

# Biodiversity Development Assessment Report

12A John St, Avalon Beach

*Prepared by Ecological Consultants Australia TA  
Kingfisher Urban Ecology and Wetlands*

**December 2023**







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

## Document control

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1	2 <sup>nd</sup> November 2021	E. Dalby-Ball, J. Hastings	Final for DA submission	Tim West
2	1 <sup>st</sup> December 2023	E. Dalby-Ball, B. Thompson	Final for DA resubmission	Tim West

## Declarations

### i. Certification under clause 6.15 Biodiversity Conservation Act 2016

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

Signature:

Date: December 2023

BAM Assessor Accreditation no: BAAS17054

This BDAR has been prepared to meet the requirements of BAM 2020. Appendix IX provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix K.

## Executive summary

Ecological Consultants Australia trading as Kingfisher Urban Ecology and Wetlands has been commissioned by THW Architects to prepare a **Biodiversity Development Assessment Report** (BDAR) to accompany a development application for the construction of two dwelling houses at 12 A John St, Avalon Beach.

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

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

### Reason for entering the BOS

Clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the Biodiversity Values Map.

### Introduction

- The property has direct interface with Careel Creek which contains estuarine habitat including mangroves.
- The native canopy trees clustered within the north-eastern portion of the site are mapped as PCT 4027-Estuarine Swamp Oak-Mangrove Forest.
- The site has no buildings. The site contained some planted exotic/non-local native trees and mown lawn/exotic garden and native canopy trees.

### Methods

- On-ground survey took place in Feb 2019, May 2019, Dec 2019, Mar 2020, Oct 2020, Jan 2021 and Sep 2023 by Senior Ecologist Geraldene Dalby-Ball and Ecologist Tina Feodoroff (2019 surveys).
- 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 10 km radius around the site.
- A single BAM plot was placed in the rear of the property in an area of native canopy. It is noted that the land is not bushland, and the gardens are landscaped, and the quadrat could not fulfill the BAM guidelines of being in a relatively 'undisturbed' area.

### Results

- The footprint of the proposed dwelling covers approximately two thirds of the site with the easterly end of the site adjacent to the creek being retained as a riparian zone.
- The site is adjacent to the Threatened Ecological Community – *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions*.
- The ratio of tree replacement recommended is in excess of 10:1. Trees can be planted on and off-site.
- Installation of three nest boxes to encourage native wildlife into the site is required (two microbat boxes and one rosella box).



- It is recommended that rather than requiring payment to the Trust that a condition be placed to revegetate the riparian zone along Careel Creek both within the property and between the property boundary and the top of the Careel Creek bank. A separate Riparian Plan and Coastal Impact Assessment (Kingfisher 2023) has been completed and includes details of the recommended works. Flora species from PCT 4027 have been prioritised for planting within the riparian zone. The works would be in excess of the \$13,805.90 and would see the local Careel Creek environment improved.

### **Mitigation Measures**

#### **Before works:**

- Tree protection as per the Arboricultural Impact Appraisal and Method Statement by Naturally Trees (Rev C).
- Mark out the riparian zone with bunting and signage to ensure only riparian creation works are conducted in this area.
- Order all plants for riparian planting (as soon as DA is approved).
- Effective site management to ensure sediment doesn't enter the waterway.
- Installation of the three nest boxes in trees to be retained.

#### **During works:**

- Protect all trees to be retained as per Arboricultural Impact Appraisal and Method Statement by Naturally Trees (Rev C).
- Bush hygiene protocols to be followed to prevent the spread of pathogens including *Phytophthora*.
- Implement riparian zone rehabilitation and creation as per the Riparian Plan and Coastal Impact Assessment (Kingfisher 2023).
- Implement the Landscape Plan as this applies to land outside the riparian zone.
- Implement recommendations of the Coastal Management Plan (Cardno 2020) and ensure the existing retaining wall is established with native vegetation to assist ecological integrity.

#### **After completion of works:**

- Maintain riparian land rehabilitation and continue to plant species from PCT 4027.
- Management of the interface with Careel Creek to reduce sediment build-up and improve bank stability and water quality.
- The property owner will purchase *S. paniculatum* (certified as being from local stock – at Bangalay Headland) as soon as they are available and plant these (at least three) on the property. These will be grown by Indigo Nursery and could be conditioned for planting pre-OC.

### **Conclusions and Recommendations**

- Riparian zone to be revegetated with Swamp Oak Floodplain Forest community.
- The riparian planting can be created as an offset (optional) for the funds to be paid into the Biodiversity Conservation Trust.
- Exotic species are to be replaced with native species from PCT 4027 and other locally native species as per the Riparian Plan and Coastal Impact Assessment (Kingfisher 2023).

- Arboricultural Impact Appraisal and Method Statement by Naturally Trees (Rev C) recommendations to be applied.
- The property boundary with the creek can be improved by installing a living (planted) low (same as existing) retainer wall. The native vegetation will assist in stabilizing this boundary with the development site and the interface will assist ecological integrity.

Table E1 Impacts that require an offset – ecosystem credits

Vegetation zone	PCT	TEC/EC	Impact area (ha)	Number of ecosystem credits required
1	4027	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.08	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	<i>Chalinolobus dwyeri</i>	0.08	1

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## Stage 1: Biodiversity Assessment

### 1 Introduction

#### 1.1 Proposed development

##### 1.1.1 Development overview

Ecological Consultants Australia trading as Kingfisher Urban Ecology and Wetlands has been commissioned by THW Architects to prepare a **Biodiversity Development Assessment Report** (BDAR) to accompany a development application for the construction of two dwelling houses at 12A John St, Avalon Beach.

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

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

It should be noted that the development application (DA2021/0420) for the subdivision of one lot into two lots at 12A John St, Avalon Beach was approved by Northern Beaches Council on the 12<sup>th</sup> of April 2022.

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

##### 1.1.2 Location

The site which is the subject of this report is Lot 2 in DP 1237357 known as 12A John Street, Avalon Beach NSW 2107 (Figure 1.1). The study area includes the site as well as any additional land traversed during the site survey.

Table 1.1. Site information.

Category	Details
Title (Lot/DP)	2/DP1237357
Total Lot Area	1,553 m <sup>2</sup> (0.15 ha)
Address	12A John Street, Avalon Beach NSW 2107
Local Government Area	Northern Beaches
Land Zoning	C2 – Environmental Conservation / C4 – Environmental Living
Local Environmental Plan	Pittwater Local Environmental Plan 2014

##### 1.1.3 Proposed development and the subject land

The proposed development is for the construction of two dwelling houses at 12A John St, Avalon Beach (Figure 1.2).

The development requires the removal of thirty-two trees, of which eleven are locally native. It is noted that six of these are *Casuarina glauca* (Swamp Oak) and possibly suckers of a fewer number of trees. No hollow-bearing trees are proposal for removal.



## Legend

- Subject land
- Cadastral lot
- Boundary
- Contour

Project: 12 John St, Avalon Beach  
Coordinate Reference System: GDA94 / NSW Lambert  
Data Source: NSW Cadastre Web Service (DCS 2014)  
Date: 20.10.2023  
Author: Brooke Thompson



Figure 1.1. Subject Land.

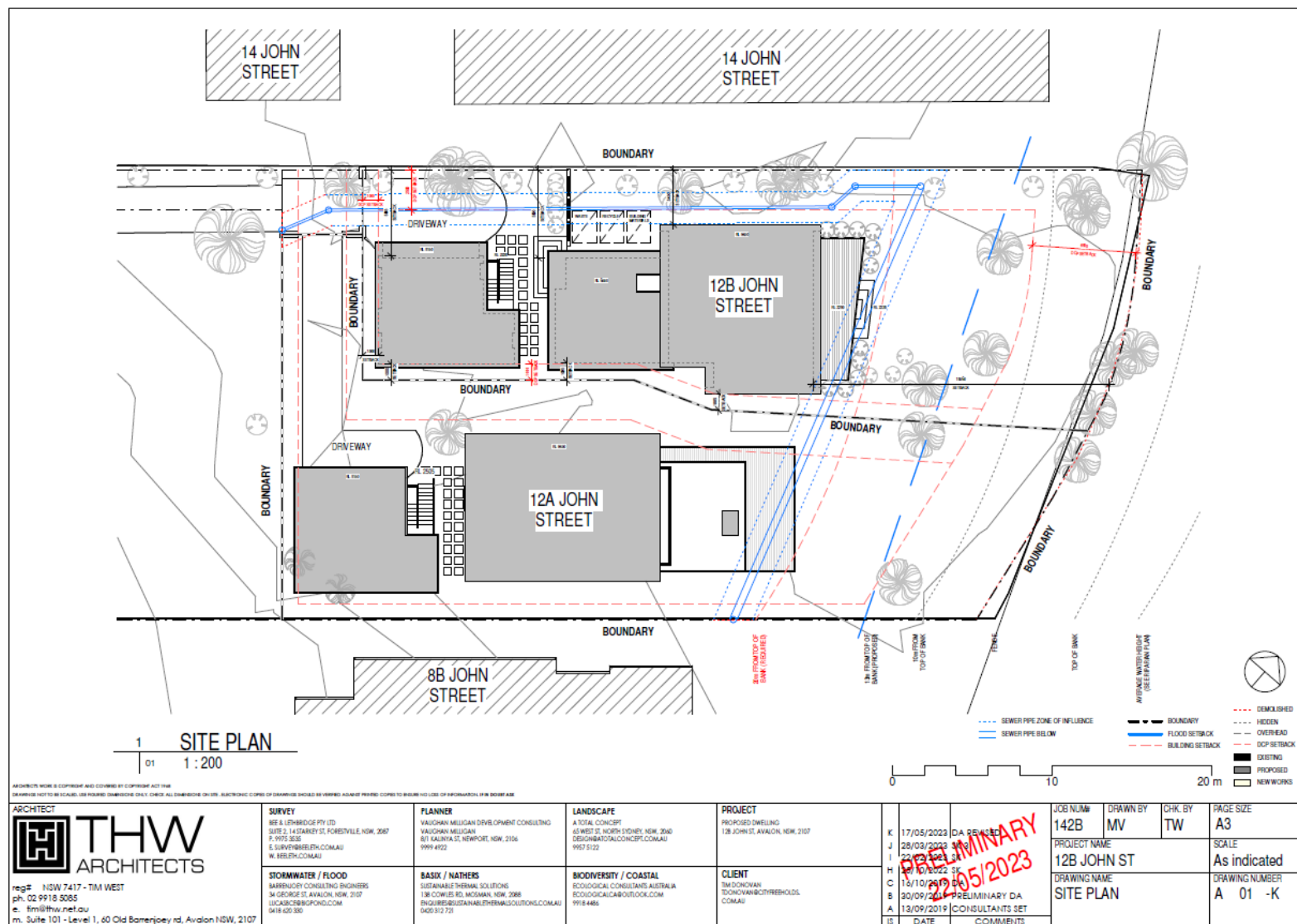
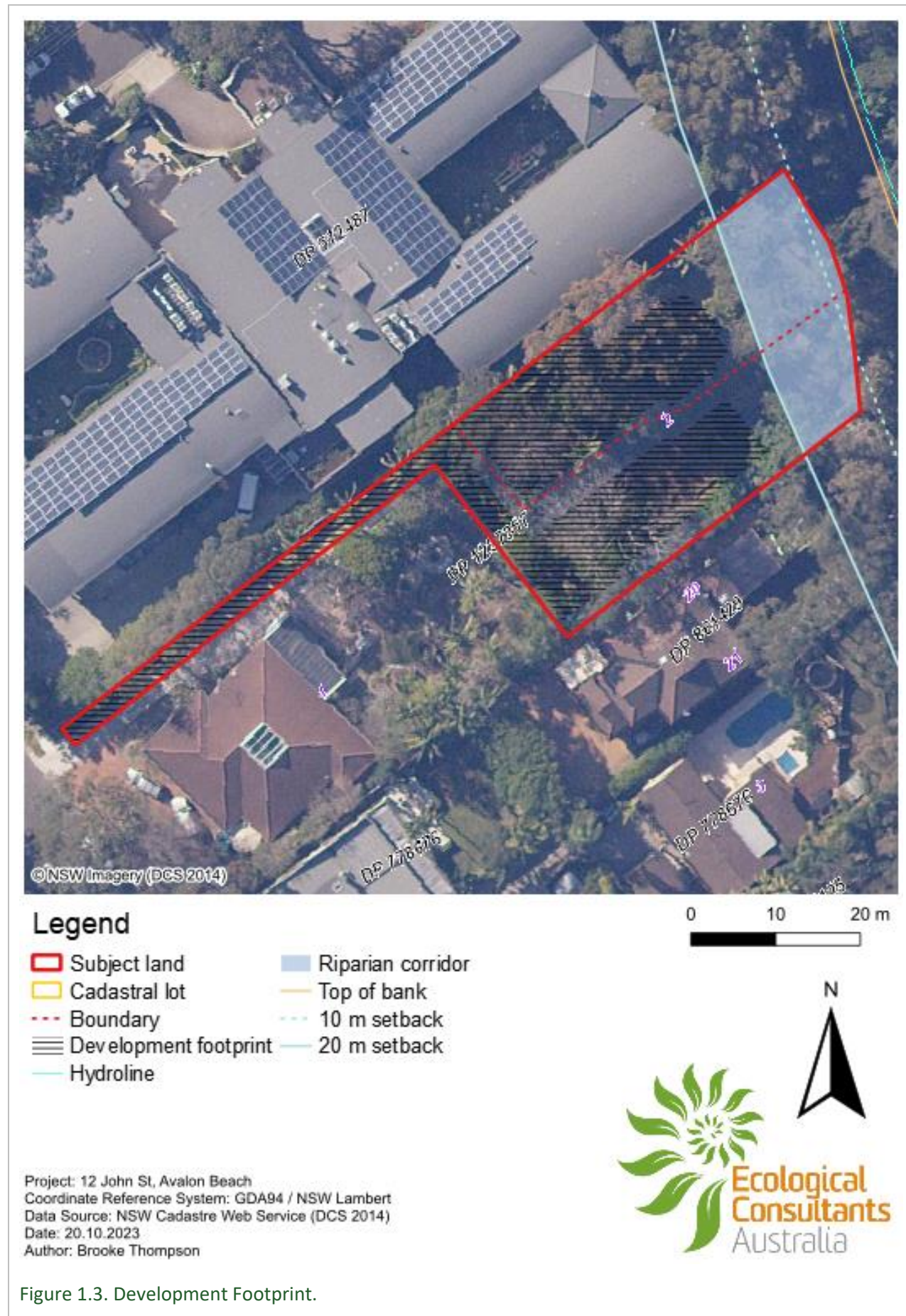


Figure 1.2. Site Plan.

Source: THW Architects. 22.05.2023.





#### 1.1.4 Other documentation

Plans, drawings and reports specific to the proposed development:

- Site Plan (THW Architects) 22.05.2023.
- Arboricultural Impact Appraisal and Method Statement Revision C (Naturally Trees).
- Riparian Plan and Coastal Impacts Assessment (Kingfisher Urban Ecology and Wetlands December 2023).

## 1.2 Information sources

The following sources of information were used in this assessment:

- [BioNet Vegetation Classification](#)
- BioNet Threatened Biodiversity Data Collection
- [NSW BioNet](#) Atlas
- [Directory of Important Wetlands in Australia](#)
- BioNet [NSW \(Mitchell\) Landscapes - Version 3.1](#)
- [Interim Biogeographic Regionalisation for Australia \(IBRA region and subregion\) - Version 7](#)
- [NSW Planning Portal Spatial Viewer](#)
- [SEED](#)
- [eSPADE v2.2](#)
- [SIX Maps](#)
- [Nearmap](#)
- [Mecone Mosaic](#)
- [Biodiversity Values Map and Threshold tool](#)
- BAM – Important Areas Viewer
- [Protected Matters Search Tool](#)
- [Northern Beaches Mapping](#)

## 1.3 Biodiversity Offsets Scheme entry

The *Biodiversity Conservation Act 2016* (BC Act) includes a framework for the protection and conservation of flora and fauna, including threatened species and ecological communities, and their habitats, and introduces the Biodiversity Offsets Scheme (BOS).

The *Biodiversity Conservation Regulation 2017* sets out threshold levels for when the BOS will be triggered. The threshold has 2 elements:

1. whether the amount of native vegetation cleared exceeds an area threshold
2. whether the impacts occur on an area mapped on the Biodiversity Values Map

If a development triggers at least one entry threshold, the development must be assessed under the BC Act using the Biodiversity Assessment Method (BAM).

### 1.3.1 Area Clearing Threshold

Area thresholds vary depending on the minimum lot size associated with the property (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) (Figure 1.4).

Minimum lot size associated with the property	Threshold for clearing, above which the Biodiversity Assessment Method (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
1,000 ha or more	2 ha or more

Figure 1.4. Area Clearing Thresholds.  
Source: <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/about-the-biodiversity-offsets-scheme/when-does-bos-apply>

The proposal requires the clearing of 0.08 ha of native vegetation to facilitate the development (Table 1.2). As such, the proposal does not trigger the area clearing threshold entry into the BOS.

Table 1.2. Application of the area clearing threshold.

Minimum lot size associated with the property	700 m <sup>2</sup> (Less than 1 ha)
Threshold for clearing	0.25 ha or more
Area proposed for clearing	0.08

### 1.3.2 Biodiversity Values Map

The Biodiversity Values (BV) Map identifies land with high biodiversity value, as defined by clause 7.3(3) of the *Biodiversity Conservation Regulation 2017*. The BOS applies to clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the *Biodiversity Conservation Regulation 2017* on land identified on the map.

The proposal requires the clearing of native vegetation and other biodiversity impacts on the BV Map (Figure 1.5).





Figure 1.5. Biodiversity Values Map.

Source: [Biodiversity Values Map and Threshold tool](#). Date accessed: 22/09/2023.

## 1.4 Matters of national environmental significance

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) is applicable if it was considered that a significant impact on a matter of national environmental significance were likely, thus providing a trigger for approval from the Minister for the Environment and Water.

Matters of NES are those identified under Part 3 Division 1 of the EPBC Act and include:

- World Heritage Properties,
- National Heritage Places,
- Wetlands of International Importance (Ramsar),
- Great Barrier Reef Marine Park,
- Commonwealth Marine Area,
- Listed Threatened Ecological Communities,
- Listed Threatened Species, and
- Listed Migratory Species.

The Commonwealth Government has published Significant Impact Guidelines (DCCEEW 2013) to provide overarching guidance on determining whether an action is likely to have a significant impact on a matter protected under the EPBC Act. A significance assessment has been provided in Appendix VIII. The proposal



does not impact a matter of national environmental significance and therefore is compliant with the EPBC Act.

## 1.5 Pittwater Local Environmental Plan 2014

The site is classified as “Biodiversity” on the Pittwater Biodiversity Map (Figure 1.6) and therefore subject to clause 7.6 of the Pittwater Local Environmental Plan (LEP) 2014.

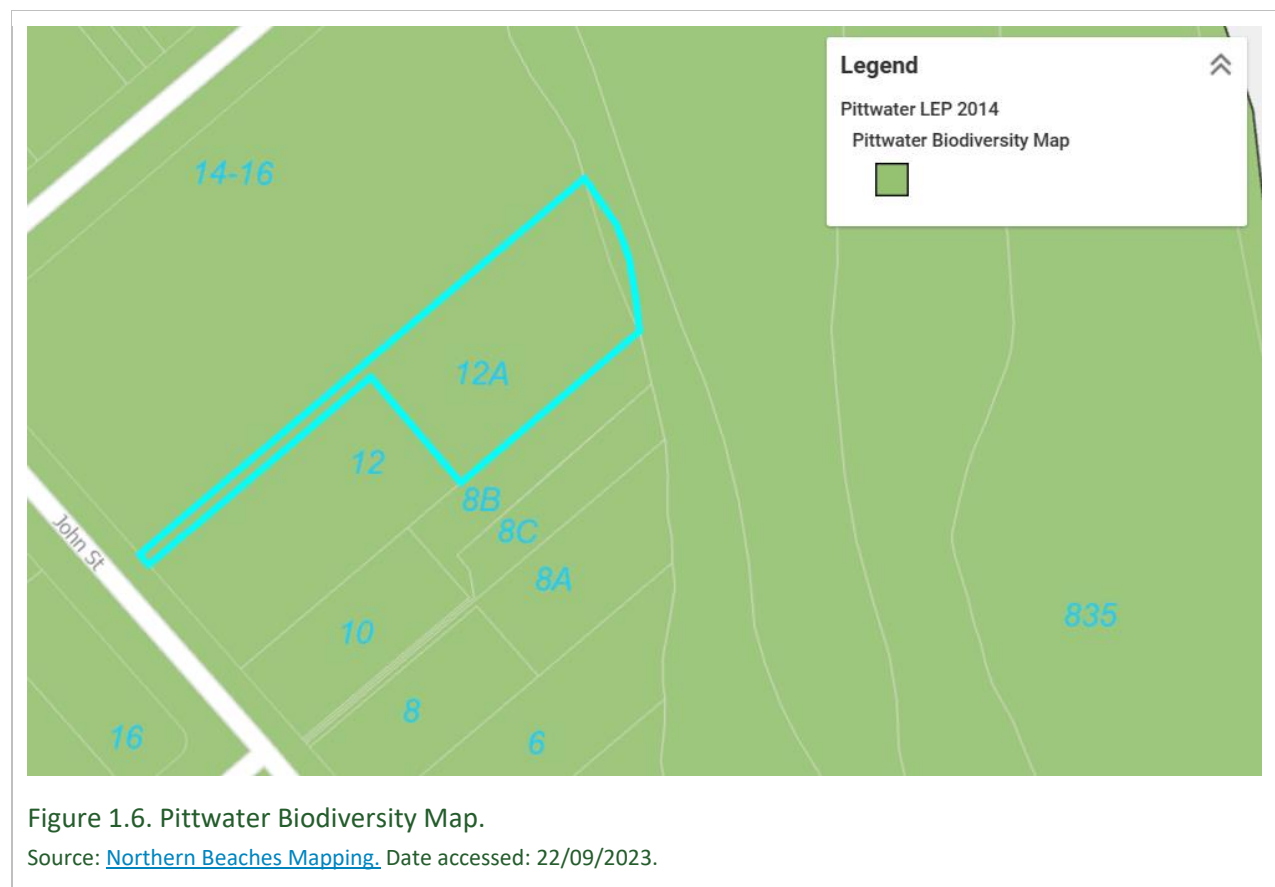
### Clause 7.6

*The objective of this clause 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.*

*Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that–*

- (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or*
- (b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or*
- (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.*



## 1.6 State Environmental Planning Policy (Resilience and Hazards) 2021

The site is classified “Coastal Environment Area” on the Coastal Environment Area Map (Figure 1.7) and “Coastal Use Area” on the Coastal Use Area Map (Figure 1.8) under the *State Environmental Planning Policy (Resilience and Hazards) 2021* (the Resilience and Hazards SEPP) and therefore consideration of section 2.10 and 2.11 of the Resilience and Hazards SEPP is required.

See Riparian Plan and Coastal Impacts Assessment (Kingfisher 2023) for consideration of section 2.10 and 2.11 of the Resilience and Hazards SEPP.

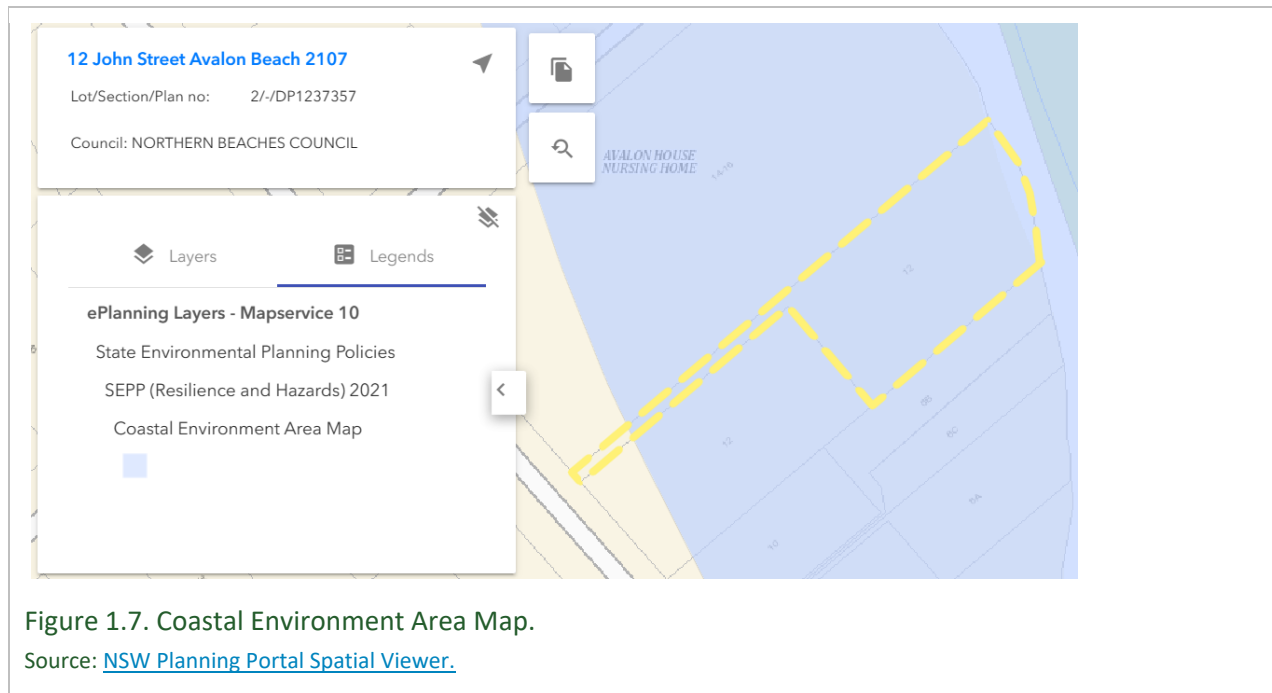


Figure 1.7. Coastal Environment Area Map.

Source: [NSW Planning Portal Spatial Viewer](#).

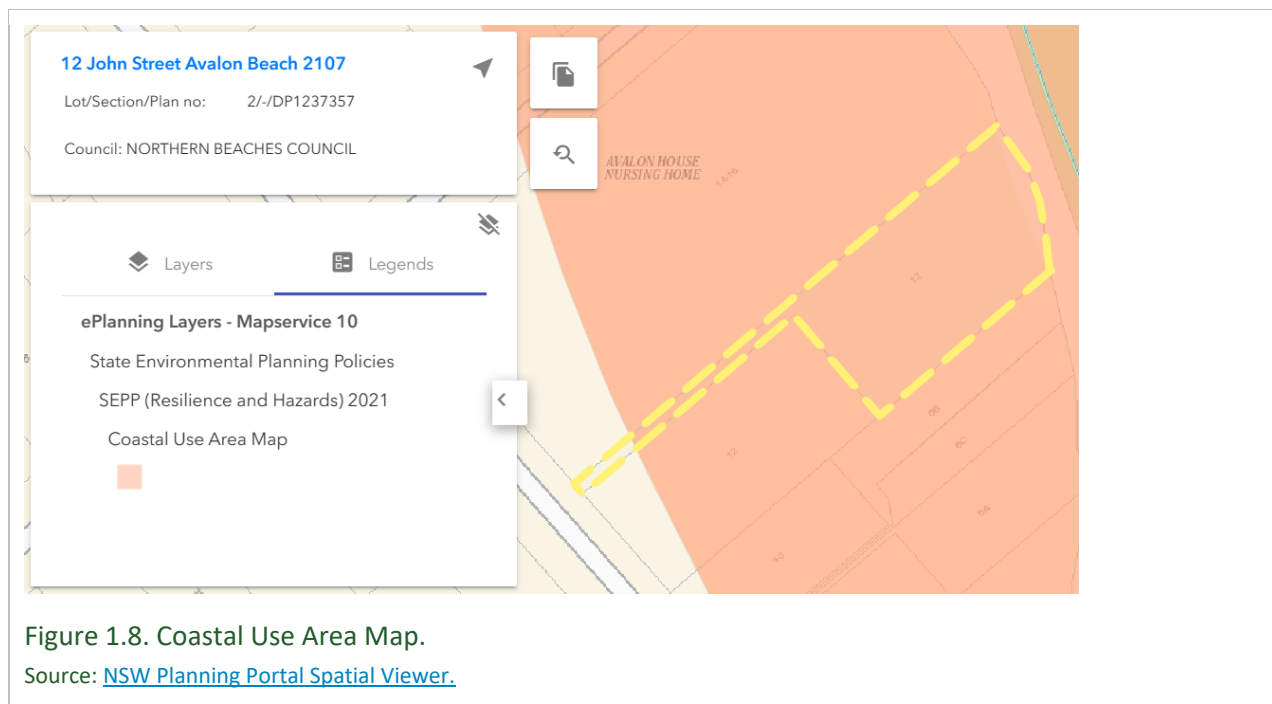


Figure 1.8. Coastal Use Area Map.

Source: [NSW Planning Portal Spatial Viewer](#).

## 2 Site context

### 2.1 Assessment area

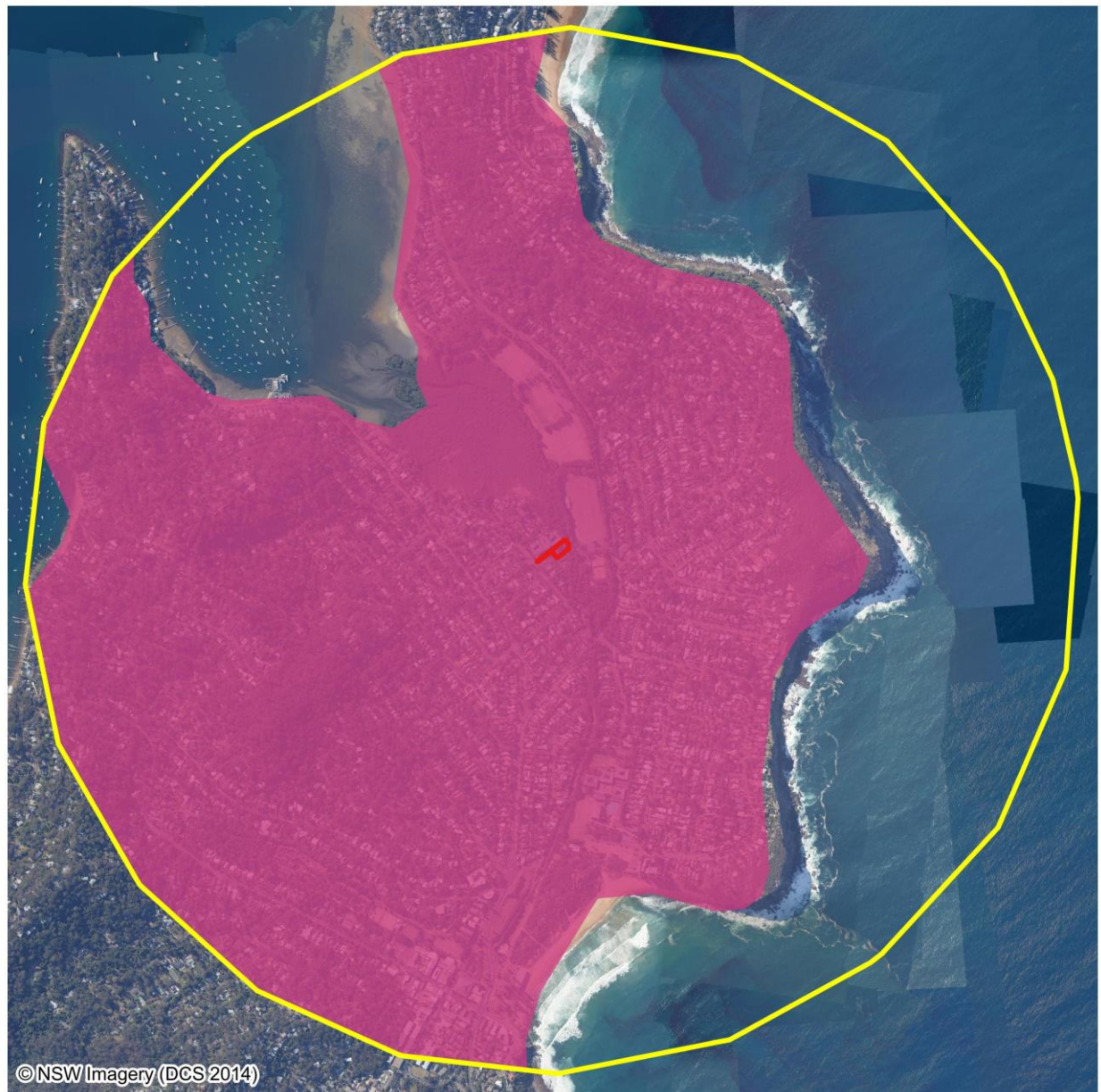
The assessment area includes the subject land and the area of land within the 1500 metre buffer zone surrounding the subject land.

### 2.2 Landscape features

Landscape features identified within the subject land and assessment area are shown on Figures 2.1-2.4, respectively. Table 2.1 outlines the relevant landscape features and a description of each.

Table 2.1. Landscape features.

Feature	Description
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
NSW (Mitchell) Landscape	Belrose Coastal Slopes
Rivers, streams and estuaries	The property has direct interface with Careel Creek to the east which contains estuarine habitat including mangroves.
Wetlands	Saltmarsh and mangroves occur within the assessment area; however, are not present on the property.
Habitat connectivity	Habitat connectivity is limited to the Careel Creek corridor. Careel Creek creates a corridor of vegetation from the saltmarsh and mangroves past Careel Bay playing fields. The corridor then meets discontinuous canopy trees. This corridor forms part of a wildlife corridor of aerial and highly mobile species. The vegetation surrounding the site is highly urbanised and characterised as discontinuous canopy and exotic understorey/landscaped gardens.
Karst, caves, crevices, cliffs, rock or other geological features of significance	There are no karsts, caves, crevices, cliffs, rocks or other geological features of significance at the property.
Areas of outstanding biodiversity value	There are no areas of outstanding biodiversity that have been identified under the BC Act.



## Legend

- Subject land
- Assessment area
- IBRA bioregion
- Sydney Basin

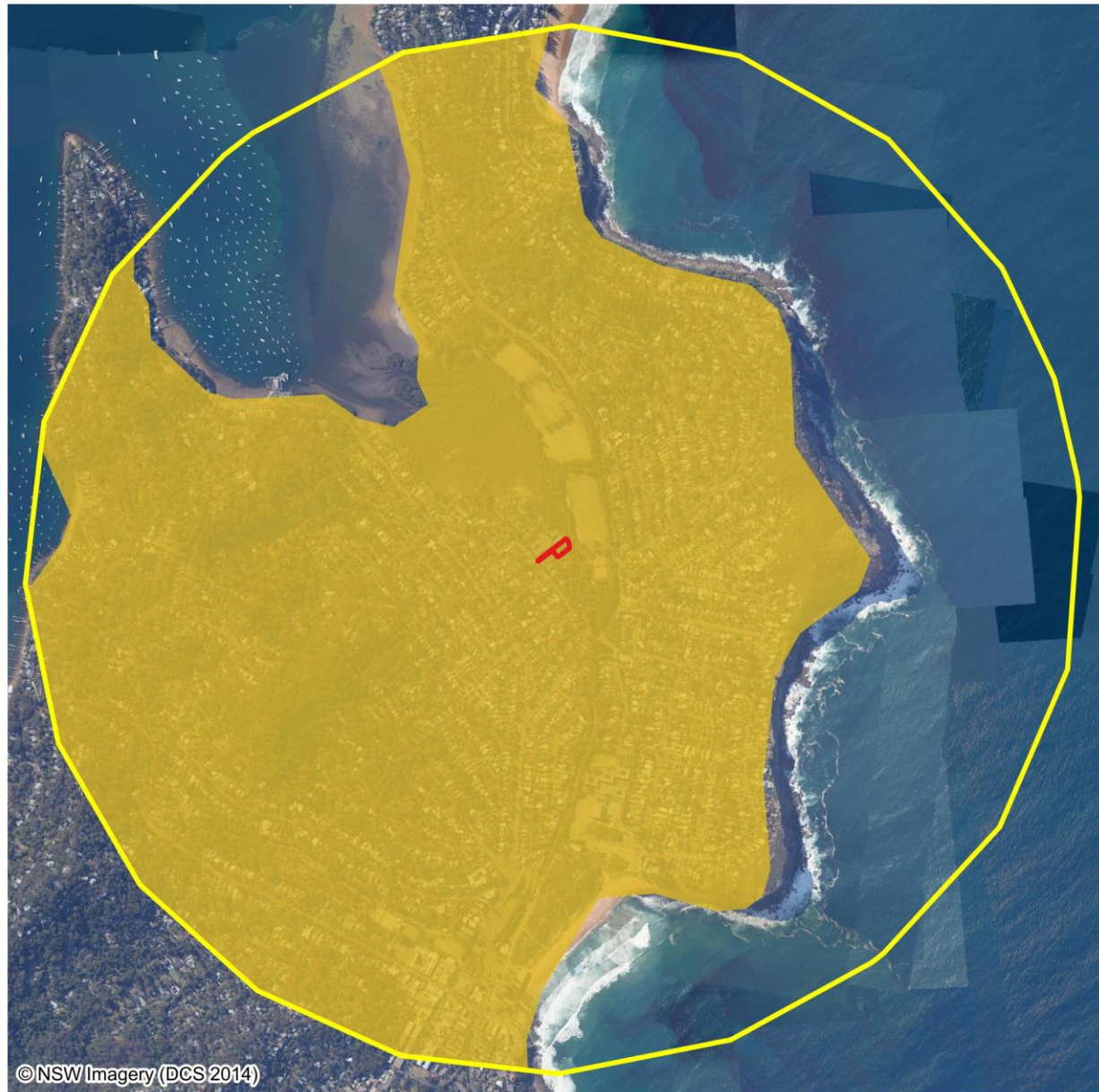
0 0.5 1 km

Project: 12 John St, Avalon Beach  
Coordinate Reference System: GDA94 / NSW Lambert  
Data Source: IBRA Version 7 (Regions) (DCCEEW 2016)  
Date: 20.10.2023  
Author: Brooke Thompson






Figure 2.1. IBRA Bioregion.






## Legend

-  Subject land
-  Assessment area
- IBRA subregion
-  Pittwater

0 0.5 1 km

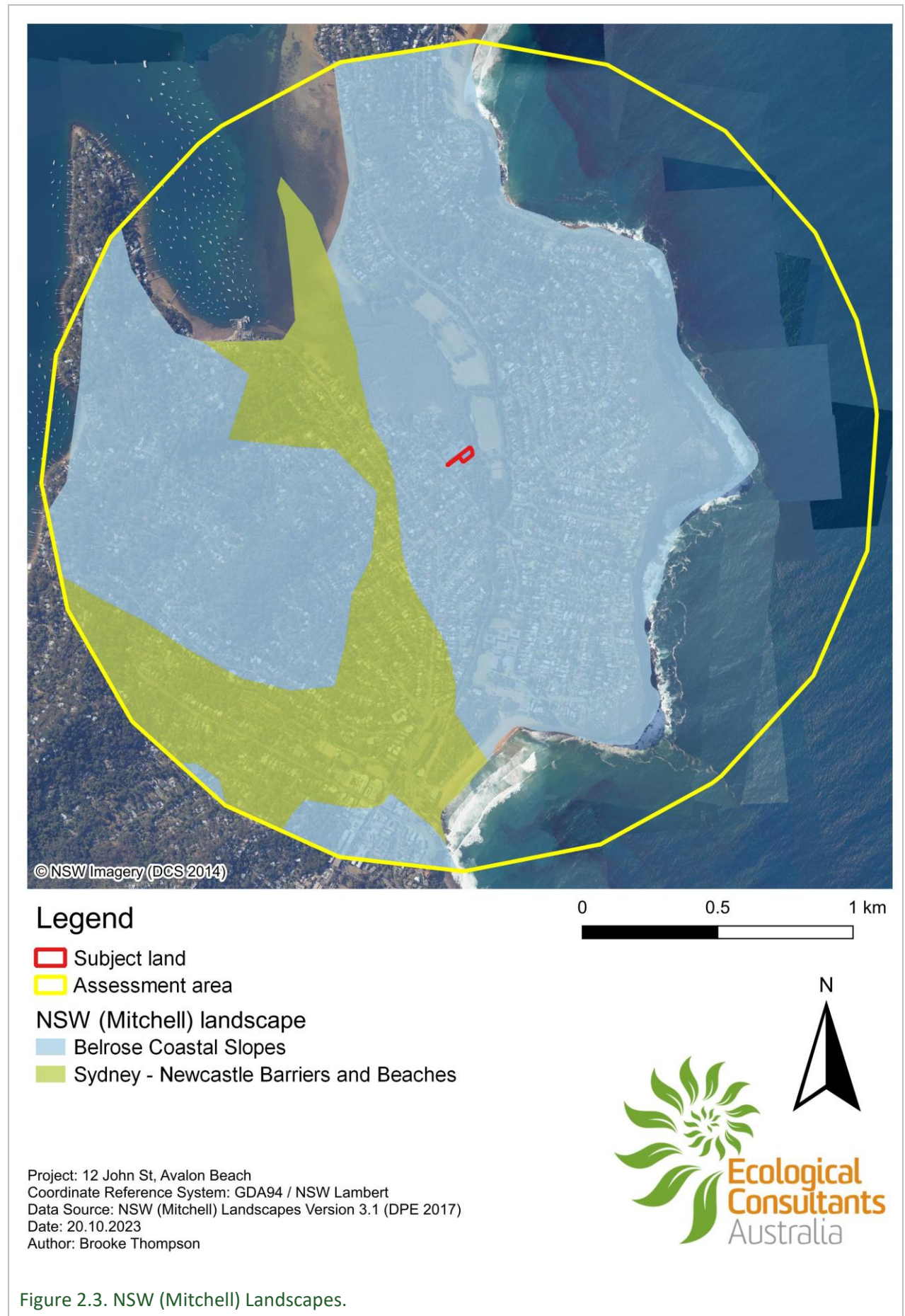


Project: 12 John St, Avalon Beach  
Coordinate Reference System: GDA94 / NSW Lambert  
Data Source: IBRA Version 7 (Regions) (DCCEE 2016)  
Date: 20.10.2023  
Author: Brooke Thompson

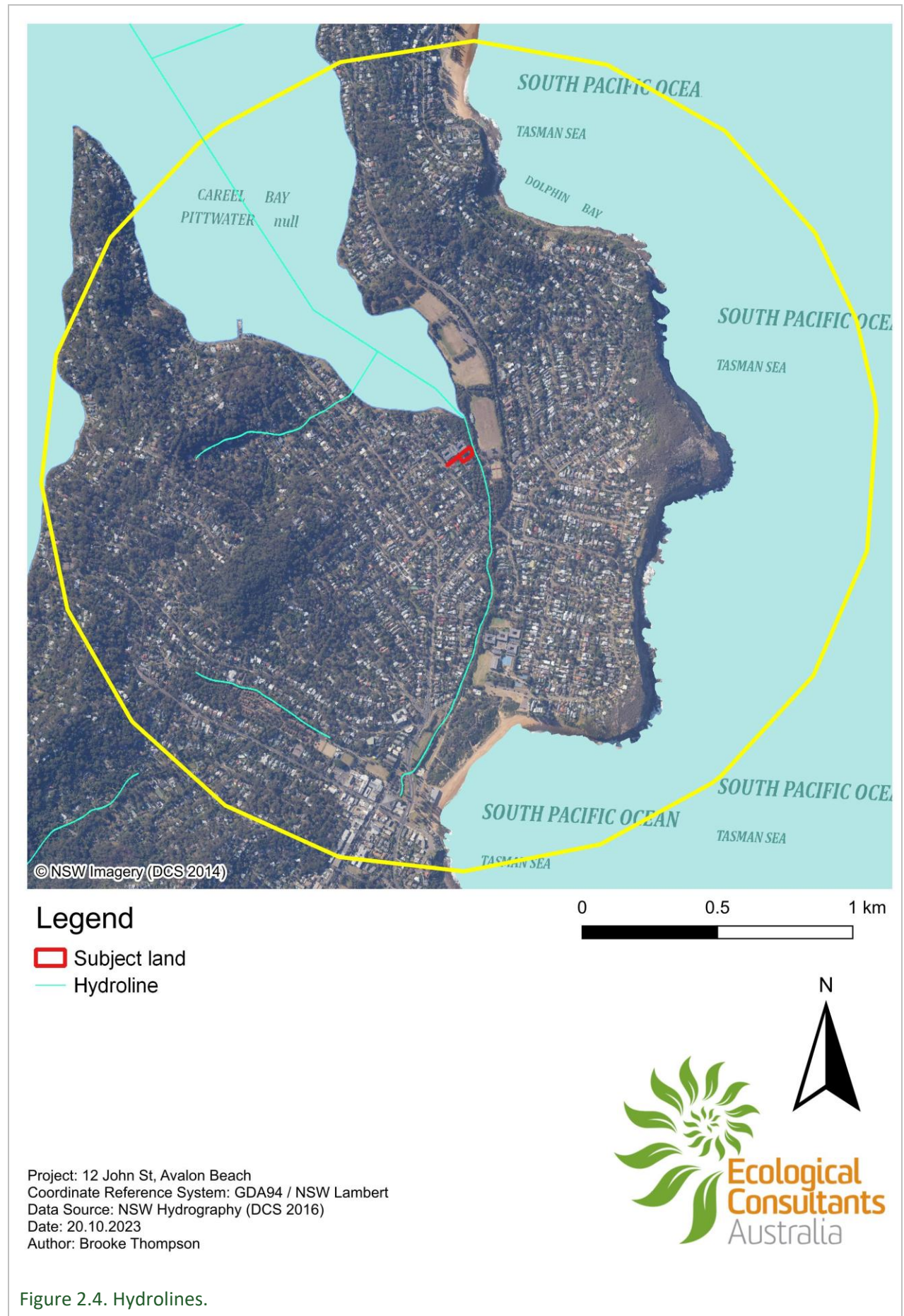


Figure 2.2. IBRA Subregion.









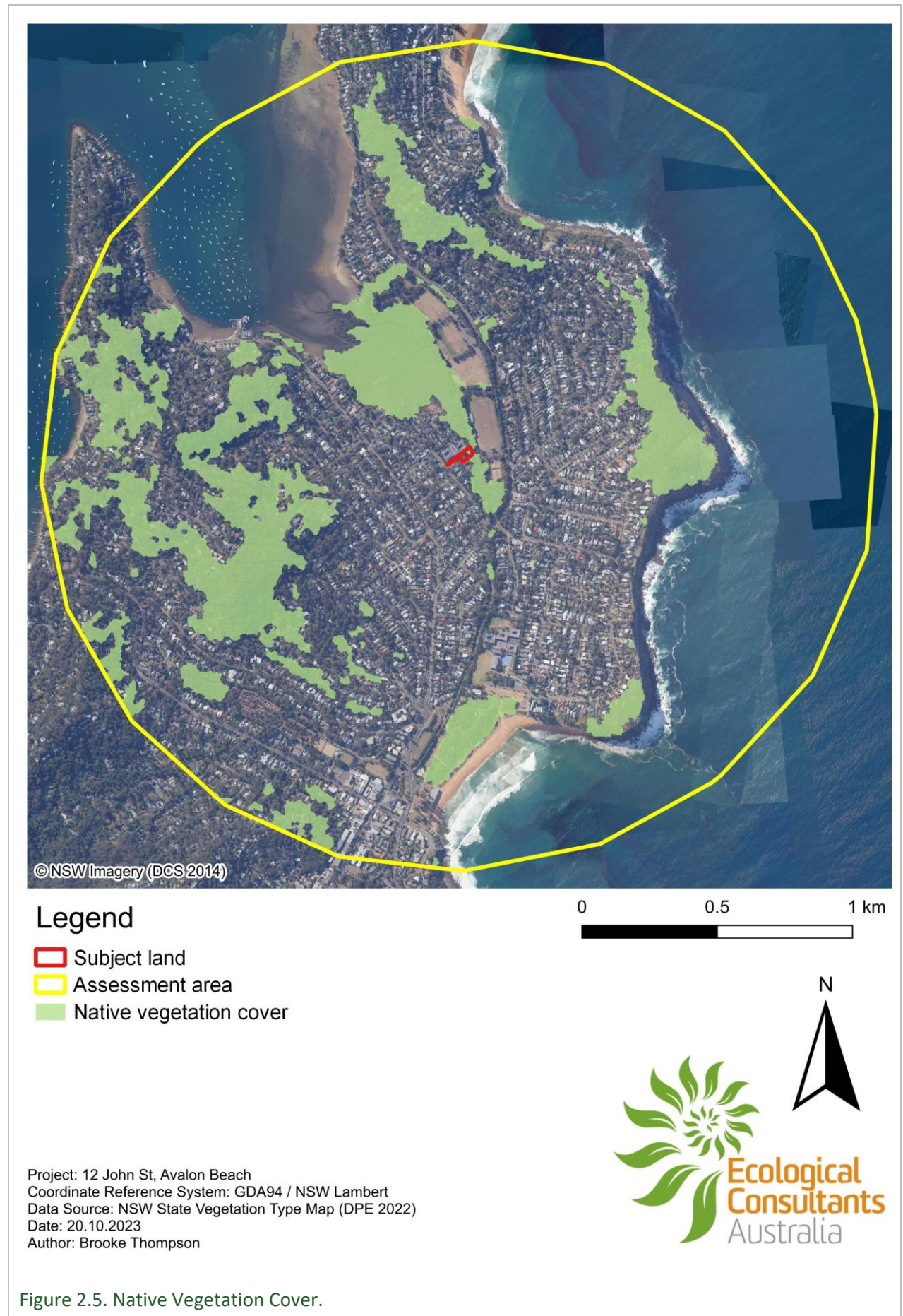
## 2.3 Native vegetation cover

Native vegetation cover has been assessed in relation to native vegetation cover across a broader area. Native vegetation cover was determined based on the extent of the NSW State Vegetation Type Map 2022 native vegetation mapping within the assessment area (Figure 2.5). Table 2.2 summarises the extent of native vegetation cover within the assessment area.

Table 2.2. Native vegetation cover.

Assessment area (ha)	733.08
Total area of native vegetation cover (ha)	104.42
Percentage of native vegetation cover (%)	14%
Class (0-10, >10-30, >30-70 or >70%)	>10-30







## 3 Native vegetation, threatened ecological communities and vegetation integrity

### 3.1 Native vegetation extent

#### 3.1.1 Changes to the mapped native vegetation extent

A review of the Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS\_ID 4489 (SydneyMetroArea\_v3\_1\_2016\_E\_4489) was initially undertaken to determine what plant community type (PCT) may occur on the subject land. The mapping indicated the presence of one PCT within the subject land (Figure 3.1).

- PCT 1234
  - PCT Name: Estuarine Swamp Oak forest
  - PCT Scientific Name: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion



Figure 3.1. PCT 1234.

Source: SydneyMetroArea\_v3\_1\_2016\_E\_4489.

Since initial desktop investigations and site surveys were completed during 2019-2021 the NSW State Vegetation Type Map Edition C1.1.M1.1 (DPE 2022) (NSW SVTM) became available. The release of SVTM coincided with an ecological systematic review of PCTs in eastern NSW. This resulted in PCT 1234 changing to PCT 4027.

- PCT 4027
  - PCT Name: Estuarine Swamp Oak-Mangrove Forest



Figure 3.2. PCT 4027.

Source: NSW State Vegetation Type Map (DPE 2022).

Initial assessments of the site during 2019-2021 validated the presence of PCT 1234- Estuarine Swamp Oak forest (now PCT 4027- Estuarine Swamp Oak-Mangrove Forest) on the subject land. Recent assessment of the site during September 2023 concluded that the native vegetation extent on the property had not changed. There was no evidence of vegetation clearing during the September 2023 surveys. Thus, initial plot data obtained during 2021 was used for the BAM Calculator (BAM-C).

### 3.1.2 Areas that are not native vegetation

The subject land is undeveloped and primarily consists of exotic understorey; however, the native canopy is indicative of the PCT 4027-Estuarine Swamp Oak-Mangrove Forest.

### 3.2 Plant Community Types

Field surveys conducted during 2019-2021 and 2023 and the collection of BAM plot data from within the subject land's vegetation validated the presence of Estuarine Swamp Oak-Mangrove Forest as mapped by DPE (2022) and as described in the BioNet Vegetation Classification database.

Table 3.1 outlines the attributes and features used to justify the allocation of PCT 4027 to the native vegetation within the subject land.

Table 3.1. PCT 4027 allocation.

PCT ID	4027
PCT Name	Estuarine Swamp Oak-Mangrove Forest
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
Vegetation Formation	Forested Wetlands
Vegetation Class	Coastal Floodplain Wetlands
PCT Percent Cleared	73.48%
Extent within the subject land (ha)	0.08
Location	Occurs at the fringes of estuaries and coastal saline lakes, and on tidal creeks, between Forster and Tuross River.
Constituent species present in the subject land	<i>Casuarina glauca</i> , <i>Melaluca quinquenervia</i> , <i>Glochidion ferdinandi</i> , <i>Banksia integrifolia</i>





Plate 1. Careel Creek at high tide adjoining the eastern boundary of the site.



Plate 2. Native Swamp Mahogany and Melaleuca. Exotic species dominate the mid and ground storey.



Plate 3. Native Canopy Swamp Mahogany and Melaleuca. Exotic species dominate the mid and ground storey.





Plate 4/5. Open areas are dominated by exotic grass and planted exotics. Photo looking from development footprint to end of the site through to what will be revegetated riparian zone towards Careel Creek. Grass also has native ground species including *Dichondra* – total about 10%.





Plate 6. Existing driveway access from John Street.



Plate 7. Existing porous driveway access.



Plate 8. Proposed development area. All trees proposed for removal tagged.



Plate 9. Proposed development area. Exotic palms.



Plate 10. Rear boundary fence joining Careel Creek.



Plate 10. Careel Creek at low tide.





Plate 11. Riparian zone condition September 2023 and November 2024..



Plate 12. Boundary fence between the site and Careel Creek.



Plate 13. Ground within proposed development area. Exotic species present.



Plate 14. Ground within proposed development area. Exotic species present (Buffalo Grass dominating).



Plate 15. Proposed development area.



Plate 16. Ground within proposed development area. Exotic species present.





Plate 17. Looking from the rear boundary back toward John Street.



Plate 18. Ground within proposed development area. Buffalo and Dichondra. Thick grass where away from Casuarina needles. More sparse under needles.

### 3.3 Vegetation zones

A single vegetation zone has been identified on site. The vegetation zone covers an area in which native vegetation including Swamp Oak (*Casuarina glauca*), is proposed for removal and/or modification. A majority of the site is currently landscaped with exotic vegetation.

Regardless, the entire impact area (0.08 ha) was used in the BAM-C as the vegetation zone to account for all impacts and thus providing a worst-case scenario.

Table 3.2. Vegetation zones and patch sizes.

Vegetation zone ID	PCT ID number and name	Area (ha)	Patch size class
1	PCT 4027 – Estuarine Swamp Oak-Mangrove Forest	0.08	<input type="checkbox"/> <5ha <input type="checkbox"/> 5-24 ha <input checked="" type="checkbox"/> 25-100 ha <input type="checkbox"/> >100 ha

### 3.4 Vegetation integrity (vegetation condition)

#### 3.4.1 Vegetation integrity survey plots

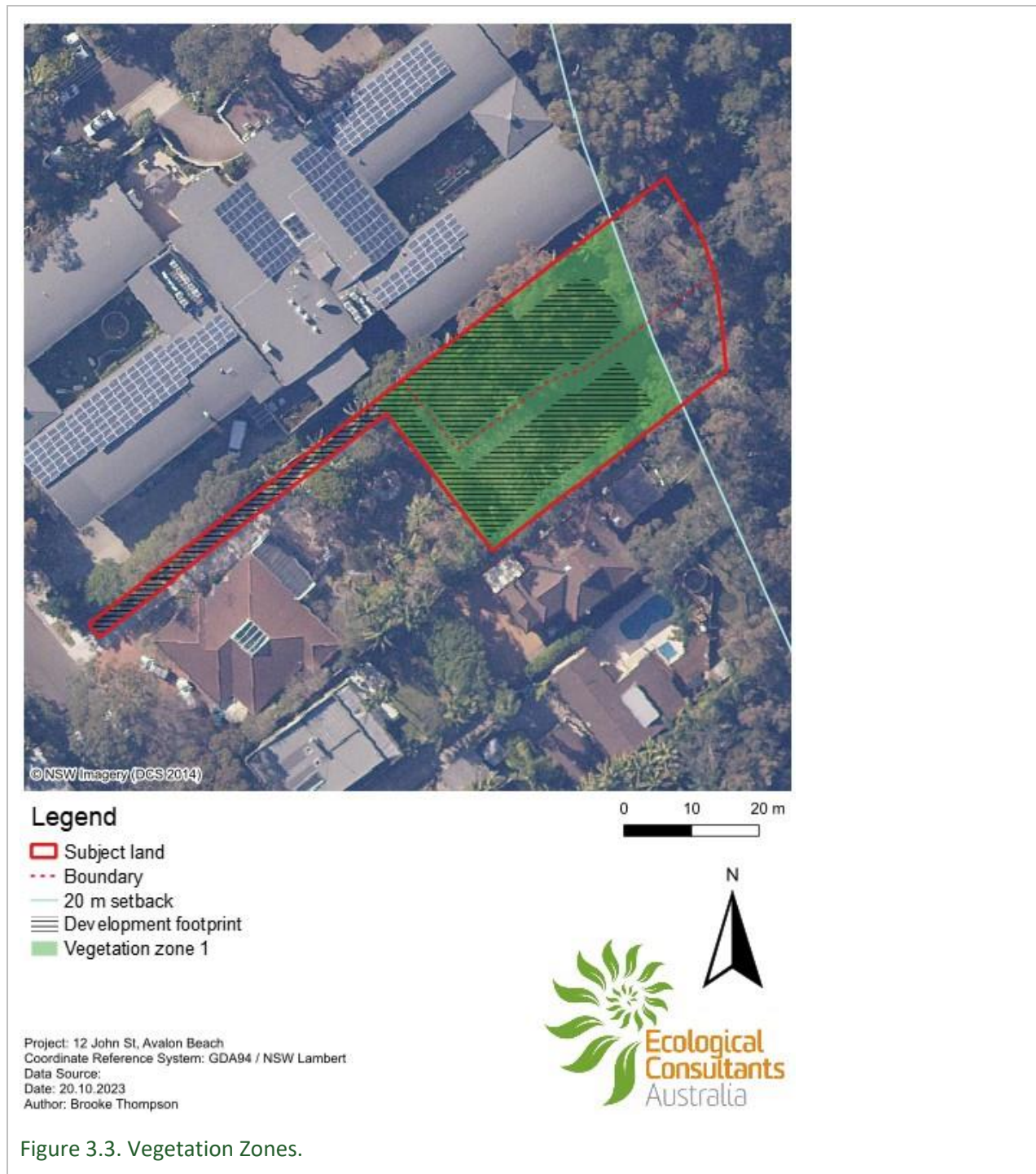
Vegetation integrity survey plots were conducted as per the Biodiversity Assessment Method 2020 around a central 50 m midline with a 400 m<sup>2</sup> plot (standard 20 m x 20 m) for assessing structure and composition inside a 1000 m<sup>2</sup> plot (standard 20 m x 50 m) for assessing function (Biodiversity Assessment Method 2020 Operation Manual – Stage 1). Additionally, five 1 m<sup>2</sup> subplots for assessing average litter cover (and other optional ground cover components) for the plot were conducted.



### 3.4.2 Vegetation integrity scores

Table 3.3. Vegetation integrity scores.

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score	Hollow bearing trees present?
1	14.1	35.1	14.1	19.1	No



## 4 Threatened Species

### 4.1 Desktop Searches

#### 4.1.1 Threatened Flora

BioNet records from a 10 km radius surrounding the study area returned a total of 9 threatened flora species currently listed as critically endangered, endangered or vulnerable under state and/or Commonwealth legislation (Table 4.1).

Table 4.1. Threatened flora recorded within a 10 km radius surrounding the study area.

Source: BioNet Atlas. Date accessed: 22/09/2023.

Family	Scientific Name	Common Name	NSW Status	Comm. Status	Records
Euphorbiaceae	<i>Chamaesyce psammogeton</i>	Sand Spurge	E		7
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V		5
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	3
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	CE	30
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	19
Orchidaceae	<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E	E	1
Orchidaceae	<i>Microtis angusii</i>	Angus's Onion Orchid	E	E	3
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	3
Rutaceae	<i>Boronia umbellata</i>	Orara Boronia	V	V	1

CE = Critically Endangered, E = Endangered, V = Vulnerable

#### 4.1.2 Threatened Fauna

BioNet records from a 10 km radius surrounding the study area returned a total of 58 threatened fauna species currently listed as critically endangered, endangered or vulnerable under state and/or Commonwealth legislation (Table 4.2).

NB: Marine species from the families Cheloniidae and Dermochelyidae (Turtles) Diomedidae and Procellariidae (Marine Birds), Dugongidae (Dugong), Otariidae, Balaenidae and Physeteridae (Whales) have been omitted from the list due to habitat constraints.

Table 4.2. Threatened fauna recorded within a 10 km radius surrounding the study area.

Source: BioNet Atlas. Date accessed: 22/09/2023.

Family	Scientific Name	Common Name	NSW Status	Comm. Status	Records
Amphibia	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		19
Amphibia	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	2
Reptilia	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V		4
Aves	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V		4
Aves	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V		3
Aves	<i>Ixobrychus flavicollis</i>	Black Bittern	V		1
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V		46
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	V		3
Aves	<i>Lophoictinia isura</i>	Square-tailed Kite	V		3
Aves	<i>Pandion cristatus</i>	Eastern Osprey	V		17
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	E		52
Aves	<i>Esacus magnirostris</i>	Beach Stone-curlew	CE		1
Aves	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V		4
Aves	<i>Onychoprion fuscata</i>	Sooty Tern	V		1
Aves	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	E	1
Aves	<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V	V	50
Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	V		3
Aves	<i>Lathamus discolor</i>	Swift Parrot	E	CE	3
Aves	<i>Neophema pulchella</i>	Turquoise Parrot	V		1
Aves	<i>Ninox connivens</i>	Barking Owl	V		18
Aves	<i>Ninox strenua</i>	Powerful Owl	V		476
Aves	<i>Tyto novaehollandiae</i>	Masked Owl	V		4
Aves	<i>Tyto tenebricosa</i>	Sooty Owl	V		2
Aves	<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	1
Aves	<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	3

Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		1
Aves	<i>Petroica boodang</i>	Scarlet Robin	V		1
Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	5
Mammalia	<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E	E	22
Mammalia	<i>Phascolarctos cinereus</i>	Koala	E	E	76
Mammalia	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V		31
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider	V		4
Mammalia	<i>Petauroides volans</i>	Southern Greater Glider	E	E	1
Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	141
Mammalia	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		1
Mammalia	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V		5
Mammalia	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	6
Mammalia	<i>Myotis macropus</i>	Southern Myotis	V		10
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		5
Mammalia	<i>Vespadelus troungtoni</i>	Eastern Cave Bat	V		1
Mammalia	<i>Miniopterus australis</i>	Little Bent-winged Bat	V		29
Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V		35
Gastropoda	<i>Meridolum maryae</i>	Maroubra Woodland Snail	E		1

CE = Critically Endangered, E = Endangered, V = Vulnerable

#### 4.1.3 Endangered Populations

BioNet Atlas records from a 10 km radius surrounding the study area returned a total of 1 endangered population (Table 4.3).

Table 4.3. Endangered populations recorded within a 10 km radius surrounding the study area.

Source: BioNet Atlas. Date accessed: 22/09/2023.

Common Name	Scientific Name	NSW Status	Comm. Status	Records
Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	<i>Petaurus norfolcensis</i>	E		1

CE = Critically Endangered, E = Endangered, V = Vulnerable



## 4.2 Identifying Threatened Species for Assessment

### 4.2.1 Ecosystem Credit Species

Ecosystem credit species are threatened species whose likelihood of occurrence can generally be predicted by vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

All ecosystem credit species were maintained in the BAM-C. The predicted species list generated from the BAM-C has been included in Appendix VI.

### 4.2.2 Species Credit Species

Species credit species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the proponent may elect to assume the species is present.

Appendix I lists candidate species credit species automatically populated in the BAM-C and whether they have been retained or excluded from further assessment based on geographic limitations and/or habitat constraints.

## 4.3 Presence of candidate species

The Large-eared Pied Bat (*Chalinolobus dwyeri*) has been assumed present on the subject land due to the presence of suitable foraging habitat. The site is also located within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices.

## 4.4 Targeted species surveys

Field surveys took place in February, May and December 2019, March and October 2020, January 2021 and September 2023 by Principal Ecologist Geraldene Dalby-Ball and Ecologist Tina Feodoroff (2019 surveys). A total of 9 field surveys were undertaken. Inspections included a range of tidal heights from full moon high tide in a rain fall event to a full moon low tide as well as average tidal flows.

Flora and fauna surveys were conducted using the random meander technique, whilst recording observations of the flora and fauna present. Notes, photos, and samples of flora species were taken to assess the ecological health and value of the site.

Due to the small area of proposed impacts, detailed or systematic surveys were not performed. Surveys were general and opportunistic in nature. Surveys included diurnal bird and fauna surveys, vegetation surveys and habitat feature assessments in which fauna habitat resources were identified.

## 4.5 Threatened species field findings

Field surveys for threatened species took place in February, May and December 2019, March and October 2020, January 2021 and September 2023 by Principal Ecologist Geraldene Dalby-Ball and Ecologist Tina Feodoroff (2019 surveys).

A total of 9 field surveys were undertaken. Inspections included a range of tidal heights from full moon high tide in a rain fall event to a full moon low tide as well as average tidal flows.

#### 4.5.1 Threatened flora

No threatened flora was observed during the field surveys, with the exception of 1 *Syzygium paniculatum* (Magenta Lilly Pilly) (T22). The author has been provided with anecdotal evidence that the specimen was planted. Given that *S. paniculatum* is a commonly sold and planted Lilly Pilly and its placement within mown lawn along with similar exotics, and GDB has personally assisted in the planting two *S. paniculatum* at 8 John St, Avalon Beach (~30 years ago), the specimen located on the property has not been assessed as a threatened species in the BAM-C.

#### 4.5.2 Threatened fauna

No threatened fauna was observed during the field surveys. The following fauna were observed:

- *Heloecius cordiformis* (Semaphore Crab) observed in the creek mudflats north of the property
- *Grallina cyanoleuca* (Magpie-lark)
- *Gymnorhina tibicen* (Australian Magpie)
- *Dacelo novaeguineae* (Laughing Kookaburra)

#### 4.5.3 Fauna habitat

No hollow-bearing trees, nests, bush rock, burrows, woody debris or other habitat features were sighted that would form primarily habitat for threatened species.

### 4.6 Species polygon

Appendix VII shows the species polygon for the Large-eared Pied Bat. Species polygons depict the extent of suitable habitat for target species within the subject land.

## 5 Avoid and minimise impacts

#### 5.1.1 Avoid

The following measures have been implemented to avoid impacts on biodiversity.

##### Location and size of footprint and vicinity to Careel creek

The site footprints are long and narrow with one drive to access both. The location has minimised impacts to Swamp Mahoganies and maximise landscape area for planting. The site has direct interface with Careel Creek. The proposal has been set back 20 metres from Careel Creek to enable the retention of land for a riparian corridor (currently turf dominated) and rehabilitation of this riparian corridor.

##### Retention of large trees

The proposal has avoided the removal of large trees and protected trees. The proposal has ensured the retention of the most significant canopy trees within the site, Trees 42 and 45 (*Eucalyptus robusta*).

Stormwater services have been located away from Careel Creek and will be pre-treated before water release.

### **Footprint of the houses**

The footprint of the houses has been reduced to allow for a 20-metre riparian set back from Careel Creek (as requested by Northern Beaches Council).

#### **5.1.2 Minimise**

The following measures have been implemented to minimise impacts on biodiversity.

#### **Hard landscaping**

Hard landscaping has been minimised and areas for planting maximised including the riparian creek line.

#### **Stormwater impact by installing bioswale**

Impacts from stormwater have been minimised by setting the outlet back from the creek, maximising infiltration on-site and pre-treatment of water on-site prerelease.

#### **5.1.3 Mitigate**

The following measures have been implemented to mitigate impacts on biodiversity.

#### **Tree removals**

While there is loss of *Casuarina glauca* from the development area the decision was made to impact *C. glauca* rather than other trees (Swamp Mahogany) as *C. glauca* are the most dominant on site and there will be retention of *C. glauca* on-site. Further there is a high concentration of them along the creek line (100+) in the immediate vicinity. Replacement planting of 20 *C. glauca* will occur and will result in the equivalent number onsite after 10 years.

#### **Flood by raising the houses allowing water to flow under**

The proposed dwellings have been raised to allow for water to flow underneath in the event of a flood this enables the natural floodway and hydrology to be retained.

#### **Mitigation through increasing native vegetation in landscaping**

Native vegetation in the site will be increased by the inclusion of native species characteristic of PCT 4027 in the landscape plan. The riparian corridor is to be revegetated in accordance with the Riparian Plan and Coastal Impact Assessment (Kingfisher 2023).



## Stage 2: Impact assessment

### 6 Impact assessment

#### 6.1 Direct impacts

##### 6.1.1 Clearing of native vegetation

As per the Arboricultural Impact Appraisal and Method Statement Revision C (Naturally Trees):

The proposed development will necessitate the removal of:

- Twelve high retention values trees (Tress 4, 8, 13, 14, 17, 18, 19, 20, 25, 29, 33 and 54).
- Twenty low retention value trees (Trees 3, 6, 7, 9, 22, 23, 24, 26, 27, 30, 31, 32, 34, 35, 36, 37, 38, 39, 40 and 41).

No.	Genus species	No.	Genus species	No.	Genus species
1	<i>Archontophoenix alexandrae</i>	23	<i>Jacaranda mimosifolia</i>	49	<i>Casuarina glauca</i>
2	<i>Archontophoenix alexandrae</i>	24	<i>Jacaranda mimosifolia</i>	50	<i>Casuarina glauca</i>
3	<i>Archontophoenix alexandrae</i>	25	<i>Liriodendron tulipifera</i>	51	<i>Casuarina glauca</i>
4	<i>Melaleuca quinquenervia</i>	26	<i>Archontophoenix alexandrae</i>	52	<i>Casuarina glauca</i>
5	<i>Glochidion ferdinandi</i>	27	<i>Magnolia × soulangeana</i>	53	<i>Casuarina glauca</i>
6	<i>Archontophoenix alexandrae</i>	28	<i>Washingtonia robusta</i>	54	<i>Carya illinoensis</i>
7	<i>Syagrus romanzoffiana</i>	29	<i>Glochidion ferdinandi</i>		
8	<i>Eucalyptus robusta</i>	30	<i>Strelitzia nicolai</i>		
9	<i>Archontophoenix alexandrae</i>	31	<i>Trachycarpus fortunei</i>		
10	<i>Archontophoenix alexandrae</i>	32	<i>Hymenosporum flavum</i>		
11	<i>Casuarina glauca</i>	33	<i>Banksia integrifolia</i>		
12	<i>Archontophoenix alexandrae</i>	34	<i>Strelitzia nicolai</i>		
13	<i>Casuarina glauca</i>	35	<i>Macadamia indica</i>		
14	<i>Casuarina glauca</i>	36	<i>Jacaranda mimosifolia</i>		
15	<i>Strelitzia nicolai</i>	37	<i>Ficus carica</i>		
16	<i>Archontophoenix alexandrae</i>	38	<i>Grevillea robusta</i>		
17	<i>Casuarina glauca</i>	39	<i>Brachychiton acerifolius</i>		
18	<i>Casuarina glauca</i>	40	<i>Strelitzia nicolai</i>		
19	<i>Casuarina glauca</i>	41	<i>Schinus areira</i>		
20	<i>Casuarina glauca</i>	42	<i>Eucalyptus robusta</i>		
21	<i>Archontophoenix alexandrae</i>	43	<i>Avicennia marina</i>		
22	<i>Syzygium paniculatum</i>	44	<i>Archontophoenix alexandrae</i>		
		45	<i>Eucalyptus robusta</i>		
		46	<i>Casuarina glauca</i>		
		47	<i>Grevillea robusta</i>		
		48	<i>Casuarina glauca</i>		

Figure 6.1. Tree Schedule.

NOTE: trees to be removed in red text.

Source: Arboricultural Impact Appraisal and Method Statement Revision C (Naturally Trees).

Eleven trees proposed for removal are locally native. It is noted that six of these are *Casuarina glauca* and possibly suckers of a fewer number of trees. No hollow-bearing trees are proposal for removal.

Native trees proposed for removal:

- Tree 4 *Melaluca quinquenervia*
- Tree 8 *Eucalyptus robusta*
- Trees 13, 14, 17-20 *Casuarina glauca* (6 trees)
- Tree 22 *Syzygium paniculatum* (recommend for removal/dieback) NOTE: this tree is 80% likely to be a planted specimen. It will be transplanted as part of works (may or may not survive). Locally native stock (from Bangalley Headland will be planted on-site).
- Tree 29 *Glochidion ferdinandi*
- Tree 33 *Banksia integrifolia*

All species listed above will be planted in the riparian rehabilitation works.

Nine *Casuarina glauca* are being retained and others planted.

The larger, slower growing trees, *Eucalyptus robusta* (Trees 42 and 45), are being retained.

## 6.2 Indirect impacts

The proposal may result in a range of minor indirect impacts affecting species and communities.

### 6.2.1 Noise

The proposed works are likely to produce construction noise that may cause disturbance to local sensitive fauna including amphibians, aves, reptiles and mammals. Construction noise may result in temporarily reduced breeding for local native species and result in fewer aerial fauna species frequenting the subject site for the duration of the project. The proposed works are to keep within standard construction hours.

### 6.2.2 Weeds

The operation of the proposed works may introduce weeds to the subject site and adjacent vegetation. Weeds are to be continually managed on the subject site pre and during works by avoiding seed spread on machinery, tools, equipment, and clothing (e.g., boots). After weeds are eradicated around the perimeter of the proposed works, there must be continuous maintenance of the weeds on the subject site to avoid exacerbated weed growth or colonisation. Weeds colonise and pioneer on cleared ground and therefore must be managed throughout the project.

### 6.2.3 Pathogens

The operation of the proposed works may also introduce pathogens to the subject site and adjacent vegetation through machinery, tools, equipment, and clothing (e.g., boots). Pathogens to be aware of include Myrtle Rust (*Puccinia psidii*) (a fungal disease), Phytophthora (*Phytophthora cinnamomi*) (a root-rot fungus), and Chytrid Fungus (*Batrachochytrium dendrobatidis*) (an infectious disease affecting amphibians). Bushland Hygiene Protocols are provided in Appendix IV.

### 6.2.4 Soil

The removal of vegetation and trees can cause soil disturbance and erosion. Soil compaction may also occur from the use of machinery. It is recommended that soil compaction on non-built areas be avoided by fencing off areas of vegetation and trees to be retained. Woody debris and the covering of organic matter on cleared areas can prevent erosion and is recommended.

### 6.2.5 Runoff

The proposed works may cause the transport of sediment from the subject site to areas downstream due to increased stormwater runoff. Erosion and sediment controls are to be implemented to ensure runoff does not impact adjacent vegetation or creek.

### 6.2.6 Light spill

Light levels are expected to increase above that which already exists. To avoid light spill (light that goes into non-target areas such as environmentally sensitive areas) Dark Sky lighting should be used to focus light on areas where needed whilst reducing light spill into the surrounding environment and thus, reducing light pollution. This form of lighting can provide the required 'safe-lighting' of areas whilst greatly reducing upward escaping light. Any lighting to be used must be shielded.



## 7 Prescribed impacts

The list of prescribed impacts is those in addition to, or instead of, impacts from clearing native vegetation as set out by the *Biodiversity Conservation Regulation 2017*. Table 7.1 outlines the additional biodiversity impacts to be considered and the potential impacts of the development on the habitat of threatened species or ecological communities.

Table 7.1. Prescribed biodiversity impacts.

Feature	Present	Description of feature characteristics and location	Potential impact	Threatened species or community likely to use or depend on feature
Karst, caves, crevices, cliffs, rocks or other geological features	No	n/a	n/a	n/a
Human-made structures	No	n/a	n/a	n/a
Non-native vegetation	Yes	The subject site contains non-native vegetation in the form of exotic grasses.	These exotic grasses are maintained and managed.	Not critical habitat for threatened species.
Habitat connectivity	Yes	The subject site has intact native canopy that connects to tree canopy on neighbouring properties.	The proposal requires the removal of 11 native trees. These trees do not exclusively connect a patch of habitat to other areas of habitat.	Microbats
Waterbodies, water quality and hydrological processes	Yes	The subject site is located adjacent to a creek.	The proposal is not expected to impact this watercourse.	Frogs, Wetland Birds
Wind turbine strikes (wind farm development only)	No	n/a	n/a	n/a
Vehicle strikes	No	n/a	n/a	n/a

## 8 Serious and Irreversible Impact Assessment (SAIL)

The following section provides details which address section 10.2 of the Biodiversity Assessment Method (BAM) (OEH 2017) and thus has referenced the guiding document *Guidance to assist a decision-maker to determine a serious and irreversible impact* in order to satisfy BAM requirements.

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

- Step 1: Identify relevant entities at risk of a SAIL
- Step 2: Evaluate the extinction risk of the entity to be impacted
- Step 3: Detail measures taken to avoid, minimise and mitigate impacts on the entity
- Step 4: Evaluate a serious and irreversible impact
- Step 5: Decision making

### 8.1.1 Step 1: Identify relevant entities at risk of a SAIL

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 SAIL 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 SAIL and are impacted on by the proposal.*

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

The following section identifies SAIL 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 SAIL entities identified by the document was accessed via

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

Note that Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions is not listed as an SAIL entity.

Table 8.1. Threatened entities at risk of an SAIL.

Scientific name	Common name	Principles			
		1	2	3	4
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat				X

### 8.1.2 Step 2: Evaluate the extinction risk of the entity to be impacted

#### Large-eared Pied Bat (*Chalinolobus dwyeri*) – Principle 4

The Large-eared Pied Bat is primarily cave-roosting species but may also use tunnels, derelict mines, culverts, bridges, storm-water tunnels, buildings and other man-made structures. Cave-roosting bats are vulnerable to disturbance to caves and subterranean tunnel roost sites, in particular as large numbers representing significant proportions of regional populations can congregate in one roost site for protection and breeding. Disturbance to roost sites include the removal of vegetation surrounding and immediately adjacent to the cave or tunnel entrance, changes to airflow within and at the cave or tunnel entrance and alteration of water flows and ground hydrology in the surrounding area.

Habitat loss for the Large-eared Pied Bat is a serious concern as the species is unlikely to respond to management. It is noted that no breeding habitat (i.e., caves, tunnels, mines, etc.) are present on the subject site. The impact area hosts marginal foraging habitat for the species in the form of canopy cover and insect abundance.

The removal of Tree 8 – *Eucalyptus robusta* and Tree 29 – *Glochidion ferdinandi* results in the loss of marginal foraging habitat; however, the trees are not expected to be significantly contributing to the long-term survival of the species, as they are considered to be marginal habitat, only to be used occasionally or opportunistically.

### 8.1.3 Step 3: Detail measures taken to avoid, minimise and mitigate impacts on the entity

#### Large-eared Pied Bat (*Chalinolobus dwyeri*) – Principle 4

The potential habitat of the Large-eared Pied Bat to be impacted by the proposal is limited to foraging habitat. No breeding or roosting habitat is proposed for removal. The extent of foraging habitat for the species would be reduced by the removal of two (2) trees.

The implementation of the Riparian Plan will see the planting of locally native species to increase foraging habitat for threatened species.

Two (2) nest boxes are to be added to the subject site to increase roosting opportunities for threatened microbats. This will increase the potential for microbats to roost in the area post development.



## **8.2 Additional impact assessment provisions as per Section 9.1.1 and 9.1.2. BAM 2020**

**8.2.1 Additional impact assessment provisions for threatened ecological communities at risk of an SAI**  
No TEC at risk of an SAI.

**8.2.2 Additional impact assessment provisions for threatened species at risk of an SAI**

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

The actions and measures taken to avoid the direct and indirect impacts on the species at risk of an SAI are provided in Section 8.1.3.

- 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 in which a single threatening event may rapidly affect all species occurrences), and**
  - iv. 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**

**Large-eared Pied Bat (*Chalinolobus dwyeri*)**

The behaviour and ecology of the Large-eared Pied Bat makes them vulnerable to threats affecting other cave-roosting bat species. Individuals congregate to roost and raise young. This can place a reasonable proportion of a local population at a single locality. Most cave roosts observed are in shallow caves or in the outer reaches of deeper mines or caves. This places individuals at risk from factors that can impact these areas, including heat and smoke during fires as well as predators sheltering within the caves. Sandstone escarpments provide many of the known populations with diurnal roosts and sites for raising young and other associated activities. In some areas these coincide with underground coal mining operations where cliffs can be destabilized through subsidence.

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

**Large-eared Pied Bat (*Chalinolobus dwyeri*)**

Cave-dwelling bat species are reliant on abiotic habitat which cannot be restored or replaced. Maternity caves have very specific temperature and humidity regimes.

- 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)**

**Large-eared Pied Bat (*Chalinolobus dwyeri*)**

Cave-dwelling bat species are dependent on roost sites for shelter and breeding and are particularly vulnerable to threats that impact these sites. Up to 100 individuals may be present at such roosts, possibly representing a substantial proportion of a local population.

## 9 Impact summary

### 9.1 Offset requirements for impacts

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

#### 9.1.1 Impacts on native vegetation and TECs or ECs (ecosystem credits)

##### Ecosystem credit summary

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
4027-Estuarine Swamp Oak-Mangrove Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.08	0	1	1

#### 9.1.2 Impacts on threatened species and their habitat (species credits)

##### Species credit summary

Species	Vegetation Zone/s names	Area / Count	Credits
<i>Chalinolobus dwyeri</i> / Large-eared Pied Bat	4027_Poor	0.08	1



9.2 Impacts that do not need further assessment

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

Table 9.1. Impacts that do not require further assessment.

Impact	Location within subject land	Justification why no further assessment is required
Clearing of non-native vegetation	Exotic tree and vegetation removal	Areas within the subject land that do not contain native vegetation do not need to be assessed, providing that the non-native vegetation does not provide habitat for threatened species. The cleared land dominated by >95% exotic grasses does not provide habitat for threatened species and does not require further assessment.

## 10 Mitigation Measures

### 10.1 Management tasks

#### 10.1.1 Delineation of work areas

During construction, impacts to the site and the vegetation to be retained should be minimised by the delineation of work areas. Access to the site would be best restricted to the development footprint only. An exclusion zone will be established for the vegetation outside the work areas.

#### 10.1.2 Vegetation clearing control measures

The following clearing controls explain the process and measures to be implemented prior to, during and after vegetation clearing.

- Prior to tree removal, a pre-clearance survey must be undertaken by the Project Ecologist to confirm no presence of fauna,
- No habitat trees are proposed for removal – seed is to be collected from the *Casuarina* trees and grown up by an appropriate native nursery.
- After tree removal, native trees, *Casuarina glauca*, can be mulched and stockpiled for use in landscape planting.

#### 10.1.3 Fencing and tree protection

Tree protection is to be implemented as per the Arborist report.

#### 10.1.4 Riparian zone protection

Riparian zone to be marked and protected such that works in this area are solely for the purpose of riparian rehabilitation. No soil compaction.

#### 10.1.5 Riparian zone revegetation

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

It is recommended that seeds are collected from the site during tree removal. Seeds can then be propagated and planted on-site once established. Plantings of tube stock across the site should be selected from locally native shrub and ground cover species and this is to be in accordance with bushfire protection requirements. Species characteristic of PCT 4027 – Estuarine Swamp Oak-Mangrove Forest are considered suitable for revegetation activities.

Riparian Plan to be implemented for restoration of the riparian zone.

#### **10.1.6 Native species landscaping**

Landscaping to be guided by the Landscaping Plan and Riparian Plan.

Landscape planting schedule must be revised by a qualified bush regenerator or qualified Ecologist. Schedule must use a diversity of local provenance native species from the relevant native vegetation community (or communities) that occur, or once occurred on site (rather than use exotic species or non-local native species).

#### **10.1.7 Erosion and sedimentation controls**

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

#### **10.1.8 Weed management and bush regeneration**

Weed management and bush regeneration to occur as per the Landscaping and Riparian Plan. Weed management will have to be on-going for the life of the development.

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

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

#### **10.1.9 Weed removal prior to riparian zone planting**

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.



#### 10.1.10 Native Seed Collection

Native trees being removed are to be checked for seeds during removal works. If seeds are present, they are to be collected for on and off-site planting.

#### 10.1.11 Nest boxes

Three nest boxes (hard-wood or marine-ply with stainless steel fixtures) are required. Boxes are to be secured by hanging and not rely on nailing into trees. Two for microbats and one for parrots. Boxes to be installed in trees to be retained and at least 3 m above ground. Image from: nestboxes.com.au



#### 10.1.12 Pathogen prevention

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



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



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

#### 10.1.13 Vertebrate pests including 'companion' animals

Vertebrate pests (cats, dogs, foxes) are a significant problem at the site. If domestic animals are permitted they should be inside most of the time and never out at night off-lead. Cats should never be allowed out on this site or surrounds. Careel Bay Wetlands is a designated Wildlife Protection Area and domestic animals are prohibited.

## 11 Appendices

### 11.1 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.

Common name	Scientific name	Habitat constraints	Retained in BAM-C	Reason for inclusion or removal
Curlew Sandpiper	<i>Calidris ferruginea</i>	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.	Foraging – Yes (Predicted species) Breeding – No (Candidate species)	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.
Great Knot	<i>Calidris tenuirostris</i>	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November.	Foraging – Yes (Predicted species) Breeding – No (Candidate species)	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.

Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin ( <i>Petrochelidon ariel</i> ), frequenting low to mid-elevation dry open forest and woodland close to these features.	Yes	The site presents foraging habitat for the species, considered to be marginal habitat, only to be used occasionally or opportunistically.  The development site would not be considered breeding habitat for the species. The impact area lacks key Habitat constraints. However, the site may be located within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels, as such the species is assumed present.
Deyeuxia appressa	<i>Deyeuxia appressa</i>	<i>D. appressa</i> hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology.	No	No flora bearing the key identifying features of the species was recorded during site surveys.
Beach Stone-curlew	<i>Esacus magnirostris</i>	Along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.	Not Foraging – Yes (Predicted species) Breeding – No (Candidate species)	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.



Swift Parrot	<i>Lathamus dicolor</i>	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	Foraging – Yes (Predicted species) Breeding – No (Candidate species)	<p>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.</p> <p>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.</p>
Little Bent-winged Bat	<i>Miniopterus australis</i>	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Foraging – Yes (Predicted species) Breeding – No (Candidate species)	<p>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 and insect abundance.</p> <p>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</p>

				site survey. No further assessment or consideration is required.
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops.	Foraging – Yes (Predicted species) Breeding – No (Candidate species)	<p>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 and insect abundance.</p> <p>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.</p>
Eastern Curlew	<i>Numenius madagascariensis</i>	Coastal lakes, inlets, bays and estuarine habitats, intertidal mudflats and sometimes saltmarsh of sheltered coasts, ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.	Foraging – Yes (Predicted species) Breeding – No (Candidate species)	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.

## 11.2 Appendix II – Test of Significance

Section 7.3 of the BC Act outlines the ‘test of significance’ that is to be undertaken to assess the likelihood of significant impact upon threatened species, populations or ecological communities listed under the BC Act. As a new guideline has not been produced by the OEH, these tests of significance have been undertaken in accordance with the guidelines provided in the *Threatened Species Test of Significance Guidelines* (Office of Environment and Heritage, 2018) which outlines a set of guidelines to help applicants/proponents of a development or activity with interpreting and applying the factors of assessment. The guidance provided by the Office of Environment and Heritage has been used here in preparing these tests of significance and in determining whether there is likely to be a significant effect to a threatened species, population or ecological community listed under the BC Act.

### Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

***(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction***

Not applicable.

***(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—***

***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,***

Some native trees, that represent small highly disturbed patches of the Swamp Oak Floodplain Forest would be impacted. The extent of this impact is small at about 0.08 hectares. This small impact will not have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction. The local occurrence of Swamp Oak Floodplain Forest will remain in the locality in its current form.

The proposal is not likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction. The composition of the Swamp Oak Floodplain Forest to be impacted is already heavily impacted by edge effects and past disturbance which has substantially modified the condition, structure and function of the community and no further impact is expected from the proposal.

***(c) in relation to the habitat of a threatened species or ecological community—***

***(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and***

***(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and***

***(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,***

Some native trees, that represent small highly disturbed patches of the Swamp Oak Floodplain Forest would be impacted. The extent of this impact is small at about 0.08 hectares.

The proposal does not involve breaking apart large high-quality blocks of Swamp Oak Floodplain Forest, so no further fragmentation or isolation is expected.

The trees to be cleared are not considered to be of importance to the long-term survival of the ecological community in the locality. These trees are poor quality remnants of vegetation that once was present in the area and provide little value in terms of habitat.

***(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),***

There will be no impact on any declared area of outstanding biodiversity value.

***(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.***

The proposal involves clearing of native vegetation which is listed as a Key Threatening Process under the BC Act.

## **Conclusion**

Due to the very small impact on the Swamp Oak Floodplain Forest and the poor quality of the vegetation to be removed there is unlikely to be a significant impact.

## **Planted threatened trees (*Syzygium paniculatum*)**

Magenta Lilly Pilly (*Syzygium paniculatum*) (Tree 22) has been assumed planted within the study area.

While this species has been assumed planted in the study area, it is listed as a threatened species under the BC Act and as such, impacts to this planted tree must be assessed.

Tree 22 *Syzygium paniculatum* (recommend for removal has dieback) NB: this tree is 80% likely to be a planted specimen. It will be transplanted as part of works (may or may not survive). Locally native stock (from Bangalley Headland plant will be planted on site (x3). While this one tree is being removed it is not expected to adversely affect the life cycle of the locally native population of Magenta Lilly Pilly (*Syzygium paniculatum*). This is the case if considered locally an original plant (though likely to be a planted specimen). It is proposed that the tree (“#22 - Magenta Lilly Pilly”) will be transplanted as part of works.

It is unlikely that the Magenta Lilly Pilly (*Syzygium paniculatum*) would flourish on site (if the development did not progress) as it appears to be senescing. The proposal can achieve a balance between development and conservation via effective mitigation measures. The habitat on site will not become fragmented. The area of potential habitat on site will be supported by the *Riparian Land Plan (ECA Dec 2023)*. This plan outlines the requirements for the riparian land on site and how it can be managed to support biodiversity and threatened species. There is expected to be net increase in available habitat on site post construction. At least 3 additional *Syzygium paniculatum* (local source) will be planted.

The factors to be considered when determining whether an action, development or activity is likely to significantly affect threatened species, or their habitats are outlined below:

***(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction***



The works are not expected to adversely affect the life cycle of the Magenta Lilly Pilly (*Syzygium paniculatum*). It is proposed that the tree (#22) will be transplanted as part of works. The tree is likely planted vegetation and unlikely that it would be remnant. The tree is experiencing die-back. The proposed transplant of Tree 22 and landscaping on site (which will include Magenta Lilly Pilly) is expected to support the local population. Due to these mitigation measures, it is unlikely that the species or local population will be placed at risk of extinction.

***(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—***

***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,***

Not applicable.

***(c) in relation to the habitat of a threatened species or ecological community—***

***(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and***

***(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and***

***(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,***

It is unlikely that the areas proposed for modification (landscaping and building areas) would be considered critical habitat for the Magenta Lilly Pilly (*Syzygium paniculatum*). At present, the site contains planted exotic / non-local native trees and mown lawn / exotic garden and native canopy trees mostly Swamp Mahogany and She-Oaks. The habitat on site will not become fragmented. The area of potential habitat on site will be supported by the *Riparian Land Plan (ECA Dec 2023)*. This plan outlines the requirements for the riparian land on site and how it can be managed to support biodiversity and threatened species. There is expected to be net increase in available habitat on site post construction.

It is unlikely that the Magenta Lilly Pilly (*Syzygium paniculatum*) would flourish on site, if the site were to remain undeveloped and remain in its current state. The proposal can achieve a balance between development and conservation via effective mitigation measures. No areas of habitat will become fragmented or isolated from other areas of habitat as a result of the proposed development.

***(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),***

There will be no impact on any declared area of outstanding biodiversity value.

***(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.***

The proposal is considered unlikely to contribute to the operation of a key threatening process considered likely to affect this species.

## **Conclusion**

The proposal would result in the removal of Tree 22. No natural habitats would be affected and the natural occurrences of the species would not be affected. The recovery of the species would not be affected. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect on the Magenta Lilly Pilly.

### Threatened microbats

While no threatened microbats were recorded in the study area during the field surveys, the following three species are considered moderately likely to occur based on the presence of suitable foraging habitat and nearby records:

- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)

These threatened microbats are likely to forage occasionally around the trees within the study area. The trees proposed for removal do not contain hollows, flaking bark or other roosting habitat features for microbats.

The factors to be considered when determining whether an action, development or activity is likely to significantly affect threatened species or their habitats are outlined below:

***(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction***

No known threatened microbat breeding sites are known in close proximity to the study area and the proposal would not impact on likely breeding habitat as no hollows were observed in the trees to be removed. As such, the impacts of the proposal to the threatened microbats would be limited to loss of foraging habitat caused by direct clearing or damage to street and garden trees during the construction phase.

The proposal would remove approximately 11 trees of potential foraging habitat. The proposal will not act alone in causing impacts to biodiversity, as very large areas of vegetation within the locality have already been removed, predominately for urban and industrial development in the recent past. The proposal would add to the loss of trees in the locality. Foraging habitat mainly comprises insects associated with planted native trees and shrubs. The affected area of foraging habitat would represent a small percentage of the total extent of foraging vegetation types present within the locality. Given the relatively widespread nature of similar vegetation in the locality and abundance of higher quality foraging habitat within the locality, the project is not expected to significantly affect the life cycle of the species.

***(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—***

***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,***

Not applicable.

***(c) in relation to the habitat of a threatened species or ecological community—***

***(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and***

***(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and***

***(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,***

The potential habitat of the threatened microbats within the study area is limited to foraging habitat and includes all trees and shrubs and associated air spaces. The extent of habitat for the threatened microbats would be reduced by approximately 11 trees. This amount of habitat removal is small when the amount of available foraging habitat in the locality is considered.

Importantly, the proposal would not result in fragmentation of habitat for the threatened microbats. These species are highly mobile and would freely fly long distances over open areas including urbanised city centres to move between foraging sites and roost sites. The proposal would not affect the movement of the threatened microbats between habitat patches.

Importantly, the proposal would not impact on the most important habitats for threatened microbats within the locality. The most important habitats for the local threatened microbat sub-populations are the remnant areas of native vegetation in larger reserves. The vegetation to be affected would only form a small proportion of available habitat for these species. The foraging habitat within the study area is unlikely to be of critical importance for the survival of the threatened microbats within the locality.

***(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),***

There will be no impact on any declared area of outstanding biodiversity value.

***(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.***


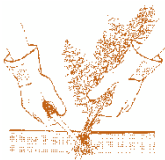

The proposal involves clearing of native vegetation which is listed as a Key Threatening Process under the BC Act.

## **Conclusion**



The threatened microbats would suffer a small reduction in extent of suitable foraging habitat from the proposal. No likely breeding sites or other important habitat would be impacted. The proposal is unlikely to reduce the population size of the threatened microbats or decrease the reproductive success of these species. The proposal would not interfere with the recovery of the threatened microbats and would not contribute to the key threats to these species. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect on the threatened microbats.

## 11.3 Appendix III – Key Weed Removal Methods

### Physical removal

Technique	Method	Equipment
<b>Hand Removal</b> 	<p>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.</p> <p>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.</p>	<p>Tools: Gloves, Rakes, Knife and Weed Bags</p>
<b>Crowning</b> 	<p>Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning.</p> <p>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</p> <p>Soil disturbance is to be kept to a minimum when using this technique.</p>	<p>Tools: Knife, mattock, trowel, impervious gloves, and all other required P.P.E.</p>
<b>Cut and Paint Stems</b> 	<p>Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent or vigorous growth will be cut and painted with Roundup® Biactive Herbicide or equivalent.</p> <p>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.</p>	<p>Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.</p>



	<p>Apply herbicide to the cut stem immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Herbicide is not to reach sediment or surrounding non-targeting plants.</p>	
<p>Scrape and Painting</p> 	<p>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.</p> <p>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 <math>\frac{3}{4}</math> of the plant height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk.</p> <p>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.</p> <p>Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.</p>	<p>Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.</p>
<p>Cut with a Chainsaw and Paint</p> 	<p>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.</p> <p>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.</p> <p>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.</p>	<p>Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.</p>

	Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.	
Spot Spraying	<p>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.</p> <p>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.</p>	<p>Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and all other required P.P.E.</p>

### 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.

## FLAME WEEDER – ECO BURN

Case Study: Weed  
Mgt and Eco-burn  
Glenorie in the  
Hills Shire Council



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

Images provided by Dragonfly  
Environmental



## 11.4 Appendix IV – Bushland Hygiene Protocols

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

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



## Facts about Phytophthora

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

### *Symptoms including Dieback*

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

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

### *Infection*

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

## 11.5 Appendix V – Field Survey Form

<b>BAM Site – Field Survey Form</b>				Site Sheet no: 1 of 1	
		<b>Survey Name</b>	<b>Zone ID</b>	<b>Recorders</b>	
<b>Date</b>	Oct 2021 /	12 John St, Avalon Beach	1	GDB	
<b>Zone</b>	<b>Datum</b>	<b>Plot ID</b>	1	<b>Plot dimensions</b>	<b>Photo #</b>
56					
<b>Easting</b>	<b>Northing</b>	<b>IBRA region</b>	Sydney Basin Pittwater	<b>Midline bearing from 0 m</b>	33°
260658	6291388				
<b>Vegetation Class</b>		Planted vegetation/remnant canopy			Confidence: H M L
<b>Plant Community Type</b>		1234	<b>EEC:</b> <input checked="" type="checkbox"/>	Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m <sup>2</sup> plot)	Sum values
Trees	4
Shrubs	1
Grasses etc.	0
Forbs	0
Ferns	0
Other	1
Count of Native Richness	
Trees	40
Shrubs	15
Grasses etc.	0
Forbs	0
Ferns	0
Other	30
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	0

BAM Attribute (1000 m <sup>2</sup> plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	Not present	Not present
50 – 79 cm	Not present	Not present
30 – 49 cm	Present	Not present
20 – 29 cm	Present	Not present
10 – 19 cm	Not present	Not present
5 – 9 cm	Not present	Not present
< 5 cm	Not present	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	No logs	

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	0	0	0	0	75	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	15					0.4					0					0				

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

### Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			Cleared and planted residential garden with remnant canopy and ground species
Cultivation (inc. pasture)			Ground species exotic with <10% natives within grass area/lawn
Soil erosion			Backs onto tidal creek - Careel Creek
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m <sup>2</sup> plot: Sheet 1 of 2		Survey Name	Plot Identifier	Recorders			
Date	Oct 2021	12 John St, Avalon Beach	1	GDB			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
TG	1 Casuarina glauca (Swamp she-oak)	N	20	8	US		
TG	2 Eucalyptus robusta (Swamp mahogany)	N	16	2	US		
TG	3 Syzygium paniculatum (Magenta lilly pilly)	N	4	1	US		
SG	4 Banksia integrifolia	N	15	2	MS		
	5						
	6						
	7 Jacaranda mimosifolia (Jacaranda)	E	2	2	US		
	8 Ficus carica (Fig)	E	1	1			
	9 Strelitzia nicolai (Giant white bird of paradise)	E	2	1			
OG	10 Archontophoenix alexandrae (Alexandra palm)	QLD N	30	4			
	11						
	12 Bouteloua dactyloides (Buffalo grass)	E					
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20 1000m2 plot						
	21 Brachychiton acerifolius (Illawarra flame tree)						
	22 Schinus areira (Pepper tree)						
	23 Carya illinoensis (Pecan tree)						
	24 Magnolia x soulangeana (Magnolia)						
	25 Liriodendron tulipifera (American tulip tree)						
	26 Grevillea robusta (Silky oak)						
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

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

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

NB: Magenta Lily Pilly not in the 20x20 plot

11.6 Appendix VI – BAM–C Reports

11.6.1 Vegetation Zones Report



BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00021287/BAAS17054/20/00021288	12A John St Avalon	22/06/2023
Assessor Name	Report Created	BAM Data version *
Kathryn Katherine Duchatel	04/12/2023	61
Assessor Number	Assessment Type	BAM Case Status
BAAS17054	Part 4 Developments (Small Area)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
2	04/12/2023	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.		

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	4027_VegetationZone1	4027-Estuarine Swamp Oak-Mangrove Forest	VegetationZone1	0.08	1	Footprint (0.08 ha)

Assessment Id	Proposal Name	Page 1 of 1
00021287/BAAS17054/20/00021288	12A John St Avalon	



11.6.2 Credit Summary Report



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00021287/BAAS17054/20/00021288	12A John St Avalon	22/06/2023
Assessor Name	Report Created	BAM Data version *
Kathryn Katherine Duchatel	04/12/2023	61
Assessor Number	BAM Case Status	Date Finalised
BAAS17054	Finalised	04/12/2023
Assessment Revision	Assessment Type	BOS entry trigger
2	Part 4 Developments (Small Area)	BOS Threshold: Biodiversity Values Map

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

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

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

Estuarine Swamp Oak-Mangrove Forest											
1	4027_Veg etationZone1	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	19.1	19.1	0.08	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	1
										<b>Subtotal</b>	<b>1</b>
										<b>Total</b>	<b>1</b>

### 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 SAIL	Species credits
<b><i>Chalinolobus dwyeri</i> / Large-eared Pied Bat ( Fauna )</b>									
4027_VegetationZone1	19.1	19.1	0.08			Vulnerable	Vulnerable	True	1
								<b>Subtotal</b>	<b>1</b>

Assessment Id

00021287/BAAS17054/20/00021288

Proposal Name

12A John St Avalon

Page 2 of 2

### 11.6.3 Predicted Species Report



## BAM Predicted Species Report

### Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00021287/BAAS17054/20/00021288	12A John St Avalon	22/06/2023
Assessor Name	Report Created	BAM Data version *
Kathryn Katherine Duchatel	04/12/2023	61
Assessor Number	Assessment Type	BAM Case Status
BAAS17054	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
2	BOS Threshold: Biodiversity Values Map	04/12/2023

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

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

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	<i>Botaurus poiciloptilus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Australian Painted Snipe	<i>Rostratula australis</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Barking Owl	<i>Ninox connivens</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Bar-tailed Godwit (baueri)	<i>Limosa lapponica baueri</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Beach Stone-curlew	<i>Esacus magnirostris</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Curlew Sandpiper	<i>Calidris ferruginea</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Dusky Woodswallow	<i>Artamus cyanopterus cyanopterus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Eastern Curlew	<i>Numenius madagascariensis</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Eastern Osprey	<i>Pandion cristatus</i>	4027-Estuarine Swamp Oak-Mangrove Forest

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## BAM Predicted Species Report

Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Great Knot	<i>Calidris tenuirostris</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Greater Sand-plover	<i>Charadrius leschenaultii</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Lesser Sand-plover	<i>Charadrius mongolus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Little Bent-winged Bat	<i>Miniopterus australis</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Little Eagle	<i>Hieraaetus morphnoides</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Little Tern	<i>Sternula albifrons</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Masked Owl	<i>Tyto novaehollandiae</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Powerful Owl	<i>Ninox strenua</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Red Knot	<i>Calidris canutus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Sanderling	<i>Calidris alba</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Spotted Harrier	<i>Circus assimilis</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Square-tailed Kite	<i>Lophoictinia isura</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Swift Parrot	<i>Lathamus discolor</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Terek Sandpiper	<i>Xenus cinereus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Turquoise Parrot	<i>Neophema pulchella</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Varied Sittella	<i>Daphoenositta chrysoptera</i>	4027-Estuarine Swamp Oak-Mangrove Forest
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	4027-Estuarine Swamp Oak-Mangrove Forest
White-throated Needletail	<i>Hirundapus caudacutus</i>	4027-Estuarine Swamp Oak-Mangrove Forest
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	4027-Estuarine Swamp Oak-Mangrove Forest

### Threatened species Manually Added

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# BAM Predicted Species Report

None added

**Threatened species assessed as not within the vegetation zone(s) for the PCT(s)**  
Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
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11.6.4 Candidate Species Report



BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00021287/BAAS17054/20/00021288	12A John St Avalon	22/06/2023
Assessor Name	Report Created	BAM Data version *
Kathryn Katherine Duchatel	04/12/2023	61
Assessor Number	Assessment Type	BAM Case Status
BAAS17054	Part 4 Developments (Small Area)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
2	04/12/2023	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
<b><i>Chalinolobus dwyeri</i></b> Large-eared Pied Bat	Yes (assumed present)	<div><input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr</div> <div><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug</div> <div><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec</div> <div><input type="checkbox"/> Survey month outside the specified months?</div>
<b><i>Deyeuxia appressa</i></b> Deyeuxia appressa	No (surveyed) *Survey months are outside of the months specified in Bionet.	<div><input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr</div> <div><input checked="" type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug</div> <div><input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec</div> <div><input checked="" type="checkbox"/> Survey month outside the specified months?</div>



## BAM Candidate Species Report

<b><i>Esacus magnirostris</i></b> Beach Stone-curlew	No (surveyed)	<input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input checked="" type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
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### Threatened species Manually Added

None added

### Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Curlew Sandpiper	<i>Calidris ferruginea</i>	Habitat constraints
Eastern Curlew	<i>Numenius madagascariensis</i>	Habitat constraints
Great Knot	<i>Calidris tenuirostris</i>	Habitat constraints
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	Habitat constraints
Little Bent-winged Bat	<i>Miniopterus australis</i>	Habitat constraints
Swift Parrot	<i>Lathamus discolor</i>	Habitat constraints

### 11.6.5 Biodiversity Credit Report (Like for like)



## BAM Biodiversity Credit Report (Like for like)

### Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00021287/BAAS17054/20/00021288	12A John St Avalon	22/06/2023
Assessor Name	Assessor Number	BAM Data version *
Kathryn Katherine Duchatel	BAAS17054	61
Proponent Names	Report Created	BAM Case Status
Tim Donovan	04/12/2023	Finalised
Assessment Revision	Assessment Type	Date Finalised
2	Part 4 Developments (Small Area)	04/12/2023
BOS entry trigger	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BOS Threshold: Biodiversity Values Map		

### Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Chalinolobus dwyeri / Large-eared Pied Bat		

### Additional Information for Approval

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## 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
4027-Estuarine Swamp Oak-Mangrove Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	0	1	1

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## BAM Biodiversity Credit Report (Like for like)

4027-Estuarine Swamp Oak-Mangrove Forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 1731, 3962, 3963, 3985, 3987, 3993, 4016, 4023, 4026, 4027, 4028, 4030, 4035, 4038, 4040, 4048, 4049, 4050, 4056	-	4027_VegetationZone1	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
<b>Chalinolobus dwyeri</b> / Large-eared Pied Bat	<b>4027_VegetationZone1</b>	0.1	1.00

### Credit Retirement Options

Like-for-like credit retirement options

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BAM Biodiversity Credit Report (Like for like)

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

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## 11.7 Appendix VII – Species Polygon





## 11.8 Appendix VIII – EPBC Act Considerations

A search of the Protected Matters Search Tool (PMST) was conducted for MNES within a 5 km radius of the subject land (see below).

### Summary

#### Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International Importance (Ramsar)</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	1
<a href="#">Listed Threatened Ecological Communities:</a>	8
<a href="#">Listed Threatened Species:</a>	108
<a href="#">Listed Migratory Species:</a>	63

#### Matters of National Environmental Significance

National Heritage Places			[ Resource Information ]
Name	State	Legal Status	Buffer Status
Natural			
<a href="#">Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves</a>	NSW	Listed place	In buffer area only

Commonwealth Marine Area	[ Resource Information ]
Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.	

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only

## Listed Threatened Ecological Communities

## [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community</a>	Endangered	Community likely to occur within area	In feature area
<a href="#">Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland</a>	Endangered	Community likely to occur within area	In feature area
<a href="#">Coastal Upland Swamps in the Sydney Basin Bioregion</a>	Endangered	Community likely to occur within area	In feature area
<a href="#">Eastern Suburbs Banksia Scrub of the Sydney Region</a>	Critically Endangered	Community may occur within area	In feature area
<a href="#">Littoral Rainforest and Coastal Vine Thickets of Eastern Australia</a>	Critically Endangered	Community likely to occur within area	In buffer area only
<a href="#">Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion</a>	Endangered	Community likely to occur within area	In buffer area only
<a href="#">River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria</a>	Critically Endangered	Community likely to occur within area	In feature area
Community Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Subtropical and Temperate Coastal Saltmarsh</a>	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species		[ Resource Information ]	
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Callocephalon fimbriatum</a> Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calyptorhynchus lathami lathami</a> South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Climacteris picumnus victoriae</a> Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Diomedea antipodensis</u></a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Diomedea antipodensis gibsoni</u></a> Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Diomedea epomophora</u></a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Diomedea exulans</u></a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Diomedea sanfordi</u></a> Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Erythrorhynchus radiatus</u></a> Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Falco hypoleucos</u></a> Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Fregetta grallaria grallaria</u></a> White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Grantiella picta</u></a> Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Hirundapus caudacutus</u></a> White-throated Needle-tail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Lathamus discolor</u></a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Limosa lapponica baueri</u></a> Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Macronectes giganteus</u></a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Macronectes halli</u></a> Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Melanodryas cucullata cucullata</u></a> South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Neophema chrysostoma</u></a> Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Numenius madagascariensis</u></a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Pachyptila turtur subantarctica</u></a> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Phoebastria fusca</u></a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Pterodroma leucoptera leucoptera</u></a> Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Pterodroma neglecta neglecta</u></a> Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Pycnoptilus floccosus</u></a> Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Rostratula australis</u></a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Stagonopleura guttata</u></a> Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Sternula nereis nereis</u></a> Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Thalassarche bulleri</u></a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Thalassarche bulleri platei</u></a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Thalassarche carteri</u></a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Thalassarche cauta</u></a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Thalassarche eremita</u></a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#"><u>Thalassarche impavida</u></a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Thalassarche melanophris</u></a> Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Thalassarche salvini</u></a> Salvin's Albatross [66463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Thalassarche steadi</u></a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<b>FISH</b>			
<a href="#"><u>Epinephelus daemeli</u></a> Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Hippocampus whitei</u></a> White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Macquaria australasica</u></a> Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Prototroctes maraena</u></a> Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Seriola brama</u></a> Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Thunnus maccoyii</u></a> Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
<b>FROG</b>			
<a href="#"><u>Heleioporus australiacus</u></a> Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Litoria aurea</u></a> Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Mixophyes balbus</u></a> Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<b>MAMMAL</b>			
<a href="#"><u>Balaenoptera borealis</u></a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#"><u>Balaenoptera musculus</u></a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Balaenoptera physalus</u></a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#"><u>Chalinolobus dwyeri</u></a> Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Dasyurus maculatus maculatus (SE mainland population)</u></a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Eubalaena australis</u></a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Isopodon obesulus obesulus</u></a> Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Notamacropus parma</u></a> Parma Wallaby [89289]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Petauroides volans</u></a> Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Petaurus australis australis</u></a> Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Petrogale penicillata</u></a> Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</u></a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Potorous tridactylus tridactylus</u></a> Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Pseudomys novaehollandiae</u></a> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Pteropus poliocephalus</u></a> Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
<b>OTHER</b>			
<a href="#"><u>Dendronephthya australis</u></a> Cauliflower Soft Coral [90325]	Endangered	Species or species habitat may occur within area	In buffer area only
<b>PLANT</b>			
<a href="#"><u>Acacia bynoeana</u></a> Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Acacia terminalis subsp. Eastern Sydney (G.P. Phillips 126) listed as Acacia terminalis subsp. terminalis MS</u></a> Sunshine Wattle (Sydney region) [91564]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Asterolasia elegans</u></a> [56780]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Astrotricha crassifolia</u></a> Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Caladenia tessellata</u></a> Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Cryptostylis hunteriana</u></a> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Cynanchum elegans</u></a> White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In buffer area only
<a href="#"><u>Darwinia biflora</u></a> [14619]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Eucalyptus camfieldii</u></a> Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Genoplesium baueri</u></a> Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Grevillea shiressii</u></a> [19186]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
<a href="#"><u>Haloragodendron lucasii</u></a> Hal [6480]	Endangered	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Kunzea rupestris</u></a> [8798]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Lasiopetalum joyceae</u></a> [20311]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Leucopogon exolasius</u></a> Woronora Beard-heath [14251]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Melaleuca biconvexa</u></a> Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Melaleuca deanei</u></a> Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Micromyrtus blakelyi</u></a> [6870]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Persicaria elatior</u></a> Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Persoonia hirsuta</u></a> Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area	In buffer area only
<a href="#"><u>Pimelea curviflora var. curviflora</u></a> [4182]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Prostanthera densa</u></a> Villous Mintbush [12233]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Prostanthera junonis</u></a> Somersby Mintbush [64960]	Endangered	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Rhizanthella slateri</u></a> Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In buffer area only
<a href="#"><u>Rhodamnia rubescens</u></a> Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Rhodomyrtus psidioides</u></a> Native Guava [19162]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Syzygium paniculatum</u></a> Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Thesium australe</u></a> Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<b>REPTILE</b>			
<a href="#"><u>Caretta caretta</u></a> Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Chelonia mydas</u></a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#"><u>Dermochelys coriacea</u></a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#"><u>Eretmochelys imbricata</u></a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Hoplocephalus bungaroides</u></a> Broad-headed Snake [1182]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Natator depressus</u></a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<b>SHARK</b>			
<a href="#"><u>Carcharias taurus (east coast population)</u></a> Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Carcharodon carcharias</u></a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Galeorhinus galeus</a> School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In feature area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Sphyrna lewini</a> Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
<b>SNAIL</b>			
<a href="#">Meridolum maryae</a> Maroubra Woodland Snail, Maroubra Land Snail [89884]	Endangered	Species or species habitat known to occur within area	In buffer area only

Listed Migratory Species			[ Resource Information ]
Scientific Name	Threatened Category	Presence Text	Buffer Status
<b>Migratory Marine Birds</b>			
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
<a href="#">Ardenna carneipes</a> Flesh-footed Shearwater, Flesh-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Ardenna grisea</a> Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Diomedea epomophora</u></a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Diomedea exulans</u></a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Diomedea sanfordi</u></a> Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Fregata ariel</u></a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Fregata minor</u></a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Macronectes giganteus</u></a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#"><u>Macronectes halli</u></a> Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Phaethon lepturus</u></a> White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Phoebastria fusca</u></a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Sternula albifrons</u></a> Little Tern [82849]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Thalassarche bulleri</u></a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Thalassarche carteri</u></a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Thalassarche cauta</u></a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Thalassarche eremita</u></a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#"><u>Thalassarche impavida</u></a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#"><u>Thalassarche melanophris</u></a> Black-browed Albatross [64472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Thalassarche salvini</u></a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#"><u>Thalassarche steadi</u></a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<b>Migratory Marine Species</b>			
<a href="#"><u>Balaenoptera borealis</u></a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#"><u>Balaenoptera edeni</u></a> Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Balaenoptera musculus</u></a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Balaenoptera physalus</u></a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#"><u>Caperea marginata</u></a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#"><u>Carcharhinus longimanus</u></a> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Carcharodon carcharias</u></a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Caretta caretta</u></a> Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Chelonia mydas</u></a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#"><u>Dermochelys coriacea</u></a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#"><u>Dugong dugon</u></a> Dugong [28]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Eretmochelys imbricata</u></a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Eubalaena australis</u></a> as <a href="#"><u>Balaena glacialis australis</u></a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Lagenorhynchus obscurus</u></a> Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Lamna nasus</u></a> Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
<a href="#"><u>Megaptera novaeangliae</u></a> Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
<a href="#"><u>Mobula alfredi as Manta alfredi</u></a> Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Mobula birostris as Manta birostris</u></a> Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Natator depressus</u></a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#"><u>Orcinus orca</u></a> Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Rhincodon typus</u></a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
<b>Migratory Terrestrial Species</b>			
<a href="#"><u>Cuculus optatus</u></a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
<a href="#"><u>Hirundapus caudacutus</u></a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Monarcha melanopsis</u></a> Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
<a href="#">Symposiachrus trivirgatus</a> as <a href="#">Monarcha trivirgatus</a> Spectacled Monarch [83946]		Species or species habitat may occur within area	In feature area
<b>Migratory Wetlands Species</b>			
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#"><u>Limosa lapponica</u></a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
<a href="#"><u>Numenius madagascariensis</u></a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#"><u>Pandion haliaetus</u></a> Osprey [952]		Species or species habitat known to occur within area	In buffer area only
<a href="#"><u>Tringa nebularia</u></a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

## Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community

Significant impact criteria as per the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment, Water, Heritage and the Arts 2013).

**An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:**

- **reduce the extent of an ecological community**

Some native trees, that represent small highly disturbed patches of the Coastal Swamp Oak Forest would be impacted. The extent of this impact is small at about 0.08 hectares.

In relation to the extent of Coastal Swamp Oak Forest across a broader area, 0.52 ha of PCT 4027 (equivalent to Coastal Swamp Oak Forest) is mapped by the NSW State Vegetation Type Map (DPE 2022) as occurring within 500 m of the development footprint (Figure 11.1). The clearing of 0.08 ha (this is an overestimate) of Coastal Swamp Oak Forest equates to the loss of 15% of Coastal Swamp Oak Forest within 500 m of the development footprint. However, it is noted that an area of approximately 0.04 ha (potentially more with Council's permission) will be revegetated and restored as PCT 4027 under the Riparian Plan (Kingfisher 2023).



Figure 11.2. Mapped areas of PCT 4027-Estuarine Swamp Oak-Mangrove Forest within 500 metres of the subject land. Source: NSW State Vegetation Type Map (DPE 2022).



- **fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines**

The proposal does not involve breaking apart large high-quality blocks of Coastal Swamp Oak Forest, so no further fragmentation or isolation is expected.

- **adversely affect habitat critical to the survival of an ecological community**

The trees to be cleared are not considered to be of importance to the long-term survival of the ecological community in the locality. These trees are poor quality remnants of vegetation that once was present in the area and provide little value in terms of habitat.

- **modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

The proposal does not modify or destroy abiotic factors necessary for the ecological community's survival.

- **cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The proposal does not cause substantial changes in the species composition of the ecological community.

The implementation of the Riparian Plan is expected to increase species composition on the subject land.

- **cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**
  - **assisting invasive species, that are harmful to the listed ecological community, to become established, or**

The proposal will see the implementation of the Riparian Plan.

The Riparian Plan is to include weed management targets that will assist in the reduction of invasive species on the subject land. Weeds are to be managed before, during and after construction works.

- **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or**

No fertilisers, herbicides or other chemicals or pollutants are proposed that would kill or inhibit the growth of species in the ecological community.

- **interfere with the recovery of an ecological community.**

The proposal is not expected to interfere with the recovery of the ecological community. The recovery of the ecological community on the subject land is to be aided by the implementation of the Riparian Plan.

## 11.9 Appendix VIII – BDAR Requirements Compliance

### Minimum information requirements for the Biodiversity Development Assessment Report: Streamlined assessment module – Small area

Report section	BAM ref.	Information	Maps & tables (in document)	Data (to be supplied)	BDAR ref.
Introduction	Chapters 2 and 3	<b>INFORMATION</b> Introduction to the biodiversity assessment including: <ul style="list-style-type: none"> <li><input type="checkbox"/> brief description of proposed development</li> <li><input type="checkbox"/> identification of subject land boundary, including:               <ul style="list-style-type: none"> <li><input type="checkbox"/> operational footprint</li> <li><input type="checkbox"/> construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure</li> </ul> </li> <li><input type="checkbox"/> general description of the subject land</li> <li><input type="checkbox"/> Sources of information used in the assessment, including reports and spatial data</li> <li><input type="checkbox"/> Identification of assessment method applied (i.e. linear or site-based)</li> </ul>			Section 1
		<b>MAPS and TABLES (in document)</b> <input type="checkbox"/> Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)			Section 1
		DATA (to be supplied) – N/A			
Landscape	Section 3.1 and 3.2, Appendix E	<b>INFORMATION</b> Identification of site context components and landscape features at the proposed site, including: <ul style="list-style-type: none"> <li><input type="checkbox"/> general description of subject land topographic and hydrological setting, geology and soils</li> <li><input type="checkbox"/> percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2 (4 .))</li> </ul>			Section 2

	<div data-bbox="562 212 1861 635"> <input type="checkbox"/> IBRA bioregions and subregions (as described in BAM Subsection 3.1.3 (2 .))                      Other relevant landscape features which may include:  <input type="checkbox"/> rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3 (3 –4.) and Appendix E)  <input type="checkbox"/> wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3 (4 .))  <input type="checkbox"/> connectivity of different areas of habitat (as described in BAM Subsection 3.1.3 (5 –6 .))  <input type="checkbox"/> areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3 (7.) and 3.1.3 (10 .))  <input type="checkbox"/> areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3 (8 –9 .))                 </div> <div data-bbox="562 659 1861 1441"> <p><b>MAPS and TABLES (in document)</b></p> <input type="checkbox"/> Site Map                     <ul style="list-style-type: none"> <li><input type="checkbox"/> boundary of subject land</li> <li><input type="checkbox"/> cadastre of subject land</li> <li><input type="checkbox"/> landscape features identified in BAM Subsection 3.1.3</li> <li><input type="checkbox"/> areas of outstanding biodiversity value within the subject land</li> </ul> <input type="checkbox"/> Location Map                     <ul style="list-style-type: none"> <li><input type="checkbox"/> digital aerial photography at 1:1,000 scale or finer</li> <li><input type="checkbox"/> boundary of subject land</li> <li><input type="checkbox"/> 1500 m buffer area <i>or</i> 500 m buffer for linear development</li> <li><input type="checkbox"/> landscape features identified in BAM Subsection 3.1.3</li> <li><input type="checkbox"/> additional detail (e.g. local government area boundaries) relevant at this scale</li> <li><input type="checkbox"/> areas of outstanding biodiversity value within the assessment area</li> </ul> <p>Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location map include:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> IBRA bioregions and subregions</li> <li><input type="checkbox"/> rivers, streams and estuaries</li> </ul> </div>	<p>Section 2</p>
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		<input type="checkbox"/> wetlands and important wetlands <input type="checkbox"/> connectivity of different areas of habitat <input type="checkbox"/> areas of geological significance and soil hazard features	
		<b>DATA (to be supplied)</b> <input type="checkbox"/> All report maps as separate jpeg files Individual digital shape files of: <ul style="list-style-type: none"> <li><input type="checkbox"/> subject land boundary</li> <li><input type="checkbox"/> assessment area (i.e. buffer area) boundary</li> <li><input type="checkbox"/> cadastral boundary of subject land</li> <li><input type="checkbox"/> areas of native vegetation cover</li> <li><input type="checkbox"/> areas of habitat connectivity</li> </ul>	Uploaded to BOAMs
Native vegetation, TECs and vegetation integrity	Chapter 4	<b>INFORMATION</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Patch size (in accordance with BAM Subsection 4.3.2 )</li> <li><input type="checkbox"/> Identification of the dominant PCT on the subject land and extent (ha) with justification of method used (existing information or plot-based survey data)</li> <li><input type="checkbox"/> Identification of any TEC associated with the PCT (BAM Subsection 4.2.2 )</li> <li><input type="checkbox"/> Estimate of percent cleared value of dominant PCT (BAM Subsection 4.2.1 (5 .))</li> <li><input type="checkbox"/> Identification of any TEC on site that is not associated with the dominant PCT (Note: This TEC is required to be assessed and offset.)</li> <li><input type="checkbox"/> Equivalence with mapping units of previous vegetation maps reviewed as part of the assessment (i.e. equivalent mapping units)</li> <li><input type="checkbox"/> Vegetation integrity of the PCT(s) on the subject land as individual vegetation zones <input type="checkbox"/></li> <li><input type="checkbox"/> 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 )</li> <li><input type="checkbox"/> Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsections 4.3.3 (5 .))</li> </ul>	Section 3



		<p>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):</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> identify the PCT or vegetation class for which local benchmark data will be applied</li> <li><input type="checkbox"/> identify published sources of local benchmark data (if benchmarks obtained from published sources)</li> <li><input type="checkbox"/> describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)</li> <li><input type="checkbox"/> provide justification for use of local data rather than BioNet Vegetation Classification benchmark values</li> </ul>	
		<p><b>MAPS and TABLES (in document)</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Map of native vegetation extent for the subject land (as described in BAM Section 3.1 )</li> <li><input type="checkbox"/> Map of PCT/vegetation zones within the subject land (as described in BAM Section 4.2 (1 .)</li> <li><input type="checkbox"/> Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries</li> <li><input type="checkbox"/> Map of TEC distribution on the subject land</li> <li><input type="checkbox"/> Patch size of native vegetation (as described in BAM Subsection 4.3.2 )</li> </ul> <p>Table of current vegetation integrity scores for vegetation zone within the site including:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> composition condition score</li> <li><input type="checkbox"/> structure condition score</li> <li><input type="checkbox"/> function condition score</li> </ul> <p><input type="checkbox"/> Report from BAM-C (Small area module) including vegetation integrity scores (BAM Section 4.4 )</p>	Section 3
		<p><b>DATA (to be supplied)</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> All report maps as separate jpeg files</li> <li><input type="checkbox"/> Plot field data (MS Excel format)</li> <li><input type="checkbox"/> Digital shape files for all maps and spatial data</li> <li><input type="checkbox"/> Field data sheets (if relevant) for determining vegetation integrity (BAM Subsection 4.3.4 )</li> </ul>	Uploaded to BOAMs Appendix V

Habitat suitability for threatened species	Chapter 5 and Section 9.1	<p><b>INFORMATION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land</li> <li><input type="checkbox"/> 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</li> <li><input type="checkbox"/> 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 )</li> <li><input type="checkbox"/> Identification of candidate species credit species that are at risk of an SAI and therefore, must be further assessed (BAM Section 9.1 )</li> </ul> <p>Note: Candidate species credit species that are not at risk of an SAI and not incidentally recorded on the subject land do not require further assessment.</p> <p>For candidate species credit species that are at risk of an SAI, 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:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> justification for determining that a candidate species credit species at risk of an SAI 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)</li> <li><input type="checkbox"/> determination of the presence of remaining candidate species credit species at risk of an SAI (by assuming presence, conducting a threatened species survey or an expert report).</li> </ul> <p>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.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> species polygons identifying the location and area of suitable habitat for each candidate threatened species at risk of an SAI that is recorded on the subject land and is measured by area, OR</li> <li><input type="checkbox"/> 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 SAI that is recorded on the subject land and is measured by count</li> </ul>	Section 4, 8
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		<input type="checkbox"/> species polygons for each threatened species identified on the subject land that is not at risk of an SAI (i.e. incidentally observed during site visit) <input type="checkbox"/> Determination of habitat condition within species polygon/s for each threatened species (measured by area) at risk of an SAI or incidentally observed during the site visit (Step 6 of BAM Section 5.2 ) <input type="checkbox"/> For flora species credit species at risk of an SAI 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 .))	
		<b>MAPS and TABLES (in document)</b> <input type="checkbox"/> Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1 , and: <input type="checkbox"/> 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 <input type="checkbox"/> identifying the sensitivity to gain class of each species (BAM Section 5.4 ) <input type="checkbox"/> Table detailing species credit species within the subject land at risk of an SAI (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 ) <input type="checkbox"/> Map of species credit species records within the subject land and species polygons for flora and fauna species at risk of an SAI or incidentally observed during the site visit (as described in BAM Subsection 5.2.5 (1 –7 .))	Section 8, 10
		<b>DATA (to be supplied)</b> <input type="checkbox"/> Digital shape files of species polygons <input type="checkbox"/> Species polygon map in jpeg format <input type="checkbox"/> Expert reports and any supporting data used to support conclusions of the expert report <input type="checkbox"/> Field data sheets (if relevant) for threatened species surveys	Uploaded to BOAMs
Prescribed impacts	Chapter 6	<b>INFORMATION</b> <input type="checkbox"/> Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	Section 9
		<b>MAPS AND TABLES (in document)</b>	Section 2

		<input type="checkbox"/> If relevant, maps showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	
		<b>DATA (to be supplied)</b> <input type="checkbox"/> If relevant, digital shape files of prescribed impact feature locations <input type="checkbox"/> Prescribed impact features map in jpeg format	Uploaded to BOAMs
Avoid and minimise impacts	Chapter 7	<b>INFORMATION</b> 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: <ul style="list-style-type: none"> <li><input type="checkbox"/> modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology</li> <li><input type="checkbox"/> alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location</li> <li><input type="checkbox"/> 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</li> </ul> <input type="checkbox"/> 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) <input type="checkbox"/> 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 5
		<b>MAPS and TABLES (in document)</b> <input type="checkbox"/> 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 <input type="checkbox"/> Map of final proposal footprint, including construction and operation <input type="checkbox"/> Maps demonstrating indirect impact zones where applicable	Section 1, 11
		<b>DATA (to be supplied)</b> Digital shape files of: <ul style="list-style-type: none"> <li><input type="checkbox"/> final proposal footprint</li> <li><input type="checkbox"/> direct and indirect impact zones</li> </ul>	Uploaded to BOAMs

		<input type="checkbox"/> Maps in jpeg format	
Assessment of impacts	Chapter 8, Section 8.1 and 8.2	<b>INFORMATION</b> Determine the impacts on native vegetation and threatened species habitat, including: <ul style="list-style-type: none"> <li><input type="checkbox"/> description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Sections 8.1 )</li> <li><input type="checkbox"/> description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal (as described in BAM Subsection 8.2</li> <li><input type="checkbox"/> Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K</li> </ul>	Section 6, 7, 8, 9
		<b>MAPS and TABLES (in document)</b> <input type="checkbox"/> Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Section 3
		<b>DATA (to be supplied) – N/A</b>	
Mitigation and management of impacts	Chapter 8, Section 8.4 and 8.5	<b>INFORMATION</b> 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.): <ul style="list-style-type: none"> <li><input type="checkbox"/> techniques, timing, frequency and responsibility</li> <li><input type="checkbox"/> identify measures for which there is risk of failure</li> <li><input type="checkbox"/> evaluate the risk and consequence of any residual impacts</li> <li><input type="checkbox"/> document any adaptive management strategy proposed</li> </ul> Identification of measures for mitigating impacts related to: <ul style="list-style-type: none"> <li><input type="checkbox"/> displacement of resident fauna (as described in BAM Subsection 8.4.1 )</li> <li><input type="checkbox"/> indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1 (3 .))</li> <li><input type="checkbox"/> mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2 )</li> </ul> <input type="checkbox"/> 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



		<b>MAPS and TABLES (in document)</b> <input type="checkbox"/> Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Section 11
		<b>DATA (to be supplied) – N/A</b>	
Thresholds for assessing and offsetting impacts of the proposal	Chapter 9	<b>INFORMATION</b> <input type="checkbox"/> Information from the TBDC and/or other sources to report on the current status of threatened species, threatened populations at risk of an SAI and TEC/s for the proposal, and <input type="checkbox"/> Report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1 <input type="checkbox"/> Report on impacts of the proposal on threatened species and/or threatened populations at risk of an SAI in accordance with BAM Section 9.1 <input type="checkbox"/> Identification of impacts requiring offset in accordance with BAM Section 9.2 <input type="checkbox"/> Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1 (3 .) <input type="checkbox"/> Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 8
		<b>MAPS and TABLES (in document)</b> <input type="checkbox"/> Map showing the extent of TECs at risk of an SAI within the subject land <input type="checkbox"/> Map showing the location of threatened species at risk of an SAI within the subject land Map showing location of: <input type="checkbox"/> impacts requiring offset <input type="checkbox"/> impacts not requiring offset <input type="checkbox"/> areas not requiring assessment	Appendix II
		<b>DATA (to be supplied)</b> Digital shape files of: <input type="checkbox"/> extent of TECs at risk of an SAI within the subject land <input type="checkbox"/> threatened species at risk of an SAI within the subject land <input type="checkbox"/> boundary of impacts requiring offset	Uploaded to BOAMS

		<input type="checkbox"/> boundary of impacts not requiring offset <input type="checkbox"/> boundary of areas not requiring assessment <input type="checkbox"/> Maps in jpeg format	
Applying the no net less standard	Chapter 10	<b>INFORMATION</b> <input type="checkbox"/> Description of the impact on PCTs/TECs <input type="checkbox"/> Description of the impact on threatened species at risk of an SAI or incidentally observed via site visit <input type="checkbox"/> Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9 <input type="checkbox"/> 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 Note: Species credits for any species at risk of an SAI 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. <input type="checkbox"/> Identification of credit class for ecosystem credits and species credits according to BAM Section 10.2 (this can be generated from BAM-C)	Section 8, 10
		<b>MAPS and TABLES (in document)</b> <input type="checkbox"/> Table showing biodiversity risk weightings <input type="checkbox"/> Table of BC Act listing status for PCTs and threatened species requiring offset <input type="checkbox"/> Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1 ) <input type="checkbox"/> Table of species at risk of an SAI or incidentally observed on site assessed for species credits and the number of credits required <input type="checkbox"/> BAM-C credit report	Section 10, Appendix VI
		<b>DATA (to be supplied) – N/A</b>	

## 12 Expertise of authors

With over 20 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and on-ground knowledge make Geraldene a valuable contribution to any project.

Geraldene has over 8 years local government experience as manager of environment and education for Pittwater Council. Geraldene presented papers on the topic at the NSW Coastal Conference, Sydney CMA and Hawkesbury Nepean forums. Geraldene is a Technical Advisor Sydney Olympic Park Wetland Education and Training (WET) panel.

Geraldene has up to date knowledge of environmental policies and frequently provides input to such works. Geraldene was a key contributor to the recent set of Guidelines commissioned by South East Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

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

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

### Geraldene Dalby-Ball DIRECTOR



#### SPECIALISATIONS

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

#### CAREER SUMMARY

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

#### QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University
- **Accredited Biobank Assessor** – in renewal
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- **Practicing member** Ecological Consultants Association of NSW

Brooke is a passionate and dedicated ecologist with valuable on ground experience working on bush regeneration projects throughout the Sydney Region. She has worked with various stakeholders across both public and private sectors to deliver sustainable and achievable environmental outcomes. She has worked on major construction contractors as well as smaller contractors to deliver tailored environmental solutions on time and within budget.

Brooke completed her Bachelor of Science at the University of Wollongong and is currently expanding her skills and knowledge undertaking Cert III in Conservation and Ecosystem at TAFE.

Brooke has experience conducting fieldwork and preparing a range of reports including the Flora and Fauna Assessment, Vegetation Management Plan (VMP), Biodiversity Development Assessment Report (BDAR), Certification Certification, Construction Environmental Management Plan (CEMP), Review of Environmental Factors (REF), and Environmental Impact Assessment (EIA).

Brooke has exceptional communication and customer service skills and can deliver professional ecological assessments.

#### Key Projects:

- Threatened species surveys.
- Flora and fauna surveys.
- Fauna spotter and handler.
- Aquatic fauna relocation.

## Brooke Thompson ECOLOGIST



### SPECIALISATIONS

- GIS mapping
- Fauna spotting
- Aquatic fauna relocation and handling
- Habitat tree assessment, marking and mapping
- Floristic plot surveys
- Flora and fauna field surveys

### CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. June 2022-*present*
- **Natural Area Specialist**, Dragonfly Environmental. January 2022-*present*
- **Volunteer**, Microplastic Surveying, University of Wollongong 2021
- **Volunteer**, Frog Surveying, Chad Beranek B EnvSc (Hons) UTS 2016

### QUALIFICATIONS AND MEMBERSHIPS

- **BSc Conservation Biology**, University of Wollongong.
- Currently undertaking Cert III Conservation and Ecosystem Management.
- WHS General Induction of Construction Industry NSW White Card.
- Early Career Ecological Consultant. Ecological Consultants Association of NSW.