature of vegetation and habitat. No individuals (nor an important population) would be expected to occur on site. The site has been significantly altered such that it does not reflect natural attributes of the original vegetation community. Therefore, the proposal is unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population
The species or an important population of the species is unlikely to occur on site due to habitat degradation. Vegetation surveys revealed a low abundance of koala use trees within the impact area. As such the area is unlikely to be occupied by the Koala and the proposal is unlikely to reduce the area of occupancy of an important population.

Fragment an existing important population into two or more populations.

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

Adversely affect habitat critical to the survival of a species.

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

Conclusion

The proposal is unlikely to have a significant impact on the Koala or areas of critical habitat for the species. The *Koala habitat assessment tool* (DotE; 2014 and updates of July 2022 BAM assessing).

14.7 Appendix VI – BDAR Requirements Compliance

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
Report section	**Information**	**Present**
Introduction	Introduction to the biodiversity assessment including: brief description of proposed development identification of subject land boundary, including: - operational footprint - construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	Section 1
	General description of the subject land	Section 1.1
	Sources of information used in the assessment, including reports and spatial data	Section 1.4
	Identification of the assessment method applied (i.e. linear or site based)	Section 1.6
	Map of the subject land boundary showing final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	Section 1
Landscape	Identification of site context components and landscape features at the proposed site, including: general description of subject land topographic and hydrological setting, geology and soils	Section 2
	percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2(4.)	Table 2.1
	IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Table 2.1
	Other relevant landscape features which may include: Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3–4.) and Appendix E)	Table 2.1
	wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(4.))	Table 2.1
	connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Table 2.1
	areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(10.)	Table 2.1
	areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.)) MAPS and TABLES (in document	Table 2.1

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
	Site Map boundary of subject land cadastre of subject land landscape features identified in BAM Subsection 3.1.3 areas of outstanding biodiversity value within the subject land	Figure 1.2.
	Location Map digital aerial photography at 1:1,000 scale or finer boundary of subject land 1500 m buffer area or 500 m buffer for linear development landscape features identified in BAM Subsection 3.1.3 additional detail (e.g. local government area boundaries) relevant at this scale areas of outstanding biodiversity value within the assessment area	Figure 2.1
	Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location map include: IBRA bioregions and subregions rivers, streams and estuaries wetlands and important wetlands connectivity of different areas of habitat areas of geological significance and soil hazard features	Figure 2.2
	All report maps as separate jpeg files Individual digital shape files of: subject land boundary assessment area (i.e. buffer area) boundary cadastral boundary of subject land areas of native vegetation cover areas of habitat connectivity	Available
Native vegetation, TECs and	Patch size (in accordance with BAM Subsection 4.3.2)	Section 3.1.1
	Identification of the dominant PCT on the subject land and extent (ha) with justification of method used (existing information or plot-based survey data)	Section 3.1.1

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
vegetation integrity	Identification of any TEC associated with the PCT (BAM Subsection 4.2.2)	Section 3.1.1 and table 3.1
	Estimate of percent cleared value of dominant PCT (BAM Subsection 4.2.1(5.)	Table 3.1
	Identification of any TEC on site that is not associated with the dominant PCT (Note: This TEC is required to be assessed and offset.)	Table 3.1
	Equivalence with mapping units of previous vegetation maps reviewed as part of the assessment (i.e. equivalent mapping units)	Section 3.1
	Vegetation integrity of the PCT(s) on the subject land as individual vegetation zones	Table 5.1
	Justification for how this was determined (i.e. qualitatively by observing values for the condition attributes set out in Table 2 of the BAM or quantitatively by collecting field data for the condition attributes at a plot in accordance with BAM Subsection 4.3.4)	Section 5.1
	Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsections 4.3.3(5.))	Section 5.1
	Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A) identify the PCT or vegetation class for which local benchmark data will be applied identify published sources of local benchmark data (if benchmarks obtained from published sources) describe methods of local benchmark data collection (if reference plots used to determine local benchmark data) provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	BioNet Vegetation Classification benchmark values used.
	Map of native vegetation extent for the subject land (as described in BAM Section 3.1) Map of PCT/vegetation zones within the subject land (as described in BAM Section 4.2(1.) Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries Map of TEC distribution on the subject land Patch size of native vegetation (as described in BAM Subsection 4.3.2)	Figures 3.1, 3.2, 3.3, 3.5. Tables 5.1
	Table of current vegetation integrity scores for vegetation zone within the site including: composition condition score structure condition score function condition score	Tables 5.1, 5.2

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
	Report from BAM-C (Small area module) including vegetation integrity scores (BAM Section 4.4)	
	All report maps as separate jpeg files Plot field data (MS Excel format) Digital shape files for all maps and spatial data Field data sheets (if relevant) for determining vegetation integrity (BAM Subsection 4.3.4)	To be provided to client
Habitat suitability for threatened species	Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land	Section 4
	Determination of the suite of threatened species likely to occur on or use the proposed site according to Steps 1 and 2 in BAM Section 5.2 including species to be assessed for ecosystem credits and the list of species to be assessed for species credits	Tables 4.1, 4.2, 4.3.
	List of ecosystem credit species derived from the TBDC (as described in BAM Subsections 5.2.1 and 5.2.2) with justification for the exclusion of any ecosystem credit species based on habitat constraints (as described in BAM Subsection 5.2.2)	Appendix I - Rationale for likelihood of occurrence
	Identification of candidate species credit species that are at risk of an SAII and therefore, must be further assessed (BAM Section 9.1) Note: Candidate species credit species that are not at risk of an SAII and not incidentally recorded on the subject land do not require further assessment. For candidate species credit species that are at risk of an SAII, a description of the species, any habitat constraints or microhabitats associated with the species on the subject land and information used to create the species polygon/s in accordance with Steps 3 to 5 of BAM Section 5.2 including: justification for determining that a candidate species credit species at risk of an SAII is unlikely to have suitable habitat on the subject land or specific vegetation zone (based on a field assessment of the subject land and published literature or an expert report prepared in accordance with Box 3 of the BAM)	Section 8
	determination of the presence of remaining candidate species credit species at risk of an SAII (by assuming presence, conducting a threatened species survey or an expert report). Note: If the subject land is mapped on an important habitat map for a species, or for a component of its habitat, the subject land is considered to have suitable habitat for the species to be present.	Section 8
	species polygons identifying the location and area of suitable habitat for each candidate threatened species at risk of an SAII that is recorded on the subject land and is measured by area, OR	Appendix VII

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
	species polygons identifying the area of suitable habitat and targeted surveys identifying the count and location of individuals on the subject land for each candidate threatened flora species at risk of an SAII that is recorded on the subject land and is measured by count	n/a no threatened flora species expected to occur on site.
	species polygons for each threatened species identified on the subject land that is not at risk of an SAII (i.e. incidentally observed during site visit) Biodiversity Assessment Method 140 Report section BAM ref. Information Maps & tables (in document) Data (to be supplied)	n/a no threatened species observed during site visit.
	Determination of habitat condition within species polygon/s for each threatened species (measured by area) at risk of an SAII or incidentally observed during the site visit (Step 6 of BAM Section 5.2)	Appendix VII
	For flora species credit species at risk of an SAII or incidentally observed during site visit, provide a count, or an estimation, of the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(4.))	n/a no threatened flora species expected to occur within the site
	Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and:	Table 5.3
	identifying any ecosystem credit species removed from the list of species on the basis of further assessment in accordance with BAM Subsections 5.2.2 and 5.2.3	All ecosystem credit species retained
	identifying the sensitivity to gain class of each species (BAM Section 5.4)	Table 5.3
	Table detailing species credit species within the subject land at risk of an SAII (BAM Section 9.1) or incidentally observed during the site visit including any associated habitat feature/components and its abundance (flora)/extent of habitat (flora and fauna) and biodiversity risk weighting (BAM Sections 5.2–5.4)	Section 5.2.2, Figure 5.2
	Map of species credit species records within the subject land and species polygons for flora and fauna species at risk of an SAII or incidentally observed during the site visit (as described in BAM Subsection 5.2.5(1–7.))	Included in SAII section
	Digital shape files of species polygons Species polygon map in jpeg format Expert reports and any supporting data used to support conclusions of the expert report Field data sheets (if relevant) for threatened species surveys	To be provided
	Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	Section 9

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
Prescribed impacts	If relevant, maps showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, humanmade structures, etc.)	Table 8 None present so no map
	If relevant, digital shape files of prescribed impact feature locations Prescribed impact features map in jpeg format	Not relevant.
Avoid and minimise impacts	Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology alternative locations that would avoid or minimise impacts on biodiversity values and juSTIFication for selecting the proposed location alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Subsections 7.1.2 and 7.2.2 Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.)	Section 10
	Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility Map of final proposal footprint, including construction and operation Maps demonstrating indirect impact zones where applicable	Table 11
	Digital shape files of: final proposal footprint direct and indirect impact zones Maps in jpeg format	Available
Assessment of Impacts	Determine the impacts on native vegetation and threatened species habitat, including: description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Sections 8.1) description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal (as described in BAM Subsection 8.2	Section 6, 7
	Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	Section 9

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
	Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 5.1
Mitigation and Management of Impacts	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Subsections 8.4.1 and 8.4.2, including (as described in BAM Subsection 8.4.1(2.): techniques, timing, frequency and responsibility identify measures for which there is risk of failure evaluate the risk and consequence of any residual impacts document any adaptive management strategy proposed mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	Section 11.
	Identification of measures for mitigating impacts related to: displacement of resident fauna (as described in BAM Subsection 8.4.1) indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	Section 11
	Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	Section 11
	Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 11
Thresholds for assessing and offsetting the impacts of the proposal	Information from the TBDC and/or other sources to report on the current status of threatened species, threatened populations at risk of an SAII and TEC/s for the proposal, and	Section 8
	Report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1	Section 8
	Report on impacts of the proposal on threatened species and/or threatened populations at risk of an SAII in accordance with BAM Section 9.1	Section 8
	Identification of impacts requiring offset in accordance with BAM Section 9.2	Section 12
	Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Section 12
	Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 12
	Map showing the extent of TECs at risk of an SAII within the subject land Map showing the location of threatened species at risk of an SAII within the subject land Map showing location of: impacts requiring offset impacts not requiring offset	Figure 3.2 figure 13.2

Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area		
	areas not requiring assessment	
	Digital shape files of: extent of TECs at risk of an SAII within the subject land threatened species at risk of an SAII within the subject land boundary of impacts requiring offset boundary of impacts not requiring offset boundary of areas not requiring assessment Maps in jpeg format	Available
Applying the no net loss standard	Description of the impact on PCTs/TECs	Section 8
	Description of the impact on threatened species at risk of an SAII or incidentally observed via site visit	Section 8
	Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9	Section 5.2, Appendix IV
	Number of species credits required for impacts on biodiversity values according to BAM Subsection 10.1.3, including any species credit species that has been incidentally observed on the subject land	Section 5.2, Appendix IV
	Note: Species credits for any species at risk of an SAII are calculated in the event that the decision-maker forms the opinion that the proposed impact is unlikely to be serious and irreversible and therefore can be offset. Identification of credit class for ecosystem credits and species credits according to BAM Section 10.2 (this can be generated from BAM-C)	Appendix IV
	Table showing biodiversity risk weightings	Appendix IV
	Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1)	Appendix IV
	Table of BC Act listing status for PCTs and threatened species requiring offset	Appendix IV
	Table of species at risk of an SAII or incidentally observed on site assessed for species credits and the number of credits required	Appendix IV
	BAM-C credit report	Appendix IV

15 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