Streamlined Biodiversity Development Assessment Report

141 Riverview Road, Avalon Beach NSW 2107

Report prepared by Narla Environmental Pty Ltd

For Uday Bonu

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NARLA
environmental

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Report Certification

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Glossary

Acronym/ Term	Definition
Accredited Biodiversity Assessor	Individuals accredited by the Department of Planning, Industry and Environment (DPIE) to apply the Biodiversity Assessment Method.
BAM	The NSW Biodiversity Assessment Method 2020
BAMC	The NSW Biodiversity Assessment Method Calculator
BC Act	New South Wales Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified.
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity from the impacts of development.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BOS	NSW Biodiversity Offset Scheme
DA	Development Application
DPIE	NSW Department of Planning, Industry and Environment (formerly OEH)
Ecosystem credit	The class of biodiversity credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ha	Hectares
HTE	High Threat Exotic
km	Kilometres
LALC	Local Aboriginal Land Council
LGA	Local Government Area
Locality	A 1,500m buffer area surrounding the Subject Land
m	metres
Native Vegetation	Means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland.
NSW	The State of New South Wales
OEH	Office of Environment and Heritage (now DPIE)
PCT	NSW Plant Community Type
Proposal	The development, activity or action proposed
PWSGF	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion
SAII	Serious and Irreversible Impacts
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy

Acronym/ Term	Definition
Species credit	The class of biodiversity credit that relate to threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject Land	The footprint of the proposed development
Subject Property	141 Riverview Road, Avalon Beach NSW 2107 (Lot 2/-/DP833902)
TEC	Threatened Ecological Community
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016
VI	Vegetation Integrity
VIS Plot	Vegetation Integrity Survey Plot
VMP	Vegetation Management Plan

Executive Summary

Narla Environmental Pty Ltd (Narla) was commissioned by Uday Bonu ('the proponent') to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application (DA) for the proposed development at 141 Riverview Road, Avalon Beach NSW 2107 (Lot 2/-/DP833902; the Subject Property). The BDAR will assess the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation 2017. The assessment has been completed as a streamlined assessment in accordance with Appendix L of the Biodiversity Assessment Method (BAM; DPIE 2020b).

The proposed development will involve the construction of a new multistorey dwelling. The proposed development has been divided into two (2) components, which are collectively referred to as the 'Subject Land':

- Operational footprint: the footprint of the proposed dwelling; and
- Additional footprint for construction: additional land that can be used for temporary/ancillary construction facilities.

The proposed development has been purposefully designed to minimise impacts on biodiversity values as much as possible. Due to the vegetated nature of the property, there are limited alternate locations for the proposed development.

The proposed development is expected to impact one (1) Plant Community Type (PCT): PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion. The following ecosystem credit is required to be offset in order to mitigate the impacts upon biodiversity as a result of the proposed development:

- One (1) ecosystem credit for PCT 1214.

The vegetation identified within the Subject Land conforms to the BC Act Listed Endangered Ecological Community (EEC), Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (PWSGF). PWSGF is listed as an 'SAII entity' within the BioNet Threatened Biodiversity Data Collection (DPIE 2021d). Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the proposed impacts are serious and irreversible has been undertaken in accordance with Section 9.1 of the BAM (DPIE 2020b): 'Additional impact assessment provisions for ecological communities'.

Suitable habitat was identified within the Subject Land for two (2) species credit species who were not able to be appropriately surveyed for and have therefore been assumed present. The following species credits are required to be offset in order to mitigate the impacts upon these species as a result of the proposed development:

- One (1) species credit for *Genoplesium baueri* (Bauer's Midge Orchid; Assumed Present); and
- One (1) species credit for *Hygrocybe aurantipes* (Assumed Present).

Both of these species are listed as an 'SAII entity' within the BioNet Threatened Biodiversity Data Collection (DPIE 2021d). Due to the potential sensitivity of these threatened species to any impact, a determination of whether or not the proposed impacts are serious and irreversible has been undertaken in accordance with Section 9.1 of the BAM (DPIE 2020b): 'Additional impact assessment provisions for threatened species or populations.'

In order to avoid and minimise potential impacts of the proposal on local biodiversity values, a series of mitigation and management measures have been identified, which are to be implemented as part of any Construction Environmental Management Plan (CEMP) produced for the site. This includes assigning a Project Ecologist to undertake an extensive pre-clearing survey, and to supervise the clearing of all vegetation in relation to the proposed development. Additionally, a Vegetation Management Plan (VMP) has been produced to guide the rehabilitation and revegetation of PWSGF within the greater Subject Property (Narla 2021).

1. Introduction

1.1 Overview

Narla was commissioned by Uday Bonu ('the proponent') to prepare this BDAR to accompany a DA for the proposed development at 141 Riverview Road, Avalon Beach NSW 2107 (Lot 2/-/DP833902; the Subject Property; **Figure 1**). This BDAR is required as the proposed works will impact upon land that is mapped as having Biodiversity Values on the Biodiversity Values Map (**Figure 2**). This BDAR will assess the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017 and BAM (DPIE 2020b).

Narla have produced this report in order to assess any potential impacts associated with the DA and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority. The assessment has been completed in accordance with Appendix L of the BAM (DPIE 2020b).

1.2 Assessment Method Applied

This BDAR will be prepared as a site-based 'Streamlined assessment module – small area development that requires consent' as the proposed works do not exceed the clearing threshold for small area developments as outlined in the BAM (DPIE 2020b; **Table 1**).

Table 1. Area limits for application of small area development threshold. Bold indicates the threshold relevant to this report.

Minimum lot size associated with the property	Maximum area limit for application of the small area development module
Less than 1ha	**≤1ha**
Less than 40ha but not less than 1ha	≤2ha
Less than 1000ha but not less than 40ha	≤5ha
1000ha or more	≤10ha

1.3 The Proposed Development

The proposed development will involve the construction of a new multistorey dwelling (**Figure 3**). The proposed works will encompass the majority of the Subject Property. The proposed development has been divided into two (2) components, which are collectively referred to as the 'Subject Land' (**Figure 1**):

- Operational footprint (0.03ha): the footprint of the proposed dwelling; and
- Additional footprint for construction (35m^2): additional land that can be used for temporary/ancillary construction facilities.

The Subject Land covers an area of approximately 0.03ha of modified remnant bushland including both native and exotic species.

Northern Beaches Council granted development consent for the construction of a covered two car space parking platform at the site frontage to Riverview Road (DA2019/1449; **Figure 1**). As such, this area was excluded from the BDAR.

1.4 Site Location and Description

The Subject Property is situated within a residential landscape in the suburb of Avalon Beach in the Northern Beaches Local Government Area (LGA; **Figure 4**). It is also located within the boundaries of the Metropolitan Local Aboriginal Land Council (Metropolitan LALC; Aboriginal Land Council 2021). It has an area of 0.07ha, has frontage to Riverview Road to the east and is bound by residential properties to the north, south and west. The Subject Property comprises remnant bushland, exotic vegetation and an existing shared access way/driveway.

Figure 1. The components of the Subject Land.

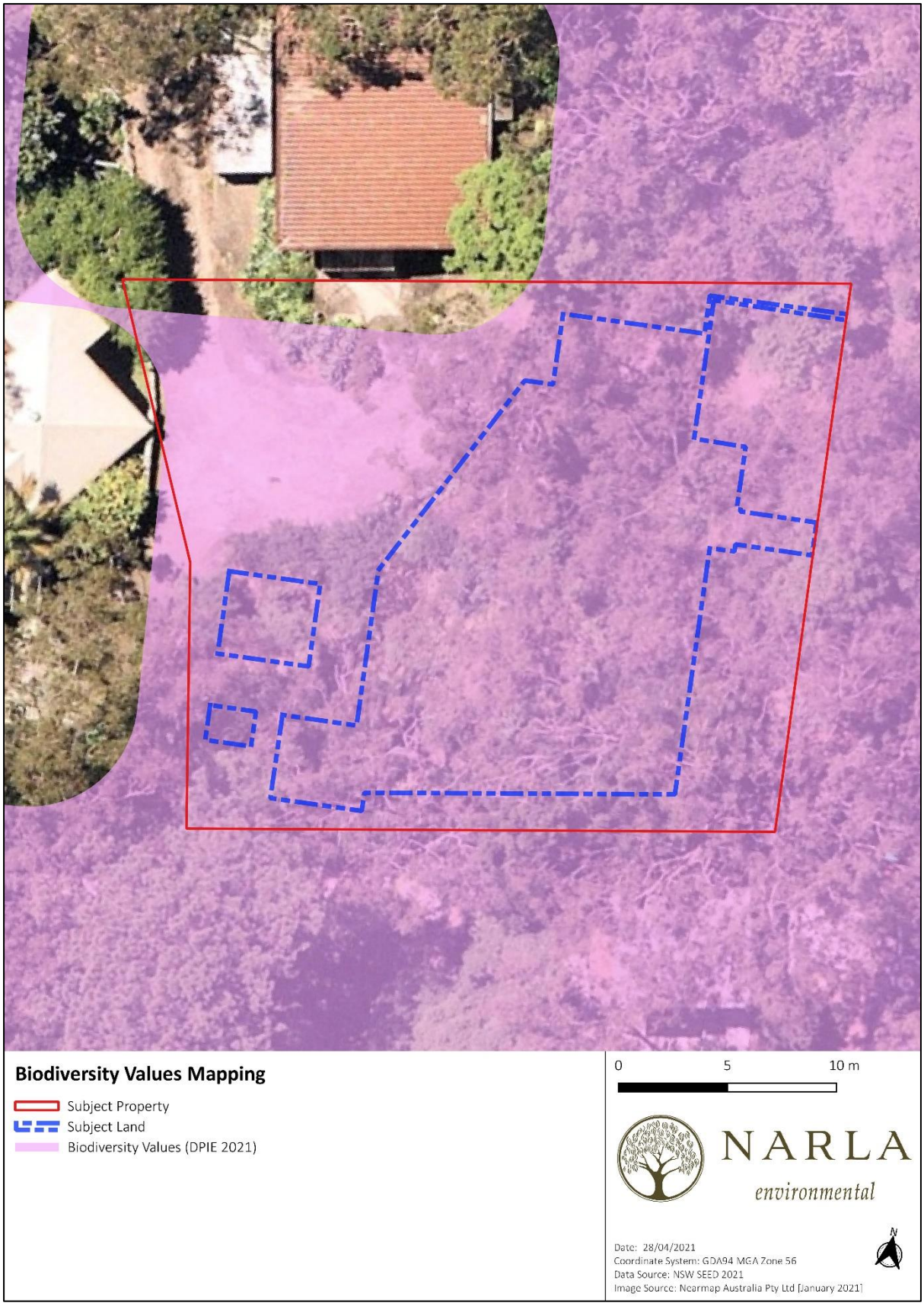

Figure 2. Location of the Subject Land in relation to the DPIE mapped Biodiversity Values land.

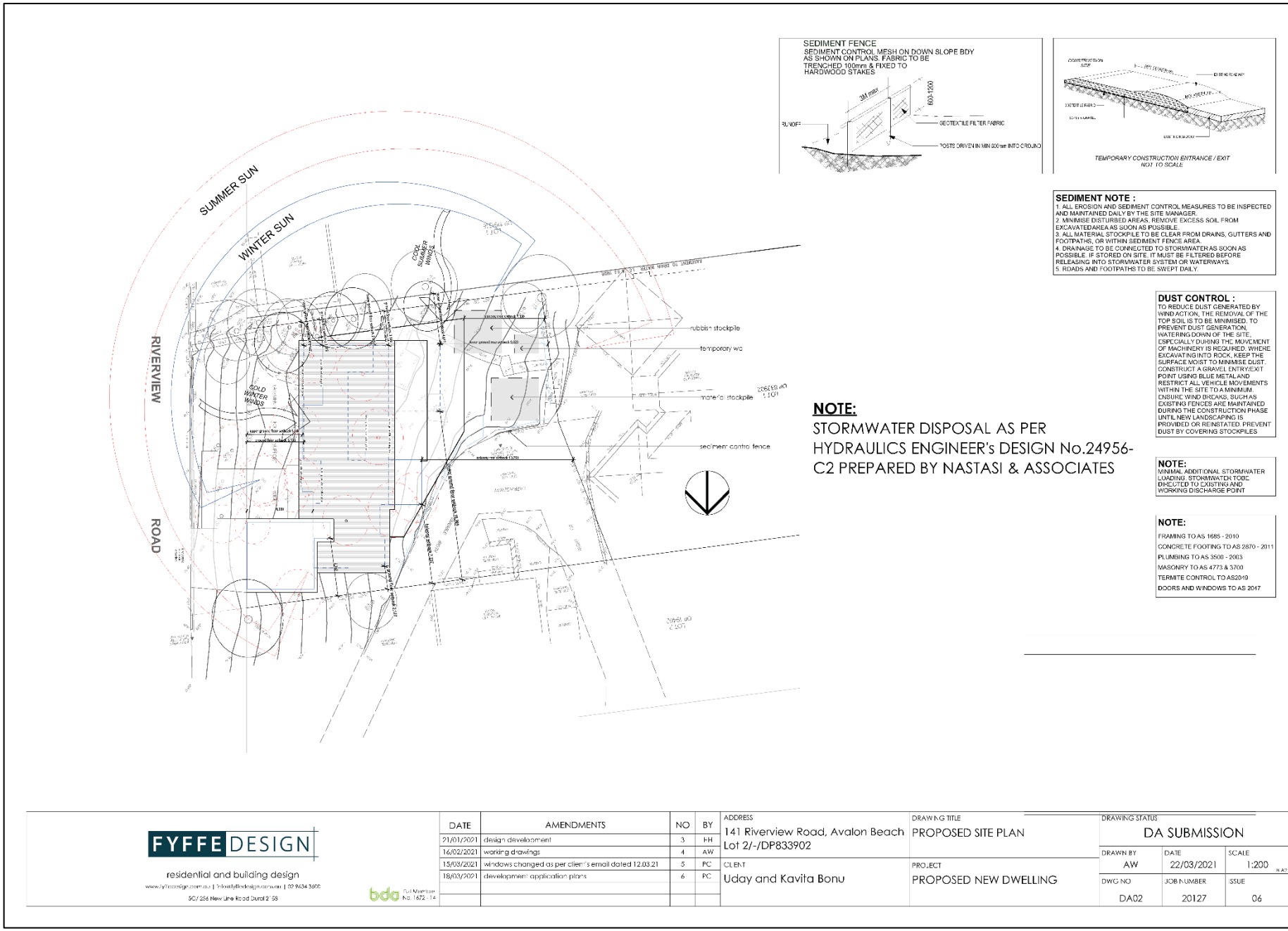

Figure 3. Proposed Site Plan (Fyffe Design 2021).

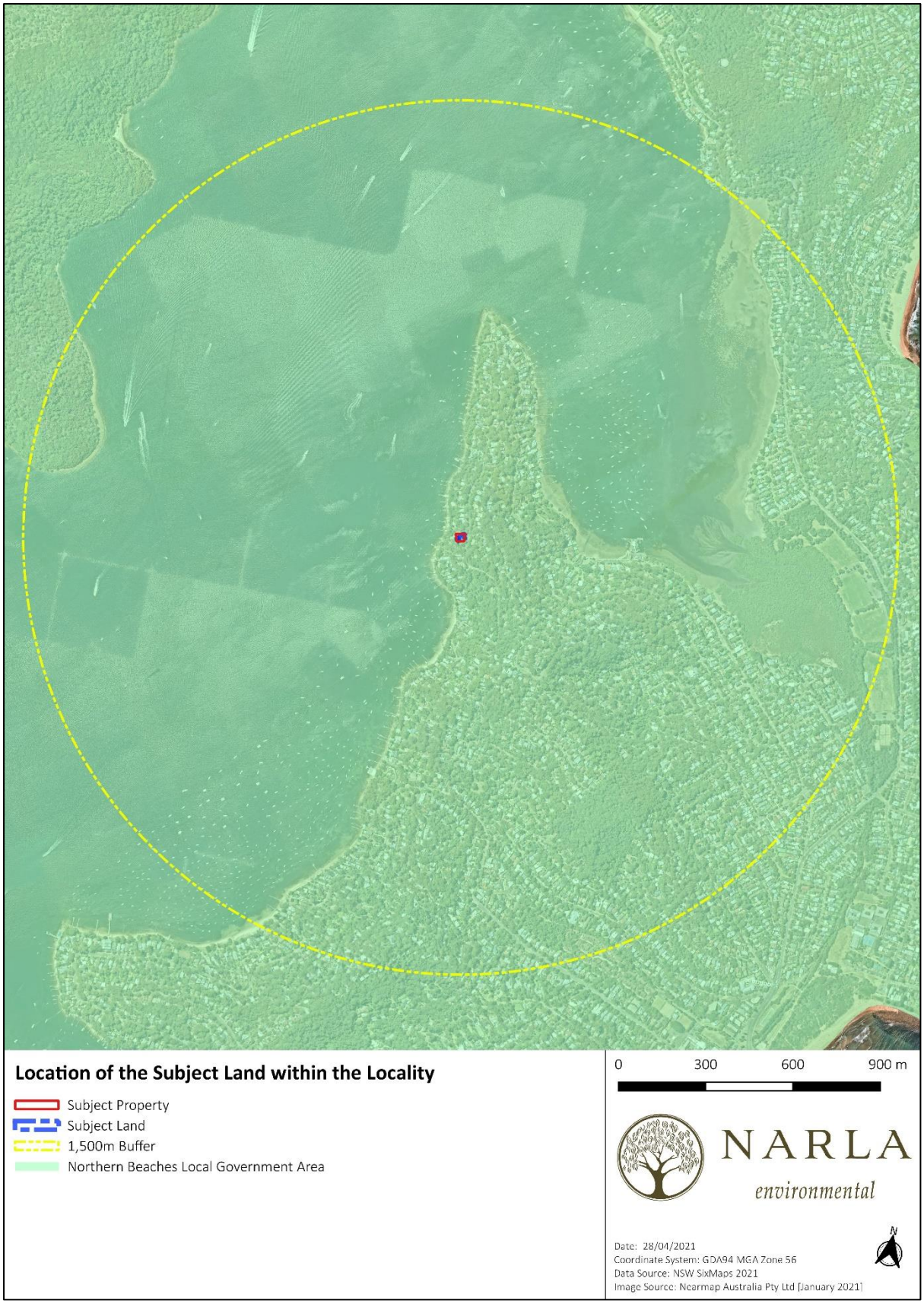

Figure 4. The location of the Subject Land within the locality.

1.5 Sources of Information Used

A thorough literature review was undertaken to gain an insight into the ecology and applicable legislation within the locality and the Northern Beaches LGA, including:

- Relevant State and Commonwealth Databases & Datasets:
    - NSW BioNet. The website of the Atlas of NSW Wildlife (DPIE 2021c);
    - NSW BioNet. Threatened Biodiversity Data Collection (DPIE 2021d);
    - NSW BioNet. Vegetation Classification System (DPIE 2021e); and
    - Six Maps Clip & Ship (NSW Government Spatial Services 2021).
- Vegetation and Soil Mapping:
    - The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH 2016a);
    - The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0. VIS_ID 4489 (OEH 2016b); and
    - Soil Landscapes of the Sydney 1:100,000 Sheet (Chapman et al. 2009).
- NSW State Guidelines:
    - Biodiversity Assessment Method (DPIE 2020b);
    - Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE 2019a);
    - Biodiversity Assessment Method Calculator Version 1.3.0.00 (DPIE 2020a);
    - Biodiversity Offsets and Agreement Management System (BOAMS);
    - Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE 2020d); and
    - Threatened Species Survey and Assessment: Guidelines for developments and activities. Working Draft (DEC 2004).
- Council Documents:
    - Pittwater Development Control Plan (DCP) 2003; and
    - Pittwater Local Environment Plan (LEP) 2014.

Preparation of this BDAR also involved the review of the following accompanying project documents:

- Arborist Report (Abacus Tree Services 2021);
- Boundary Identification and Detail Plan (DP Surveying 2020);
- Natural Environment Referral Response – Biodiversity (Northern Beaches Council 2021a);
- Natural Environment Referral Response – Coastal (Northern Beaches Council 2021b);
- Plans Master Set (Fyffe Design 2021);
- Statement of Environmental Effects (Key Urban Planning 2021); and
- Stormwater Management Plans Nastasi & Associates (2021).

These sources were used to gain an understanding of the natural environment and ecology of the Subject Land and its surrounds. Searches using NSW Wildlife Atlas (BioNet; DPIE 2021c) were conducted to identify current threatened flora and fauna records within and surrounding the Subject Land. These data were used to assist in establishing the presence or likelihood of any biodiversity values as occurring on, or adjacent the Subject Land and helped inform our Ecologist on what to look for during the site assessment.

1.6 Aim and Approach

This report has been prepared in accordance with the BAM (DPIE 2020b) and aims to:

- Describe the biodiversity values present within the Subject Land, including the extent of native vegetation, vegetation integrity and the presence of Threatened Ecological Communities (TECs);
- Determine the habitat suitability within the Subject Land for candidate threatened species;
- Prepare an impact assessment in regard to potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and SAIIs within the Subject Land;
- Discuss and recommend efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e., ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker as to the number and class of offset credits required to be purchased and retired as a result of the proposed development.

2. Landscape

2.1 IBRA Bioregion and Subregion

The Subject Land occurs within the 'Pittwater' Interim Biogeographic Regionalisation for Australia 7 (IBRA7) Subregion, which is part of the 'Sydney Basin' IBRA7 Bioregion (**Figure 5**).

2.2 Mitchell Landscapes

'NSW Landscapes Mapping: Background and Methodology' (Mitchell 2002) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided information on location and a meaningful descriptive landscape term.

The Subject Land was only partially mapped as containing the 'Belrose Coastal Slopes' Mitchell Landscape Ecosystem (**Figure 6**). It has been assumed that the Belrose Coastal Slopes Mitchell Landscape covers the entire Subject Land. This landscape is characterised by benched hill slopes and deep valleys of the coastal fall on horizontal Triassic quartz sandstone, lithic sandstone and shales. The landscape includes a high proportion of rock outcrop with discontinuous cliffs to 5m high. Shallow uniform or gradational sands and earthy sands occur on ridges, deeper sands, loamy sands and organic sands occur on wet benches and in hanging swamps, grey or yellow texture-contrast soils occur on shale benches.

General elevation ranges between 0 and 180m, with a local relief of 80m. In deeper soils on ridges, low woodlands consist of Scribbly Gum (*Eucalyptus haemastoma*), Red Bloodwood (*Corymbia gummifera*), Yellow-top Ash (*Eucalyptus luehmanniana*), and Narrow-leaved Apple (*Angophora bakeri*). Scrub and heath of Scrub She-oak (*Allocasuarina distyla*) and Heath Banksia (*Banksia ericifolia*), with other *Hakea*, *Grevillea*, and *Baeckea* sp., occur on ridges and upper benches. In hanging valleys, wet heath and swamps consist of *Gahnia* sp. and Swamp Banksia (*Banksia robur*). Coastal forest occurs in sheltered areas on better quality shale soil consisting of Sydney Blue Gum (*Eucalyptus saligna*), Blackbutt (*Eucalyptus pilularis*), Turpentine (*Syncarpia glomulifera*), Grey Ironbark (*Eucalyptus paniculata*), Spotted Gum (*Corymbia maculata*), Southern Mahogany (*Eucalyptus botryoides*), Cabbage-tree Palm (*Livistona australis*) and Burrawang (*Macrozamia* sp.). Coastal headlands include scrub of *Allocasuarina distyla*, Coast Rosemary (*Westringia fruticosa*), and Dwarf Kangaroo Grass (*Themeda triandra*).

2.3 Topography, Geology and Soils

The Subject Land has a west facing slope with elevation ranging from 29m above sea level in the west, up to 42m in the east (Google Earth 2021). The Subject Land is mapped as occurring on the Watagan soil landscape, which is underlain by Narrabeen Group of sediments. Mostly interbedded laminite and shale with quartz to lithic quartz sandstone. Clay pellet sandstone occurs south of the Hawkesbury River (Chapman et al. 2009).

The Subject Land did not contain any areas of geological significance, such as karsts, caves, cliffs or crevices. The Subject Land was not mapped as occurring on Acid Sulfate Soils nor mapped as having risk/probability of exhibiting occurrence of acid sulfate soils. However, the surrounding locality (1,500m buffer) contained large areas mapped as having both low and high probabilities of Acid Sulfate Soils (**Figure 7**).

2.4 Hydrology

No mapped watercourses were located within the Subject Land or Subject Property; however, the riparian buffer zone from a 4th order stream to the west intersects with the Subject Property (**Figure 8**). A number of mapped watercourses and associated riparian buffer zones also occur within the 1,500m buffer surrounding the Subject Land, including 1st, 2nd and 4th order streams (**Figure 9**).

2.4.1 Coastal Environment Area and Coastal Use Area

The Subject Land occurs on areas identified as 'Coastal Environment Area' and 'Coastal Use Area' as per the State Environmental Planning Policy (Coastal Management) 2018. Additionally, areas of 'Coastal Wetland', 'Littoral Rainforest' and proximity to both are mapped within the 1,500m buffer area to the east and south of the Subject Land (**Figure 10**).

2.5 Native Vegetation Cover and Connectivity

Native vegetation cover and connectivity have been assessed in accordance with Section 3.1.3 and 3.2 of the BAM (DPIE 2020b). The native vegetation cover will be used to assess the habitat suitability of the Subject Land for threatened species. Areas of connectivity will determine the extent of habitat that may facilitate the movement of threatened species across their range. A 1,500m buffer around the boundary of the Subject Land was calculated to determine the extent of native vegetation and habitat connectivity. Native vegetation covered approximately 143ha within the buffer circle (total area = 711ha) and was assigned to the >10–30% class.

Patchy areas of habitat connectivity that may facilitate the movement of threatened species were evident within the 1,500m surrounding the Subject Land (**Figure 11**).

2.6 Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value occur on the Subject Land or surrounding area.

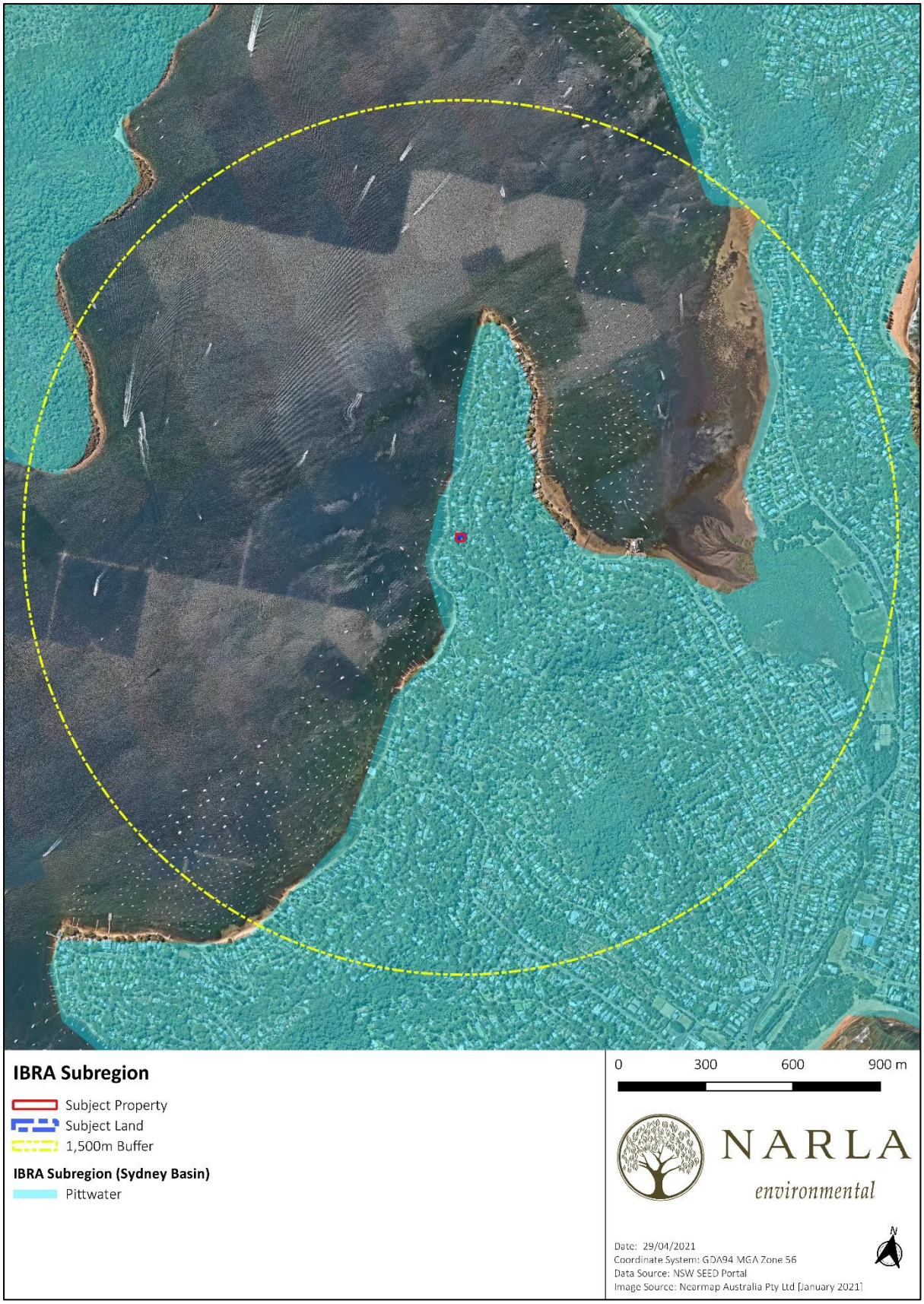

Figure 5. IBRA Bioregion and Subregion of the Subject Property, Subject Land and within a 1,500m buffer.

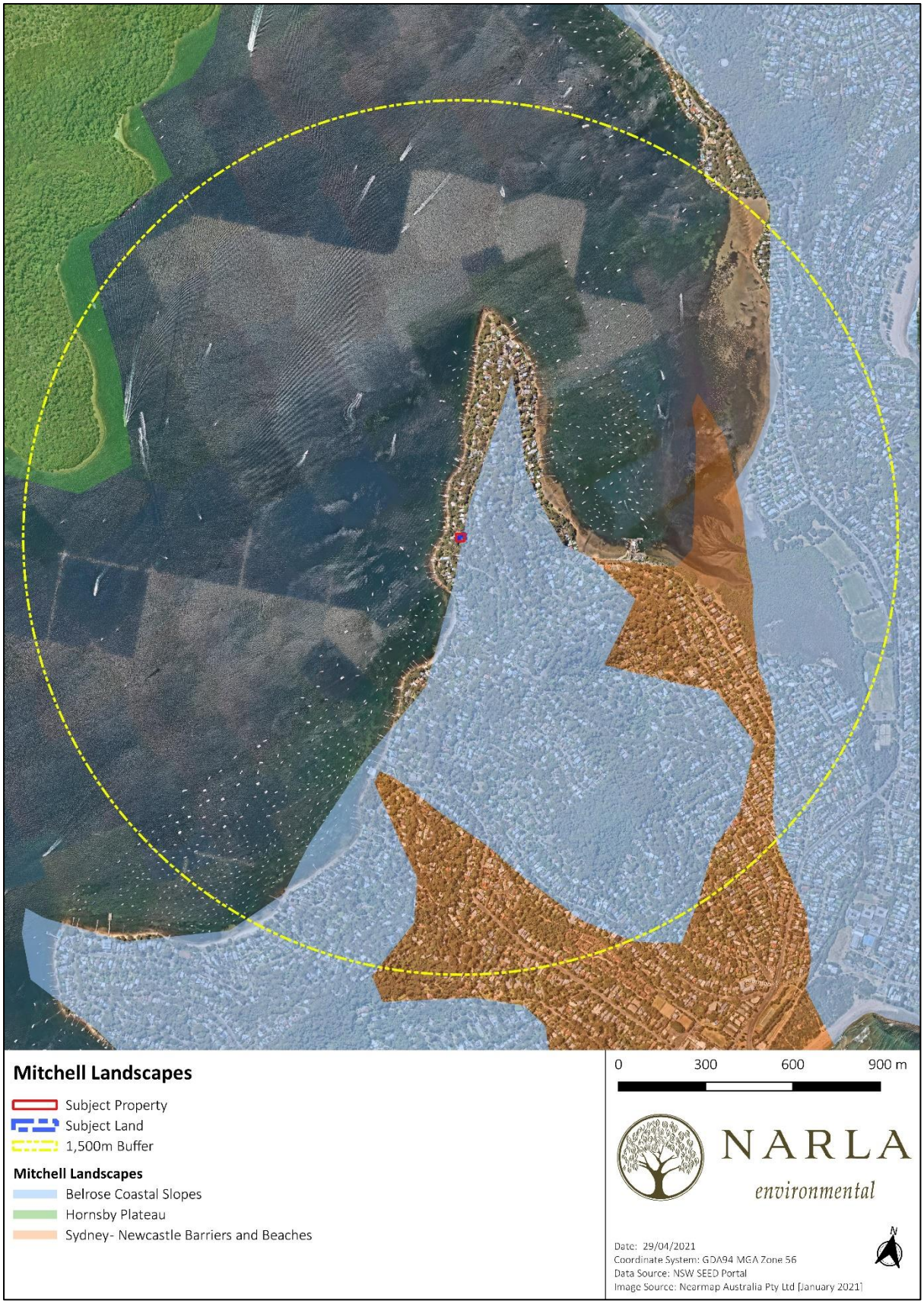

Figure 6. Mitchell Landscapes of the Subject Property, Subject Land and within a 1,500m buffer.

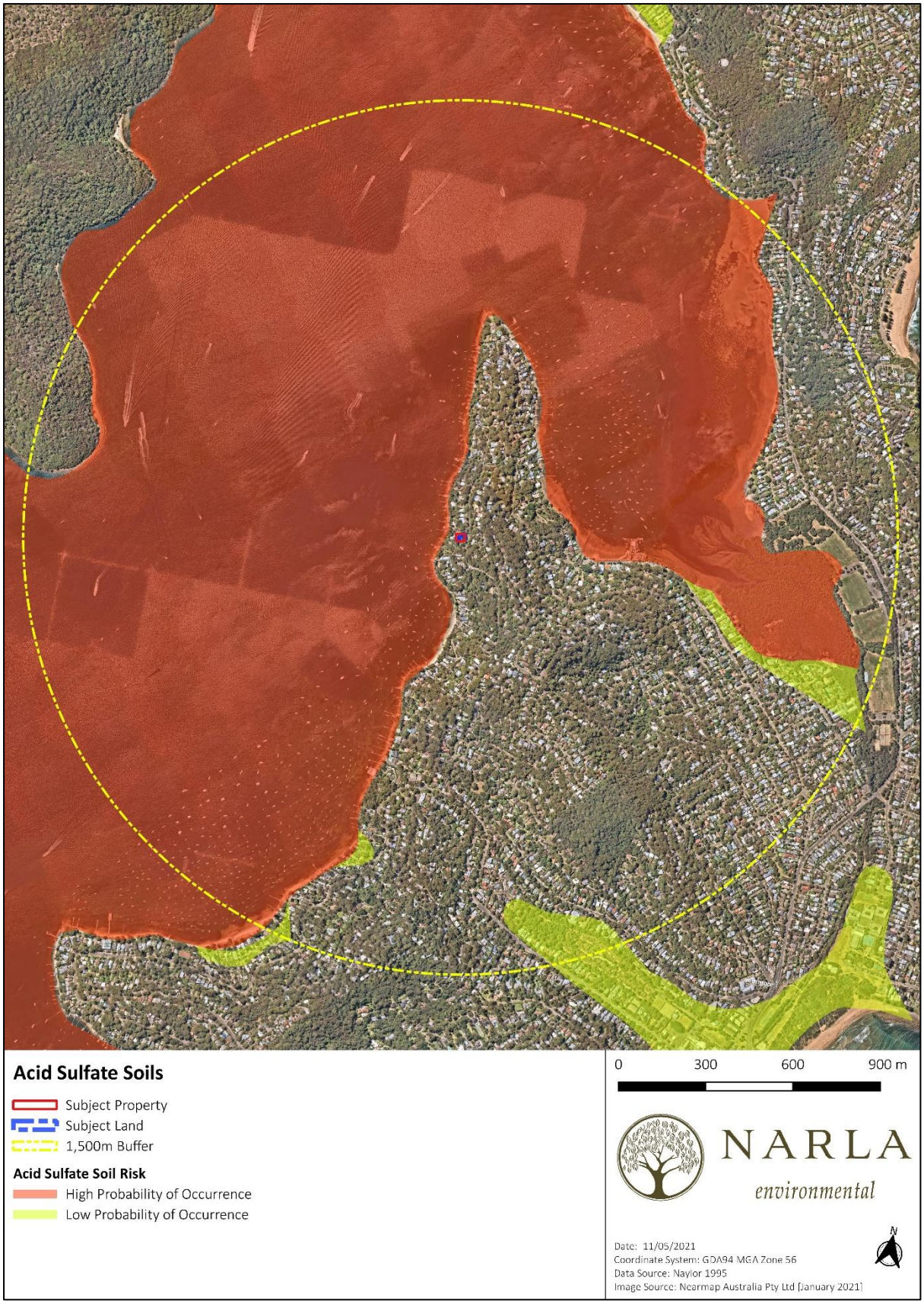

Figure 7. Risk of Acid Sulfate Soils within the Subject Property, Subject Land and within a 1,500m buffer.

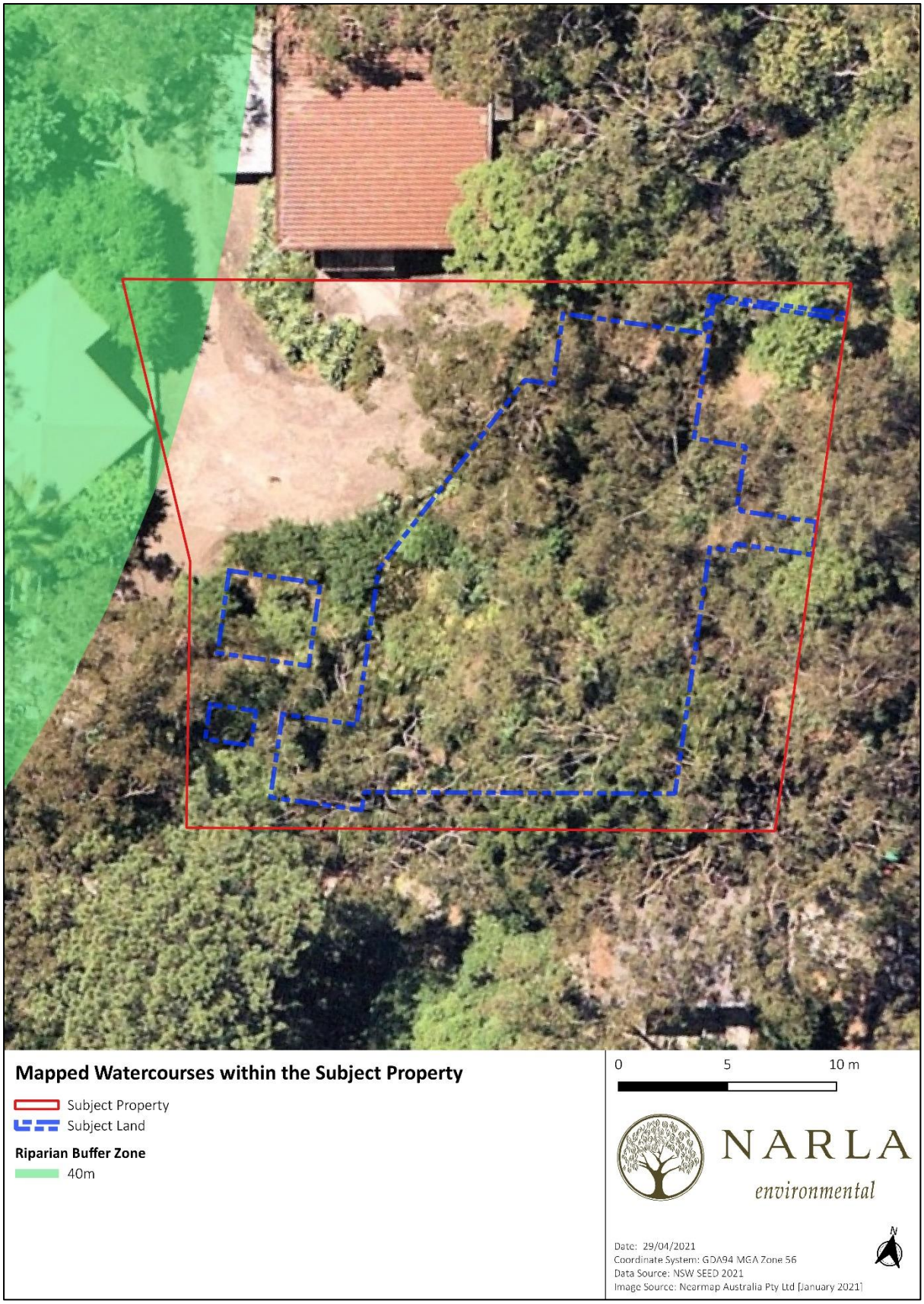

Figure 8. Watercourses and riparian buffer zones occurring within and adjacent to the Subject Land.

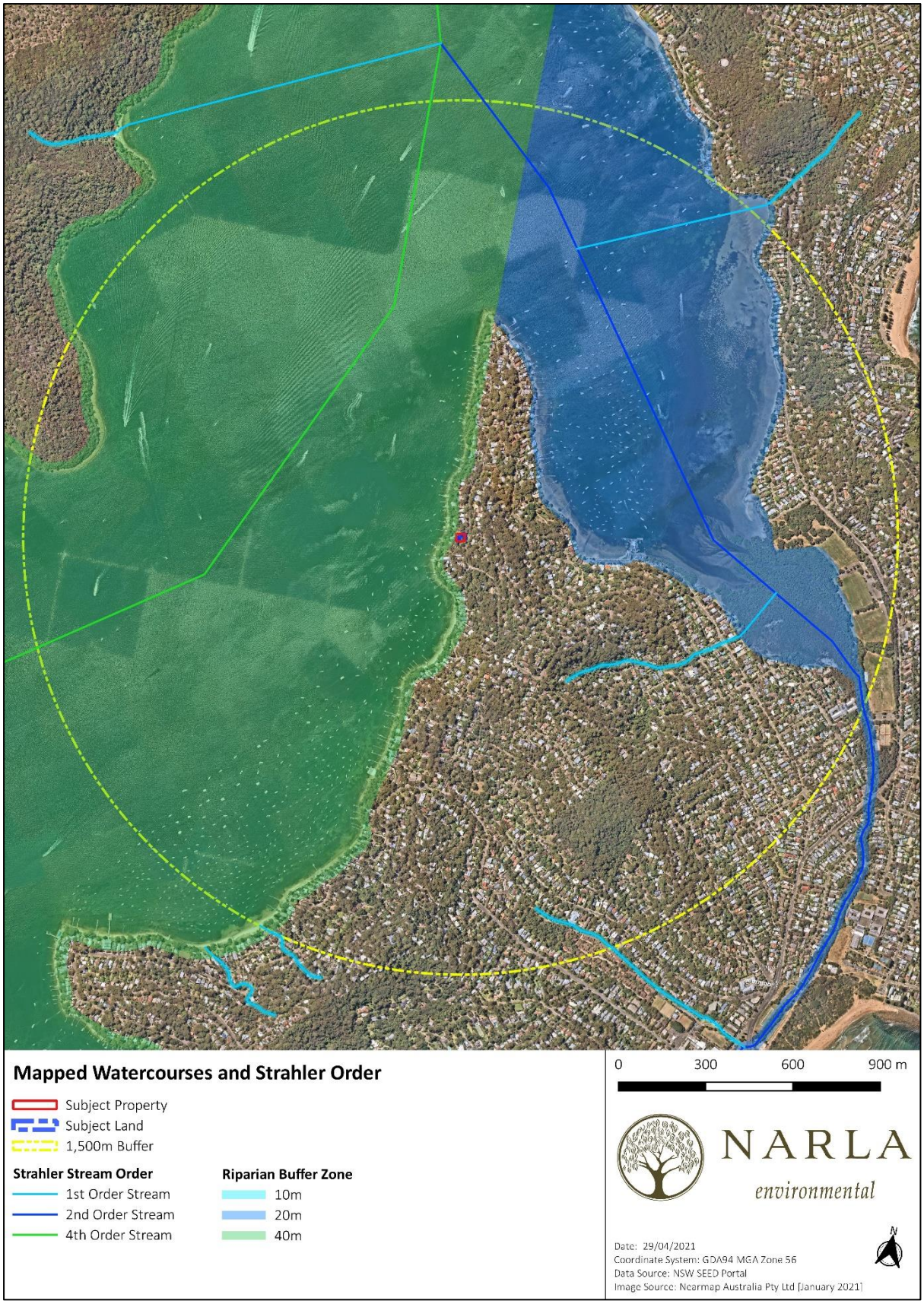

Figure 9. Rivers and streams (with associated riparian buffers) occurring within the 1,500m buffer.

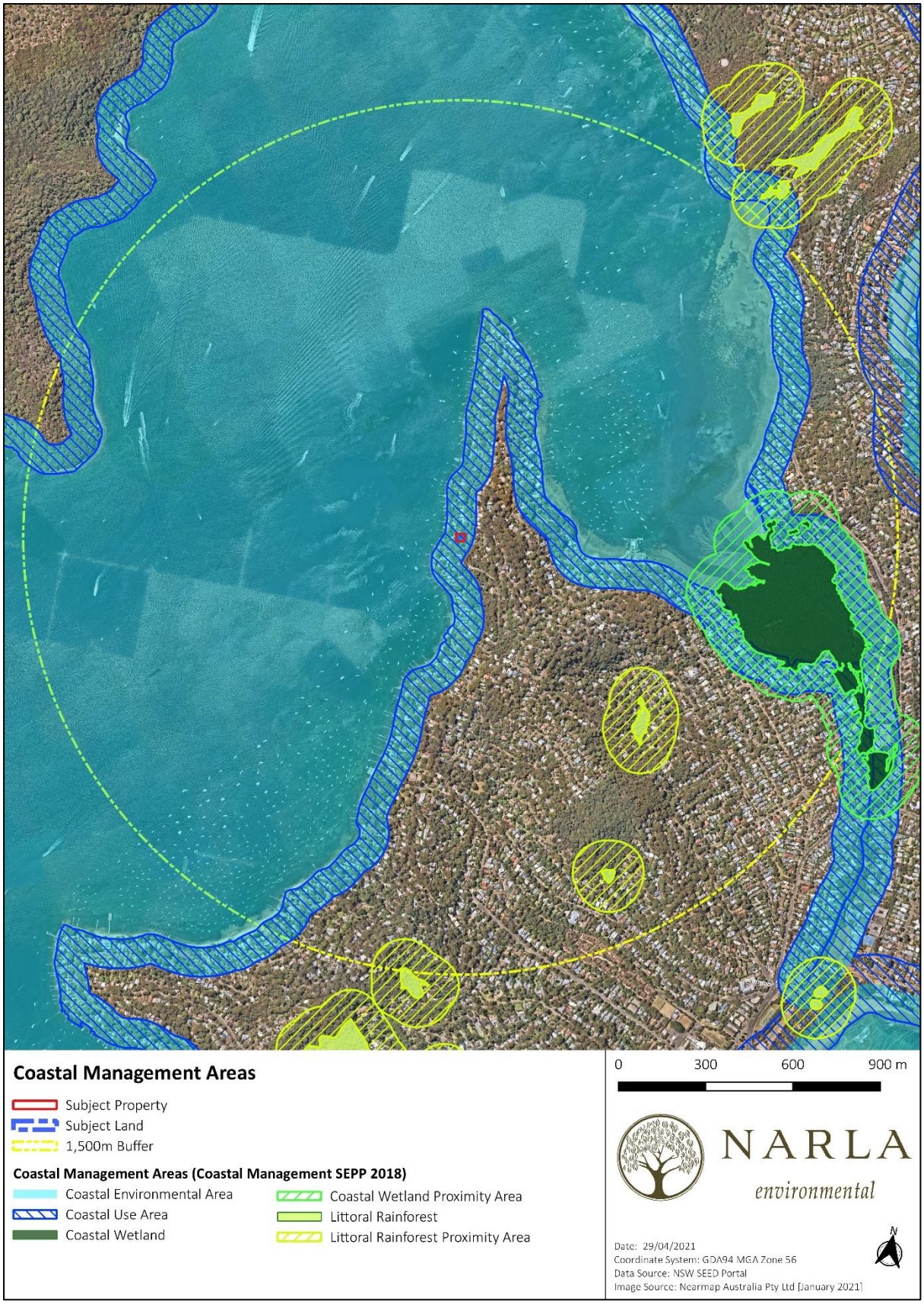

Figure 10. Areas mapped under the Coastal Management SEPP within the Subject Property, Subject Land and within a 1,500m buffer.

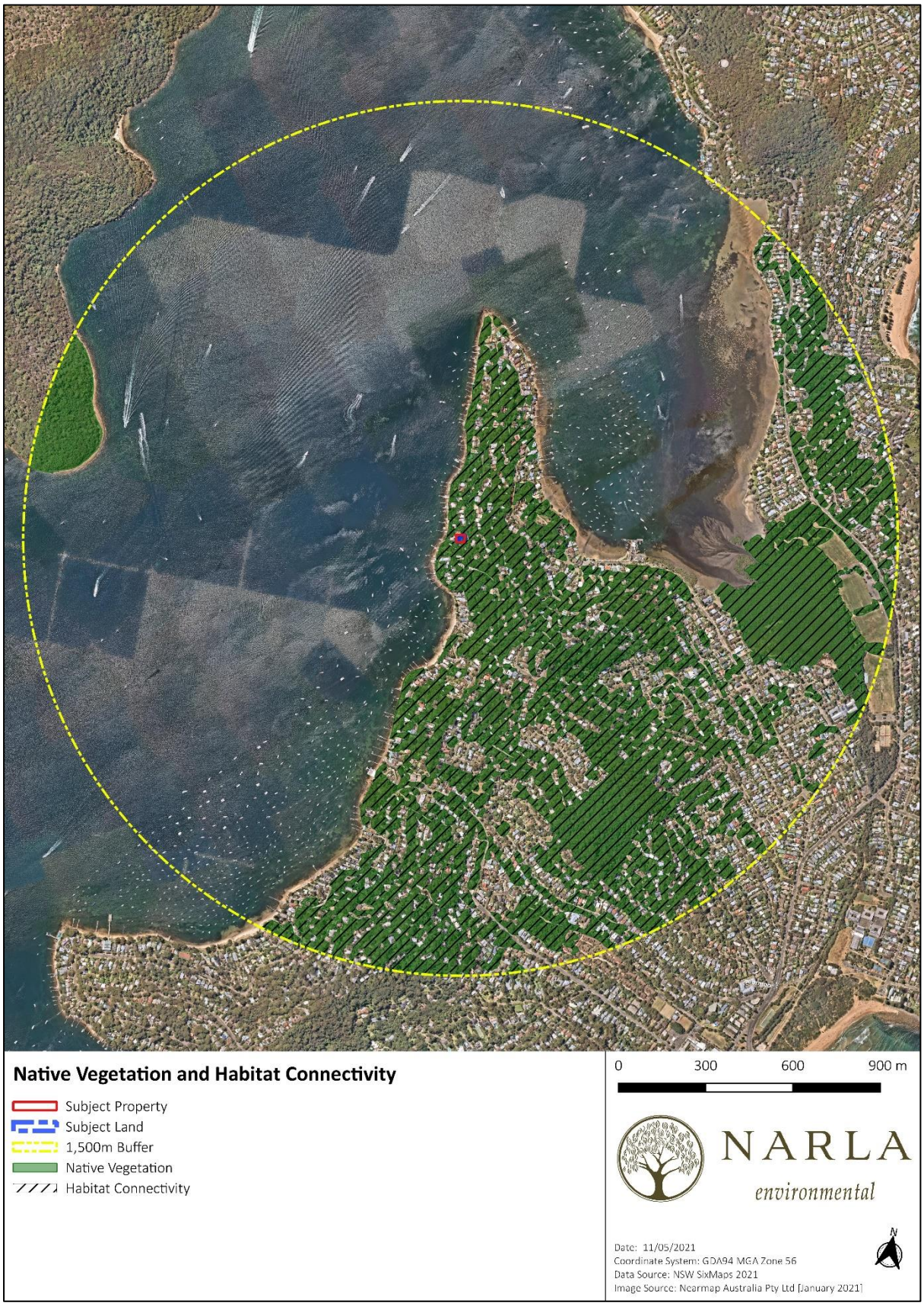

Figure 11. The extent of native vegetation within a 1,500m buffer.

3. Native Vegetation

3.1 Dominant Plant Community Type (PCT) Identified within the Subject Land

3.1.1 Historically Mapped Vegetation

The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH 2016a) indicates the presence one (1) PCT within the Subject Land:

- PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion.

3.1.2 Plant Community Type Selection Process

Plant Community Type selection for the vegetation community occurring on the Subject Land was undertaken using information and databases provided in the BioNet Vegetation Classification System (DPIE 2021e). The following selection criteria were used in the PCT Filter Tool to develop the PCT shortlist:

- IBRA Bioregion: Sydney Basin
- IBRA Subregion: Pittwater
- Dominant Species: *Allocasuarina torulosa* (Forest Oak), *Corymbia maculata* (Spotted Gum) and *Eucalyptus paniculata* (Grey Ironbark).

This process delivered a selection of eight (8) PCT's that occur within the Pittwater IBRA Subregion (and Sydney Basin Bioregion) that had two or more of the observed dominant species (i.e., the highest potential of occurring within the Subject Land). The geographical distribution and landscape position characterised by each shortlisted PCT was then compared against the location and landscape of the Subject Land. It was found that the Subject Land was located in the right distribution and contained the appropriate landscape attributes for one (1) candidate PCTs (**Table 2**). The steps taken to justify the presence/absence of the candidate PCT within the Subject Land are detailed in **Table 3**.

Table 2. Output from the PCT Filter Tool (DPIE 2021e) and subsequent shortlisting of dominant PCTs. Green shading indicates the selected best fit dominant PCT.

Plant Community Type (PCT)	Subject Land within known geographic distribution/ landscape position	No. of Matches	*Allocasuarina torulosa*	*Corymbia maculata*	*Eucalyptus paniculata*
PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion	Yes.	3	✓	✓	✓
PCT 684: Blackbutt - Narrow-leaved White Mahogany shrubby tall open forest of coastal ranges, northern	No. Usually occurs on coastal lowlands and foothills mainly north from the Hawkesbury River to the Watagan Mountains. The Subject Land has a significant west-facing slope and occurs south of the Hawkesbury River.	2	✓		✓

Plant Community Type (PCT)	Subject Land within known geographic distribution/ landscape position	No. of Matches	*Allocasuarina torulosa*	*Corymbia maculata*	*Eucalyptus paniculata*
Sydney Basin Bioregion					
PCT 1183: Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the Sydney Basin Bioregion	No. Occurs in sheltered gullies or on slopes of the sandstone plateaux of the southern Central Coast. The Subject Land is not situated on the Central Coast.	2	✓	✓	
PCT 1281: Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion	No. Found on shale and shale-enriched sandstone soils on the coast and hinterland of Sydney. The Subject Land does not occur on such soils; it occurs on Narrabeen Sandstone.	2	✓		✓
PCT 1385: Rough-barked Apple - Grey Gum grassy open forest of the hinterland hills of the Central Coast, Sydney Basin Bioregion	No. Restricted to Mangrove Creek Catchment and Dharug National Park. The Subject Land does not occur within these areas.	2	✓		✓
PCT 1589: Spotted Gum - Broad-leaved Mahogany - Grey Gum grass - shrub open forest on Coastal Lowlands of the Central Coast	No. Restricted to the coastal lowlands of the Central Coast. The Subject Land does not occur on the Central Coast.	1		✓	
PCT 1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	No. Occurs on low ranges of the lower Hunter Valley and Central Coast at lower elevations. The Subject Land does not occur within these areas.	2	✓	✓	
PCT 1914: Rough-barked Apple - Grey Ironbark - Turpentine tall open forest in diatremes around Sydney and the Central Coast	No. Occurs on isolated volcanic landforms associated with the northern Sydney coastal plateaus. These landforms are either diatremes or dykes. Both landforms feature clay-rich soils. The Subject Land does not occur on these landforms and occurs on Narrabeen Sandstone.	2	✓		✓

Table 3. PCT selection criteria. Green indicates the selected PCT.

Candidate PCT	Characteristics (DPIE 2020c)	Justification
PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion	**Landscape position/ geology**	**Justification**
	The community occurs on the foreshores and escarpments of the Pittwater peninsula. It has a close association with Narrabeen sediments exposed on rises, escarpments and foot slopes throughout northern Pittwater (now Northern Beaches) LGA and Wagstaff peninsula in the Gosford LGA. The forest spans a number of aspects and topographic positions but is rarely found above 100m above sea level.	Narla have assigned this PCT to the vegetation within the Subject Land as it fits with the landscape profile and comprises a number of diagnostic species. In particular, PCT 1214 was the only PCT within the selection criteria that correlated with the diagnostic species as well as the landscape position/geology of the Subject Land. PCT 1214 occupies the foreshores and escarpments of the Pittwater peninsula. It occurs on Narrabeen sediments on rises, escarpments and foot slopes, and is rarely found above 100m above sea level. The Subject Land occurs on an escarpment of the Pittwater peninsula and it occurs on Narrabeen Sandstone, 29 to 42m above sea level. PCT 1214 is characterised as a tall open forest. Although the ground and shrub layer of the Subject Land was highly disturbed, three (3) diagnostic canopy species were identified within the Subject Land: *Allocasuarina torulosa*, *Corymbia maculata* and *Eucalyptus paniculata.* Additionally, two (2) shrub species were identified: *Macrozamia communis* and *Notelaea longifolia;* and one (1) climber: *Eustrephus latifolius.* As such, PCT 1214 was identified as the 'best fit' PCT.
	Characteristic canopy	
	Allocasuarina torulosa, Corymbia maculata, C. gummifera, Eucalyptus paniculata, E. umbra, E. botryoides, Elaeocarpus reticulatus and *Glochidion ferdinandi.*	
	Characteristic mid-storey/ shrub	
	Podolobium ilicifolium, Macrozamia communis, Notelaea longifolia and *Synoum glandulosum* subsp. *glandulosum.*	
	Characteristic ground layer	
	Billardiera scandens, Dianella caerulea, Entolasia stricta, Lomandra longifolia, Xanthorrhoea macronema, Microlaena stipoides var. *stipoides, Schelhammera undulata, Themeda triandra, Eustrephus latifolius, Pandorea pandorana, Cassytha pubescens, Cissus hypoglauca, Geitonoplesium cymosum* and *Lomandra filiformis.*	

3.1.3 Final PCT and Vegetation Zone Selection

The field survey conducted by experienced Narla Ecologists, Chris Moore and Angus McClelland, confirmed that one (1) PCT was identified within the Subject Land:

- PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion.

One (1) vegetation zone was identified within the Subject Land that consisted of the same condition class and vegetation type:

- Zone 1: PCT 1214 – Moderate condition (remnant canopy).

This vegetation zone is detailed in **Table 4** and displayed in **Figure 12**.

Table 4. Vegetation zone identified within the Subject Land.

PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion	
Vegetation class	Southern Lowland Wet Sclerophyll Forests (Grassy Sub-formation)
Total area within the Subject Land	0.03ha
Description in VIS	
Stands of *Corymbia maculata* (Spotted Gum) mark this distinctive forest on the foreshores and escarpments of the Pittwater peninsula. These trees form a tall open forest that may also include *Eucalyptus paniculata* (Grey Ironbark) and *Eucalyptus umbra* (Broad-leaved White Mahogany). At the lower heights of the eucalypt stratum, it is common to find an open cover of *Allocasuarina torulosa* (Forest Oak). The midstorey usually comprises a mixed layer of mesic and dry shrub species and occasional palms. Shrub species include *Elaeocarpus reticulatus* (Blueberry Ash), *Synoum glandulosum* subsp. *glandulosum* (Scentless Rosewood), *Persoonia linearis* (Narrow-leaved Geebung) and *Podolobium ilicifolium* (Mountain Holly). Like many spotted gum forests along coastal New South Wales, *Macrozamia communis* (Burrawang) can assume a prominent component of the ground layer above a scatter of grasses, ferns and small vines. At times the ground layer appears very grassy, with an abundance of *Imperata cylindrica* var. *major* (Blady Grass) notable where there is a history of frequent fire. Pittwater Spotted Gum Forest has recently been subject to review which concluded that this forest has a close association with Narrabeen sediments exposed on rises, escarpments and foot slopes throughout northern Pittwater (now Northern Beaches) LGA and Wagstaff peninsula in the Gosford LGA. The forest spans a number of aspects and topographic positions but is rarely found above 100m above sea level. It receives between 1150 and 1300mm of mean annual rainfall.	
Condition Class	**Vegetation Zone 1: Moderate condition (remnant canopy)**
Extent within Subject Land (approximate)	0.03ha
Field survey effort	Given the area restraints and the presence of a paved driveway over a large portion of the Subject Property, only one (1) 20m x 20m BAM plot could be established.
Description of vegetation	The vegetation within this zone was characterised by a native remnant canopy with some exotic species, and a disturbed native and exotic shrub and ground layer. Native canopy species were dominated by *Allocasuarina torulosa* (Forest Oak) and *Corymbia*

PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion	
	maculata (Spotted Gum). Other canopy species included *Brachychiton acerifolius* (Illawarra Flame Tree), *Eucalyptus paniculata* (Grey Ironbark) and *Jacaranda mimosifolia* (Jacaranda). The shrub layer contained native species including *Pittosporum undulatum* (Sweet Pittosporum), *Macrozamia communis* (Burrawang) and *Notelaea longifolia* (Large Mock-olive); however, it also contained exotics such as *Euphorbia pulcherrima* (Poinsettia), *Ligustrum lucidum* (Large-leaved Privet) and a *Phyllostachys* spp. (Bamboo). The ground layer was dominated by *Oplismenus aemulus* (Australian Basket Grass) with other sporadic natives including *Entolasia marginata* (Bordered Panic), *Desmodium rhytidophyllum* and *Youngia japonica*. Exotic species were abundant in the ground layer including *Ehrharta erecta* (Panic Veldtgrass) and *Bidens pilosa* (Cobblers Pegs).
Structure of vegetation	Moderate canopy cover was evident within the BAM plot, with native trees totalling 20.2% cover. Native shrub cover was low at 2%. Native groundcover was moderate with 30.6% grass, 4.9% forb, 0.1% fern and 2.4% other. A moderate cover of leaf litter (50%) was also apparent. No fallen logs were present. The BAM plot contained a low-moderate diversity of tree stem sizes with no large trees (>50cm DBH), small-medium trees (5-49cm DBH) and regenerating stems present. No hollow bearing trees were recorded within the BAM plot.
Scientific Reference from VIS (DPIE 2021e)	Office of Environment and Heritage (OEH) (2013) The Native Vegetation of the Sydney Metropolitan Area Version 2.0
TEC Status (BC Act 2016 and EPBC Act 1999)	Conforms to the BC Act listed EEC, Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (see Section 3.2.1). This vegetation zone does not conform to an EPBC Act listed TEC.
TEC area (ha)	0.03ha of EEC, Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (BC Act 2016).
Estimate of percent cleared value of PCT in the major catchment area	71%

3.2 Threatened Ecological Communities

3.2.1 Biodiversity Conservation Act 2016

Vegetation Zone 1 occurs on shale-derived soils from Narrabeen series geology in the Northern Beaches (formally Pittwater) LGA. Furthermore, the vegetation comprises the following nine (9) species listed in the final determination for Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion: *Allocasuarina torulosa* (Forest Oak), *Corymbia maculata* (Spotted Gum), *Desmodium rhytidophyllum*, *Entolasia marginata* (Bordered Panic), *Eucalyptus paniculata* (Grey Ironbark), *Eustrephus latifolius* (Wombat Berry), *Macrozamia communis* (Burrawang), *Notelaea longifolia* (Large Mock-olive) and *Pittosporum undulatum* (Sweet Pittosporum). As such, Vegetation Zone 1 conforms to the BC Act listed EEC, Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (PWSGF; Figure 12).

Plate 1. Representative photo of Vegetation Zone 1: Moderate condition (remnant canopy) within the Subject Land.

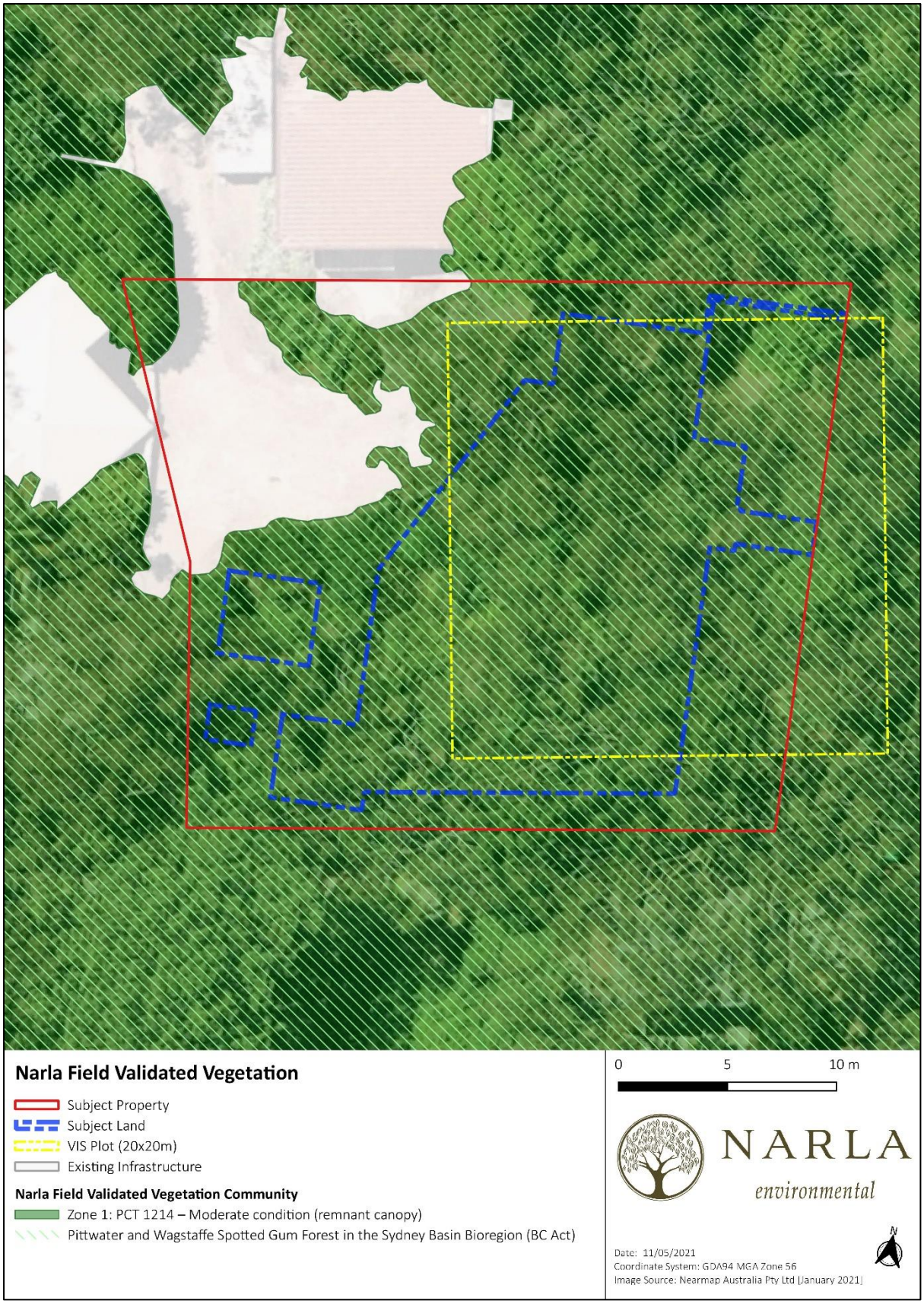

Figure 12. Narla field validated vegetation mapping and location of BAM VIS plot within and outside of the Subject Property.

3.3 Assessing Patch Size

As defined by the BAM, a patch is an area of native vegetation that occurs on the Subject Land and includes native vegetation that has a gap of less than 100m from the next area of native vegetation (or ≤30m for non-woody ecosystems). A patch may extend onto adjoining land. For each vegetation zone, the assessor must determine the patch size in hectares and assign it to one of the following classes:

- <5ha;
- 5 – <25ha;
- 25 – <100 ha; or
- ≥100 ha.

The patch size class is used to assess habitat suitability on the Subject Land for threatened species. The assessor may assign more than one patch size class to the vegetation zone if both of the following apply:

- A vegetation zone comprises two or more discontinuous areas of native vegetation, and
- The areas of discontinuous native vegetation have more than one patch size class.

As areas outside of the Subject Property were not assessed as part of the scope of this assessment, the vegetation zone identified within the Subject Land was separated into the following categories to allow for aerial mapping of patch size within the broader area (**Table 5**; **Figure 13**):

- Woody Ecosystems:
    - Zone 1: PCT 1214 – Moderate condition (remnant canopy).

The 1,500m buffer contained large areas of mangroves east of the Subject Property. As mangroves do not constitute vegetation zone 1, this area was excluded.

Table 5. Patch size class of the PCT and associated vegetation zone.

Plant Community Type	Category	Vegetation Zone	Patch Size Class
PCT 1214	Woody Ecosystems	Zone 1	>100ha

Figure 13. Patch size within the 1,500m buffer for the vegetation zone identified within the Subject Land.

3.4 Vegetation Integrity Survey (VIS) Plot

One (1) BAM VIS plot was conducted within the Subject Property. Owing to the small nature of the Subject Property as well as the presence of substantial ecotones (shared access way), a 20m x 20m plot was conducted that encompasses the vegetated areas of the Subject Property. It is believed that the 20m x 20m has provided a VIS score that accurately represents the condition of the vegetation that is present within Subject Land and the surrounding area. Plot data gathered for each attribute used to assess the function of the Subject Land vegetation is detailed in **Appendix A**. Vegetation Integrity (VI) Scores represented by existing vegetation within the vegetation zone is detailed in **Table 6**.

3.4.1 Determining Future Vegetation Integrity Scores

Most projects will result in complete clearing of vegetation and threatened species habitat within the development footprint. In this scenario, the assessor must assess the proposed future value of each of the VI attributes as zero in the BAMC. However, in circumstances where partial clearing of vegetation is proposed and remaining vegetation will be maintained, the assessor may determine that the future value of the relevant VI attributes is greater than zero (DPIE 2020b).

The Subject Land will experience complete clearing to facilitate the proposed development. Therefore, all future conditions scores must be considered as zero. Consequently, Vegetation Zone 1 has been assigned the following management zone (**Figure 14**):

- Vegetation Zone 1: Moderate condition (remnant canopy):
    - Management Zone 1: Complete removal;

The attributes influencing future vegetation scores within this management zone are detailed in **Table 7**.

Figure 14. Management zone within the Subject Land.

Table 6. Vegetation integrity scores for the identified zone.

PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion											
Vegetation Zone	Management Zone	Area (ha)	Survey Effort	Composition Condition Score	Structure Condition Score	Function Condition Score	VI Score	Future VI Score	Change in VI Score	Total VI Loss	Hollow bearing trees
Zone 1: PCT 1214 – Moderate condition (remnant canopy)	Management Zone 1 – Complete removal	0.03	1 x 400m^2 (20m x 20m) VIS Plot	54.7	32.3	42.6	42.2	0	-42.2	-42.2	0

Table 7. Management zone within the Subject Land and relevant vegetation attributes (composition, structure and function) affecting future VI scores.

Vegetation Zone	Management Zone	Changes in Current Vegetation Attributes	Vegetation Attributes Not Changed	Future Vegetation Scores and Justification
Zone 1: PCT 1214 – Moderate condition (remnant canopy)	Management Zone 1 – Complete removal	All vegetation will be removed	N/A	▪ All vegetation within the development footprint is required for removal to allow for the proposed development; and ▪ Future composition, structure and function score is 0.

4. Threatened Species

4.1 Candidate Ecosystem Credit Species

Ecosystem credit species associated with the Subject Land are listed below in **Table 8.** No species predicted by the BAM calculator as potential ecosystem credits were excluded from the assessment due to habitat constraints.

Table 8. Candidate ecosystem credits predicted to occur within the Subject Land

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
Anthochaera phrygia Regent Honeyeater (Foraging)	Critically Endangered	No	-
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable	No	-
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	Vulnerable	No	-
Calyptorhynchus lathami Glossy Black-Cockatoo (Foraging)	Vulnerable	No	-
Daphoenositta chrysoptera Varied Sittella	Vulnerable	No	-
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	No	-
Glossopsitta pusilla Little Lorikeet	Vulnerable	No	-
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable	No	-
Lathamus discolour Swift Parrot (Foraging)	Endangered	No	-
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	Vulnerable	No	-
Miniopterus australis Little Bent-winged Bat (Foraging)	Vulnerable	No	-
Miniopterus orianae oceanensis Large Bent-winged bat (Foraging)	Vulnerable	No	-
Ninox connivens Barking Owl (Foraging)	Vulnerable	No	-
Ninox strenua Powerful Owl (Foraging)	Vulnerable	No	-
Pandion cristatus Eastern Osprey (Foraging)	Vulnerable	No	-
Petroica boodang Scarlet Robin	Vulnerable	No	-
Phascolarctos cinereus Koala (Foraging)	Vulnerable	No	-
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	Vulnerable	No	-

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	Vulnerable	No	-
Tyto novaehollandiae Masked Owl (Foraging)	Vulnerable	No	-
Varanus rosenbergi Rosenberg's Goana	Vulnerable	No	-

4.2 Candidate Species Credit Species Summary

This section provides a summary of the candidate species credit fauna and flora species for the Subject Land derived from BAMC (DPIE 2020a). A summary of the targeted survey effort applied to each species is provided along with the results of the survey effort, specifically whether or not the species credit needs to be offset through retiring of Biodiversity Offset Credits (**Table 9**; **Table 10**).

Table 9. Candidate Fauna Credit Species predicted to occur within the Subject Land.

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Anthochaera phrygia Regent Honeyeater (Breeding)	No, the Subject Land is not included on the map of important areas for Regent Honeyeaters.	No	N/A	Very High – 3	No
Chalinolobus dwyeri Large-eared Pied Bat	No. The SAII threshold for this species is potential breeding habitat and presence of breeding individuals. Potential breeding habitat is identified as land within 100m of rocky areas containing caves, overhangs, crevices, cliffs, escarpments, old mines, tunnels, culverts, or derelict concrete buildings. As no rocky areas containing caves, overhangs, crevices, cliffs, escarpments, old mines, tunnels, culverts, or derelict concrete buildings were present within 100m of the Subject Land, the SAII threshold is not met for this species and therefore does not require assessment under the streamlined assessment method.	No	N/A	Very High – 3	No
Lathamus discolour Swift Parrot (Breeding)	No, the Subject Land is not included on the map of important areas for Swift Parrots.	No	N/A	Very High – 3	No
Miniopterus australis Little Bent-winged Bat (Breeding)	No. This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	N/A	Very High – 3	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	No. This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	N/A	Very High – 3	No

Table 10. Candidate Flora Credit Species predicted to occur within the Subject Land.

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Diuris bracteata	Following the latest taxonomy, this species is thought to be extinct or at least there are no known extant plants or populations (DPIE 2021b). Therefore, it has been deemed extremely unlikely to occupy the Subject Land and has been excluded from the assessment.	No	N/A	Very High – 3	No
Genoplesium baueri Bauer's Midge Orchid	Yes. This species is generally found in dry sclerophyll forest and moss gardens over sandstone. As such habitat is present within the Subject Land, this species was included in the assessment.	No	Yes (Assumed Present)	Very High – 3	Yes
Hygrocybe aurantipes	Yes. This species occurs in gallery warm temperate forests dominated by *Acmena smithii* (Lilly Pilly), *Backhousia myrtifolia* (Grey Myrtle), *Glochidion ferdinandi* (Cheese Tree) and *Pittosporum undulatum* (Sweet Pittosporum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes. As potential habitat is present within the Subject Land, this species was included in the assessment.	No	Yes (Assumed Present)	Very High – 3	Yes
Rhodamnia rubescens Scrub Turpentine	Yes. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. As such habitat is present within the Subject Land, this species was included in the assessment.	Yes	No	Very High – 3	No

4.3 Species Credit Habitat Surveys

Species credit habitat surveys were undertaken for any SAII species credit species considered likely to have suitable habitat within the Subject Land (**Figure 15**). These surveys were implemented in accordance with Section 5.3 of the BAM and all relevant OEH and DPIE threatened species survey guidelines.

Habitat surveys were undertaken on Tuesday the 27th of April 2021 by experienced Narla Ecologists, Chris Moore and Angus McClelland, within the Subject Land and the areas immediately adjacent. Weather conditions taken from the nearest weather station (Terrey Hills, station no. 066059) in the lead up and during the field survey are outlined in **Table 11**.

Pre-survey weather conditions contained minimal rainfall. These conditions may not be conducive to the emergence of annual herbs.

Table 11. Weather conditions taken from the nearest weather stations (Station number 066059) in the lead up and during the field survey (BOM 2021). Survey date is in bold.

Timing/activities	Date	Day	Temperature		Rainfall (mm)
			Min	Max	
Lead up to the survey	20/04/2021	Tuesday	9.3	21.1	0.2
	21/04/2021	Wednesday	12.7	19.1	0
	22/04/2021	Thursday	8.1	19.6	0
	23/04/2021	Friday	7.8	20.4	0
	24/04/2021	Saturday	8.4	21.1	0
	25/04/2021	Sunday	10.0	20.1	0
	26/04/2021	Monday	10.8	20.2	0
Site Assessment & Habitat Survey	**27/04/2021**	**Tuesday**	**12.1**	**20.9**	**0**

4.3.1 Fauna Species Credit Survey

A total of five (5) SAII threatened fauna species were identified within the BAMC (DPIE 2020b) as having the potential to occur within the Subject Land. Following the site assessment, none of the species were identified as having the potential to occur within the Subject Land due to the following (BAM Section 5.2.2, DPIE 2020b):

- The assessor determines that microhabitats required by a species are absent from the Subject Land (or specific vegetation zone) [(Section 5.2.3(2ai) of the BAM (DPIE 2020b)].

4.3.2 Flora Species Credit Survey

Four (4) SAII threatened flora species was identified within the BAMC (DPIE 2020a) as having the potential to occur within the Subject Land. Following the site assessment, three (3) species were identified as having the potential to occur within the Subject Land due to suitable habitat.

A targeted survey was undertaken for one (1) of these species (*Rhodamnia rubescens)* using parallel field traverses in accordance with the 'Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method' (DPIE 2020c; **Figure 15**). This species was not detected within the Subject Land or Subject Property.

Two (2) species (*Genoplesium baueri* and *Hygrocybe aurantipes*) are assumed to be present within the Subject Land as the DPIE approved survey period was outside the time of the site assessment (**Table 12**). The remaining flora species (*Diuris bracteata*) was not surveyed for due to the following:

- This species is considered likely to be extinct according to the Threatened Biodiversity Data Collection (DPIE 2021d).

Table 12. Species credit flora species requiring targeted surveys.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Genoplesium baueri Bauer's Midge Orchid **(Assumed Present)**				✓								
Hygrocybe aurantipes **(Assumer Present)**				✓								
Rhodamnia rubescens Scrub Turpentine				✓								
Key	✓ = Time of Site Assessment						= Optimum Survey Period					

4.4 Species Polygons

According to the BAM (DPIE 2020b), where a species is assumed to be present on the Subject Land, the assessor may use:

- An expert report to determine the location and area of the species polygon. The expert report must be used to identify the area of habitat for the species, or for species assessed by count, to identify the likely location and estimated number of individuals; or
- The area supporting the habitat constraints relevant to the species in the vegetation zone(s) (e.g., small rocky outcrops) as the species polygon for species assessed by area; or
- The entire vegetation zone(s) the species is predicted to occur within as the species polygon for species assessed by area.

Genoplesium baueri (Bauer's Midge Orchid) and *Hygrocybe aurantipes*, both assumed to be present within the Subject Land, have had the following species polygons assigned to them:

- The species polygons for these species have been assigned to all vegetation to be impacted within the Subject Land, as the species polygons must encompass the entire vegetation zone(s) where the candidate species is predicted to occur (**Appendix B**).

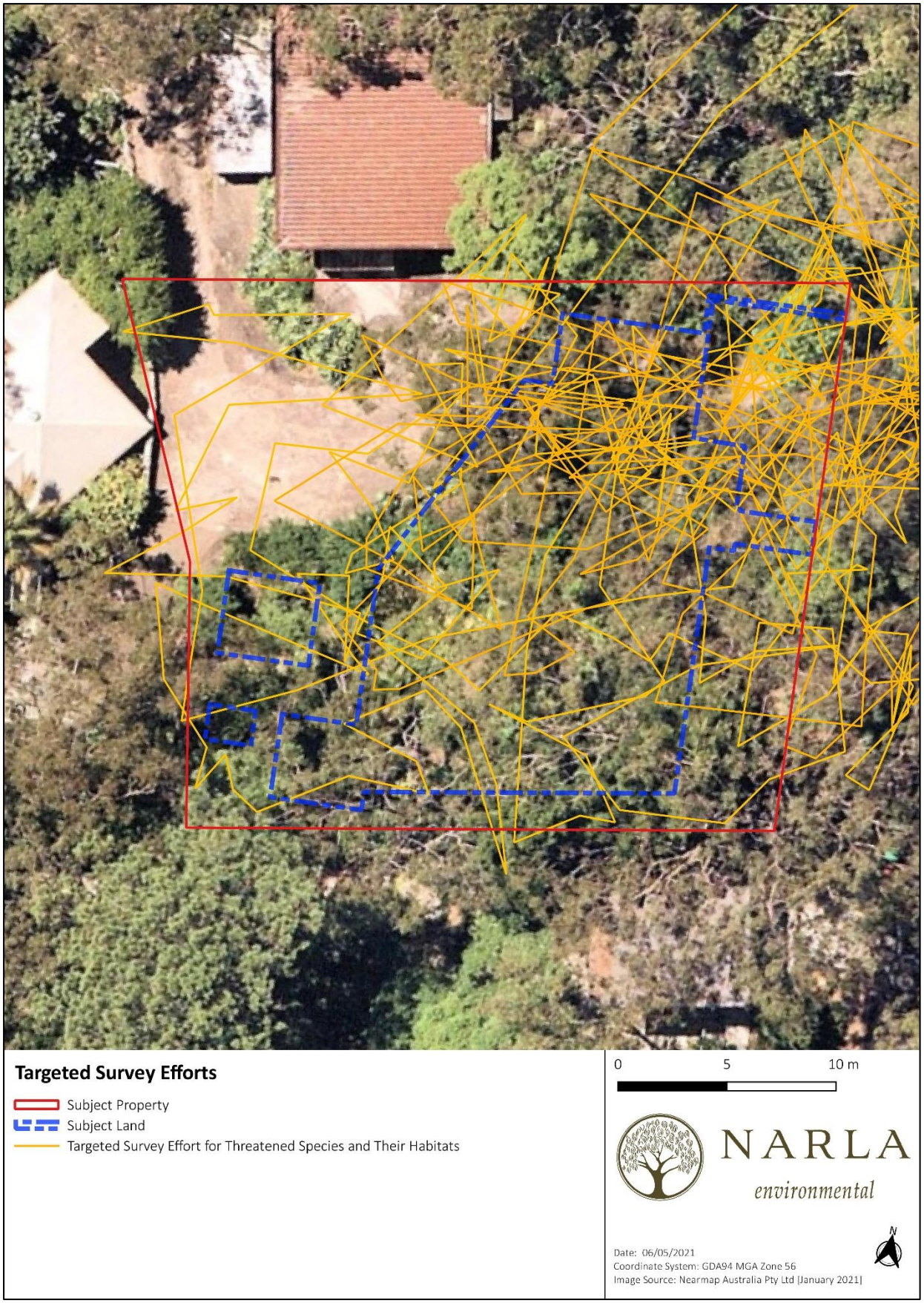

Figure 15. Targeted survey effort for species credit species and their habitats within the Subject Land.

5. Prescribed Impacts

Certain projects may have impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. For many of these impacts, the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Prescribed biodiversity impacts require an assessment of the impacts of the development on the habitat of threatened species or ecological communities. This is discussed in **Table 13**.

Table 13. Prescribed and uncertain impacts associated with the proposed development.

Will there be impacts on any of the following?	Yes/No	If Yes, Address all of the assessment questions from section 6 of the BAM
Habitat of threatened entities including: ▪ karst, caves, crevices, cliffs, rocks and other geological features of significance, or ▪ human-made structures, or ▪ non-native vegetation.	Yes	There are no karsts, caves, crevices, cliffs, rocks and other features of geological significance, or human-made structures on the Subject Land. Non-native vegetation was present within the Subject Land in the form of common environmental weeds and garden escapees. No threatened species predicted to occur within the Subject Land are believed to be reliant on this exotic vegetation. A Vegetation Management Plan has been prepared for the broader Subject Property that will guide the restoration of these areas with native species.
On areas connecting threatened species habitat, such as movement corridors.	No	It is unlikely the proposed development will interrupt connectivity for any threatened species, as extensive areas of habitat connectivity will continue to exist in vegetated areas surrounding the Subject Land.
That affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining).	No	There are no confirmed threatened species and ecological communities within the Subject Land that are sustained by water bodies and hydrological processes. It is also not expected that the removal of vegetation within the Subject Land will impact upon any groundwater processes within the surrounding landscape.
On threatened and protected animals from turbine strikes from a wind farm.	No	No wind farms are associated with the proposed development.

Will there be impacts on any of the following?	Yes/No	If Yes, Address all of the assessment questions from section 6 of the BAM
On threatened species or fauna that are part of a TEC from vehicle strikes.	No	The Subject Land has the potential to support threatened species. However, due to the small nature of the proposed development, it is highly unlikely that vehicle strikes will be an issue given the only vehicle use would be along a raised vehicular platform.

6. Avoid, Minimise and Mitigate Impacts

6.1 Impact Mitigation and Minimisation Measures

This section details the measures to be implemented before, during and post construction to avoid and minimise the impacts of the development (**Table 14**).

Table 14. Avoidance, minimisation and mitigation of impacts associated with the proposed development.

Action	Outcome	Timing	Responsibility
Avoid and Minimise Impact - Project Location and Design	Due to the vegetated nature of the property, there are limited alternate locations for the proposed development. The proponent has designed the development on areas containing remnant canopy vegetation with a degraded and weed infested ground and shrub layer. A total of 24 trees are recommended for removal to accommodate the proposed development, with 13 trees to be retained (Abacus Tree Services 2021). The proponent has produced a VMP (Narla 2021) to guide the revegetation and rehabilitation of the retained vegetation in the greater Subject Property to enhance the remaining EEC.	Pre-construction phase	Proponent
Preparation of a Construction Environmental Management Plan (CEMP)	A CEMP may be required for the construction phase of the project, and will be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties and nearby waterways in accordance with relevant policy documentation and Government guidelines. In order to address the potential impacts of the proposal on biodiversity, the mitigation and management measures outlined within this table would be implemented as part of the CEMP for the site.	Pre-construction phase	Proponent Construction Contractor

Action	Outcome	Timing	Responsibility
Assigning a Project Ecologist for Vegetation Clearing	Prior to construction, the applicant should commission the services of a qualified and experienced Ecologist Consultant (minimum 2 years' experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management. The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act. The Ecologist will be commissioned to: ▪ Undertake any required targeted searches for threatened flora prior to vegetation clearing; ▪ Undertake an extensive pre-clearing survey, delineating habitat-bearing trees and shrubs to be retained/removed; and ▪ Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat and/or relocate any displaced fauna.	Prior to and during vegetation clearance works	Proponent Project Ecologist
Targeted Survey for *Genoplesium baueri*	If possible, the proponent should commission a targeted survey for the assumed present species, *Genoplesium baueri* (Bauer's Midge Orchid). The survey should be conducted within the DPIE approved survey months of February or March.	Prior to and during vegetation clearance works	Proponent Project Ecologist
Targeted Survey for *Hygrocybe aurantipes*	If possible, the proponent should commission a targeted survey for the assumed present species, *Hygrocybe aurantipes*. The survey should be conducted within the DPIE approved survey months of May or June.	Prior to and during vegetation clearance works	Proponent Project Ecologist
Implementation of the Vegetation Management Plan (VMP)	The proponent must implement the management actions outlined in the VMP (Narla 2021), particularly, weed removal and the rehabilitation and revegetation of PWSGF.	Construction phase; Post-construction phase	Proponent Project Ecologist
Tree Protections	Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction	Construction phase; Post-	Proponent

Action	Outcome	Timing	Responsibility
	sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ. A Minor Encroachment is less than 10% of the TPZ and is outside the SRZ. A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods.	construction phase	
Landscaping	Future landscaping efforts should incorporate vegetation representative of PWSGF as outlined in the VMP (Narla 2021).	Construction phase; Post-construction phase	Proponent
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Construction phase	Proponent Construction Contractor
Erection of temporary fencing	Temporary fencing should be erected around retained native vegetation that may incur indirect impacts on biodiversity values due to the construction works.	Construction phase	Proponent Construction Contractor
Storage and Stockpiling (Soil and Materials)	All storage, stockpile and laydown sites must remain within the allocated stockpile locations. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	Construction Contractors
Stormwater	Potential impacts relating to stormwater and runoff will be managed during construction and operation phases. The CEMP will guide stormwater management during the construction phase of development.	Post-construction phase	Proponent Construction Contractors/ Architect

7. Assessment of Impacts

7.1 Direct Impacts

7.1.1 Full Clearing

The proposed development will require the complete clearing of approximately 0.03ha of PCT 1214 – Moderate condition (remnant canopy).

The proposed works will require the removal of 0.03ha of vegetation that conforms to the BC Act listing for the EEC, Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion.

The vegetation proposed for removal within the Subject Land is deemed of moderate quality. Although remnant species remain, large portions are overrun with common exotic species and garden escapees. The implementation of the VMP (Narla 2021) will see the rehabilitation (weed removal) and revegetation of this EEC within the remaining areas of the Subject Property.

7.1.2 Direct Impacts – Partial Clearing

No partial clearing will occur as a result of the proposed development.

7.2 Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the Subject Land. Impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat. The indirect impacts of this proposed development are outlined in **Table 15.**

Table 15. Indirect impacts associated with the proposed development.

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(a) inadvertent impacts on adjacent habitat or vegetation	Vegetation and habitat directly adjacent to the Subject Land has the potential to experience ongoing indirect impacts as a result of the proposed development. The disturbance caused during construction may increase weed infestations within adjacent vegetation, which in turn may decrease its habitat value. Additionally, the proposed development may indirectly impact the vegetation surrounding the Subject Land through accidental Trampling. The proposed development has the potential to alter the natural hydrology occurring within the area due to an increase in hard surfaces. This in turn may negatively impacting vegetation downslope of the Subject Land by altering natural runoff.	One (1) TEC occurs within the Subject Land – Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion. Two (2) threatened species, *Genoplesium baueri* (Bauer's Midge Orchid) and *Hygrocybe aurantipes* have also been assumed present within the Subject Land. There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat condition and direct impacts such as trampling.	While changes to vegetation condition, hydrology and threats of trampling may have a localised impact to threatened species, threatened ecological communities and their habitats, this is not expected to impact on their bioregional persistence. Furthermore, the implementation of the VMP will address the minimisation of inadvertent impacts from the proposed development, primarily with weed control.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects however, the surrounding area is comprised	One (1) TEC occurs within the Subject Land – Pittwater and Wagstaffe Spotted Gum Forest in the Sydney	While edge effects may have a localised impact to TECs and threatened species, this is not expected to impact on their

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
	of heavily urbanised properties, therefore it is unlikely that the proposed development will exacerbate these impacts more than is already present. Additionally, due to the small nature of proposed development, it is unlikely that this will impact local species moving between areas. Any impacts are expected to be restricted to the immediate area surrounding the Subject Land to a couple of metres.	Basin Bioregion. Two (2) threatened species, *Genoplesium baueri* (Bauer's Midge Orchid) and *Hygrocybe aurantipes* have also been assumed present within the Subject Land. There is also the potential that threatened species occur in areas adjacent the Subject Land. The TEC and threatened species may be impacted by edge effects leading to a reduced viability in habitat.	bioregional persistence, considering the areas of habitat connectivity that continue to exist within the surrounding areas.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	An increase in noise is to be expected during construction. As the Subject Land is located in a residential area, this is not expected to have an impact on any species roosting adjacent to the site during the day as they would be adapted to such noises. It is not expected that construction would occur throughout the night, and as such would not impact on nocturnal species that may utilise adjacent habitat, or diurnal species that roost in adjacent habitat. The construction may increase dust in adjacent habitat. Dust can impact on a plant's ability to photosynthesise and may increase plant mortality in the adjacent	One (1) TEC occurs within the Subject Land – Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion. Two (2) threatened species, *Genoplesium baueri* (Bauer's Midge Orchid) and *Hygrocybe aurantipes* have also been assumed present within the Subject Land. There is also the potential that threatened species occur in areas adjacent the Subject Land. Threatened species may be impacted by an increase in noise and dust spill	While the construction may have a localised impact to the TEC and threatened species, this is not expected to impact on their bioregional persistence. The areas of habitat connectivity that continue to exist within the surrounding areas will allow their movement away from potentially impacted areas.

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
	vegetation. However, this is not expected to have such an impact to decrease the viability of adjacent habitat. Construction will occur during normal working hours and as such, light spill is not expected to affect adjacent habitat.	into adjacent habitats, although this will be primarily restricted to the construction period.	
(d) transport of weeds and pathogens from the site to adjacent vegetation	As previously discussed, the proposed construction may lead to an increase in weed infiltration restricted to the immediate area surrounding the Subject Land to a couple of metres due to enhanced edge effects. However, weeds are not expected to be transported via human or vehicular traffic into surrounding areas during construction. Temporary fencing will be erected around retained native vegetation to avoid such indirect impacts occurring during construction.	One (1) TEC occurs within the Subject Land – Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion. Two (2) threatened species, *Genoplesium baueri* (Bauer's Midge Orchid) and *Hygrocybe aurantipes* have also been assumed present within the Subject Land. There is also the potential that threatened species occur in areas adjacent the Subject Land. The TEC and threatened species may be impacted by weed and pathogen transportation leading to a reduced viability in habitat.	While weeds and pathogens may have a localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence considering the patchy habitat connectivity within the surrounding areas. Furthermore, the implementation of the VMP will address the minimisation of inadvertent impacts from the proposed development, primarily with weed control.

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(e) increased risk of starvation, exposure and loss of shade or shelter	Given the tree removal proposed, there is an increased risk that any threatened fauna would be exposed to increased risks from starvation, exposure, and loss of shade or shelter as a result of the proposed development; however, this risk is small given the small area of impact. No habitat is to be removed beyond the Subject Land, although disturbances from noise during construction and operation may deem such habitats unsuitable for certain species (for a short time). However, due to the areas of habitat connectivity that continue to exist within the surrounding areas, it is unlikely that this impact will be significant as such habitats will continue to provide food resources and shelter for fauna species, along with the retained vegetation within the greater Subject Property.	Two (2) threatened species, *Genoplesium baueri* (Bauer's Midge Orchid) and *Hygrocybe aurantipes* have been assumed present within the Subject Land. There is also the potential that threatened species occur in areas adjacent the Subject Land. These threatened species may be impacted by an increased risk of starvation, exposure and loss of shade or shelter.	While the proposed development may have a localised impact to threatened species, this is not expected to impact on their bioregional persistence. The areas of habitat connectivity that continue to exist within the surrounding areas will allow their movement away from potentially impacted areas. Furthermore, the implementation of the VMP will see the revegetation of PWSGF within the remaining vegetation of the Subject Property, decreasing these risks further.
(f) loss of breeding habitats	An increase in noise is to be expected during and post-construction; however, the surrounding area contains urbanised properties and roads, therefore it is unlikely that the proposed development will exacerbate these impacts more than is already present. The removal of native vegetation may reduce breeding habitat for nesting animals and may reduce prey presence for predatory species such as owls, thereby reducing their breeding habitat. As such, there is potential for disturbance to breeding habitats directly adjacent to the Subject Land.	There is potential that threatened fauna species use habitat adjacent to the Subject Land for breeding. Such species may be impacted by an increase in noise, exposure, fragmentation and loss of vegetation which may impact on their breeding habitat.	This impact is expected to be localised and will not have an overall impact on the bioregional persistence of threatened species. The areas of habitat connectivity that continue to exist within the surrounding areas will allow their movement away from potentially impacted areas. Furthermore, the implementation of the VMP will see the revegetation of

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
			PWSGF within the remaining vegetation of the Subject Property which may increase potential breeding habitat in the greater Subject Property.
(g) trampling of threatened flora species	Two (2) threatened flora species (*Genoplesium baueri* and *Hygrocybe aurantipes*) were assumed present within the Subject Land. The lack of proximal records makes it unlikely that these species would be present within the Subject Land and adjacent areas. Without targeted survey these species cannot be fully ruled out as occurring within the Subject Land however, it is unlikely that trampling of these threatened species will be associated with this project.	Two (2) assumed present threatened flora species, *Genoplesium baueri* (Bauer's Midge Orchid) and *Hygrocybe aurantipes.*	Although unlikely that these species would be present, potential for them to be trampled within the Subject Land will be mitigated through the purchasing of offset credits and the pre-clearing assessment conducted prior to construction works.
(h) inhibition of nitrogen fixation and increased soil salinity	Most types of human disturbance can inhibit nitrogen fixation however there is only a small area being disturbed for the proposed development and therefore it is unlikely that this will cause any noticeable impacts to adjacent vegetation. Increased soil salinity may result due to clearing of vegetation leading to the rising of the water table. However, clearing will be limited to the Subject Land and will only impact the immediate area surrounding the Subject Land to a couple of metres.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(i) fertiliser drift	This issue is not likely to affect the vegetation within or surrounding the Subject Land. Although fertiliser may be used in weed control, no fertiliser drift is expected.	N/A	N/A
(j) rubbish dumping	There is the possibility that rubbish dumping (including littering) in adjacent vegetation increases during construction; however, the surrounding area is comprised of heavily urbanised properties, therefore it is unlikely that the proposed development will exacerbate these impacts more than is already present. The dumping/littering of food resources may provide a food source for fauna. However, this may also encourage invasive species into such habitats. This impact can be mitigated by the appropriate disposal of rubbish.	There is potential that threatened fauna species use habitat adjacent to the Subject Land. Such species may be impacted by the dumping of rubbish, particularly food resources. This may result in both positive (food source) and negative impacts (increase in predators) to such species.	This impact is expected to be localised and will not have an overall impact on the bioregional persistence of the TECs or threatened species.
(k) wood collection	This issue is not likely to affect the vegetation surrounding the Subject Land during and post-construction, particularly as the majority of vegetation surrounding the Subject Land cannot be accessed as it is private property.	N/A	N/A
(l) bush rock removal and disturbance	This issue is not likely to affect the vegetation surrounding the Subject Land. No bush rock was observed within or adjacent to the Subject Land.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(m) increase in predatory species populations	There is potential that predatory species, such as foxes and cats, already inhabit areas within and surrounding the Subject Land. There is the possibility that other indirect impacts, such as an increase in rubbish dumping, may encourage predatory species into the area, however, this increase will be limited to the time of construction works.	There is potential that threatened fauna species use habitat adjacent to the Subject Land. Such species may be impacted by an increase in predatory species populations.	An increase in predatory species adjacent to the Subject Land may have widespread ramifications for any locally occurring threatened species. In particular, the patchy areas of habitat connectivity adjacent to the Subject Land will allow for the movement of predatory species across the wider landscape.
(n) increase in pest animal populations	There is potential that pest animal populations already inhabit areas within and surrounding the Subject Land. There is the possibility that other indirect impacts, such as an increase in rubbish dumping, may encourage an increase in pest animal populations, however, this increase will be limited to the time of construction works.	There is potential that threatened fauna species use habitat adjacent to the Subject Land. Such species may be impacted by an increase in pest animal populations.	An increase in pest animal species adjacent to the Subject Land may have widespread ramifications for any locally occurring threatened species. In particular, the patchy areas of habitat connectivity adjacent to the Subject Land will allow for the movement of pest animal species across the wider landscape.
(o) increased risk of fire	The Subject Land is not identified as occurring within bushfire prone land. Furthermore, the small size of the proposed works is not expected to alter the bushfire risk of vegetation surrounding the Subject Land.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(p) disturbance to specialist breeding and foraging habitat, e.g., beach nesting for shorebirds.	No specialist breeding and foraging habitat was identified within or adjacent to the Subject Land. Therefore, it is not expected that the proposed development will disturb any specialist breeding and foraging habitat.	N/A	N/A

8. Threshold for Assessing and Offsetting

8.1 Impacts on Native Vegetation

The following native vegetation within the Subject Land is proposed to be impacted as a result of the proposed development: 0.03ha representative of PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion.

The purchase and retirement of Biodiversity Offset Credits will be required for the 0.03ha of vegetation within Zone 1: Moderate condition (remnant canopy), representative of PCT 1214 (**Figure 16**).

8.2 Impacts on Threatened Species

The following threatened species has been assumed present within the Subject Land and will require the purchase and retirement of Biodiversity Offset Credits:

- *Genoplesium baueri* (Bauer's Midge Orchid); and
- *Hygrocybe aurantipes.*

Figure 16. Impacts on native vegetation and offset requirements.

8.3 Serious and Irreversible Impacts (SAII's)

One (1) threatened ecological community and two (2) assumed present threatened species within the Subject Land have been identified as entities at risk of an SAII in the Threatened Biodiversity Data Collection (DPIE 2021d):

- Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion;
- *Genoplesium baueri* (Bauer's Midge Orchid); and
- *Hygrocybe aurantipes.*

8.3.1 Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion

The threshold for consideration of SAII for Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion is currently under development. This means that any impact on the potential habitat for this ecological community could be considered 'serious and irreversible'. Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the proposed impacts are serious and irreversible is to be undertaken in accordance with Section 9.1 of the BAM (DPIE 2020b) as outlined in Table 16.

Table 16. Additional impact assessment provisions for ecological communities that are associated with a serious and irreversible impact.

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	
BC Act Status: Endangered	
a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SAII	The proponent has designed a modest home which will only impact approximately 0.03ha of PWSGF. Furthermore, the implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of the broader Subject Property.
b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone	The proposed development will impact on approximately 0.03ha of Vegetation Zone 1: Moderate condition (remnant canopy) of PWSGF. Vegetation Zone 1 comprised a mixed native/exotic canopy, shrub and ground layer. The zone was of moderate condition, with a VI Score of 42.2. There is the potential for the proposed development to have an indirect impact on PWSGF not being removed within and surrounding the Subject Land (approximately 0.03ha); However, the implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of this vegetation.
c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SAII	The impact thresholds for this community are currently under development.
d) the extent and overall condition of the potential TEC within an area of 1,000ha, and then 10,000ha, surrounding the	The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH 2016a) indicates the presence of approximately 124ha of PWSGF within an area of 1,000ha surrounding the Subject Land, and 376ha of PWSGF within an area of 10,000ha surrounding the Subject Land.

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion		
BC Act Status: Endangered		
proposed development footprint	The PWSGF within these areas largely comprises fragmented patches of varying sizes. The conditions of these patches cannot be determined without ground truthing, although are expected to be partially degraded due to their positioning within a residential landscape.	
e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration	The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH 2016a) and the Gosford LGA vegetation mapping (Bell 2009) indicate approximately 491.3ha of PWSGF occurs within the Pittwater IBRA Subregion. This comprises fragmented patches of varying sizes. The conditions of these patches cannot be determined without ground truthing. Overall, the impact of the proposed development will result in the removal of 0.03ha, accounting for 0.006% of the extant area of PWSGF in the Pittwater IBRA Subregion. This will result in approximately 491.27ha of PWSGF remaining within the Pittwater IBRA Subregion after the proposed development.	
f) an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion	Approximately 33% of the remaining stands of the community are reserved, including 47ha in Bouddi National Park and 3ha in Brisbane Water National Park (Bell 2009). Thirty-seven hectares have been mapped within Ku-ring-gai Chase National Park but this has not been substantiated in more recent studies. Within the Pittwater (now Northern Beaches) LGA, 50ha of the community occur in Council reserves including Stapleton Park and McKay, Crown of Newport, and Angophora bushland reserves (NSW Scientific Committee 2013).	
g) the development, clearing or biodiversity certification proposal's impact on:	i) abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns	The proposed development has the potential to alter the natural hydrology occurring within and surrounding the Subject Land due to excavation works during construction, the installation of buildings, and an increase in hard surfaces. This may alter water runoff levels and increase nutrients into adjacent areas of PWSGF, causing an increase in weed infestations. However, the implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of PWSGF in the greater Subject Property.
	ii) characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants	The areas of PWSGF within the Subject Land are of a moderate quality with a mixed exotic/native canopy, shrub and ground layer. Fire and flood regimes have been largely altered due to the residential development that has occurred in the area. Therefore, it is highly unlikely that the proposed development will exacerbate impacts on characteristic and functionally important species as the area

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion		
BC Act Status: Endangered		
		is already highly altered. It is not expected that the proposed development will impact any characteristic and functionally important species outside of the Subject Land.
	iii) the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC	The proposed development may enhance weed infiltration into adjacent habitat by an increase in edge effects. However, the implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of this vegetation. It is therefore not expected that the quality and integrity of adjacent PWSGF will be significantly reduced by the proposed development.
h) direct or indirect fragmentation and isolation of an important area of the potential TEC	The PWSGF within the Subject Land and surrounds does not occur within a 'Priority Management Area' as defined under the Saving our Species Program (DPIE 2019b). Therefore, the development will not directly or indirectly fragment or isolate an important area of PWSGF.	
i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.	The Saving our Species Program (DPIE 2019b) has identified various measures proposed to manage key threats to conserve this ecological community, including: ▪ Liaise with relevant fire authority (National Parks and Wildlife Service, Rural Fire Service) to develop and implement fire plans as per the TEC thresholds (Fire no more than once every 10 years).; ▪ Provide landholders with information about threats to the TEC including habitat loss, clearing, illegal tree and understorey removal, weeds, fire, erosion, encroachment and disease. Methods of engagement can include workshops, letter-box drops, media campaigns, field days etc. Consult with landholders about participating in conservation agreements (preferably long-term in perpetuity) to protect the TEC on their property; ▪ Undertake active weed control for invasive species that compete with native species, including aerial spraying. Primary weed control to be undertaken in year 1, followed by secondary weed control annually (where required); ▪ Close illegal tracks at strategic sites to restrict access by recreational users. Develop and implement a rehabilitation plan to re-vegetate closed tracks. Locally sourced seed from species listed on the Scientific Determination will be used for re-vegetation and should represent all stratum of the TEC; ▪ Install fencing at strategic sites to restrict access by recreational users; and	

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	
BC Act Status: Endangered	
	▪ Install signage in National Parks and Council reserves to educate the community about the TEC and threats to it, including disease. A number of impact mitigation measures are to be implemented by the proponent before, during and after construction to avoid and minimise the impacts of the proposed development on PWSGF (see Table 14).

8.3.2 *Genoplesium baueri* (Bauer's Midge Orchid)

The threshold of SAII for *Genoplesium baueri* is currently under development. This means that any impact on the potential habitat for this threatened species could be considered 'serious and irreversible'. Due to the potential sensitivity of this threatened species to any impact, a determination of whether or not the proposed impacts are serious and irreversible is to be undertaken in accordance with Section 9.1 of the BAM (DPIE 2020b) as outlined in Table 17.

Table 17. Additional impact assessment provisions for threatened species or populations that are associated with a serious and irreversible impact

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Genoplesium baueri*	
BC Act Status: Endangered	
a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SAII	The proposed development will result in the removal of approximately 0.03ha of potential habitat for this species. This SAII species has not been surveyed for and as such has been assumed present within the Subject Land. It is deemed unlikely that this species would occupy the Subject Land; However, it is recommended that a targeted survey be conducted for this species during the optimal survey period of February-March to officially rule out its presence. In order to mitigate further damage to potential habitat, the proponent has also opted for a development footprint which will only impact a small area of potential habitat (0.03ha).
b) the size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification.	Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. This species has not been surveyed for and has been assumed present within the Subject Land. There is only one (1) record of this species within a 100km^2 search area, which was recorded in 2014 over 9km south of the Subject Land (DPIE 2021c). It is therefore unlikely that the proposed development would have any direct or indirect impacts on a local population.
c) the extent to which the impact exceeds any threshold for the potential entity	The impact thresholds for this species are currently under development.

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Genoplesium baueri*		
BC Act Status: Endangered		
d) the likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:	i. an estimate of the change in habitat available to the local population as a result of the proposed development	The proposed development will result in the removal of approximately 0.03ha of potential habitat for this species. No direct or indirect impacts associated with the proposed development are expected to impact on the habitat available to a local population of this species.
	ii. the proposed loss, modification, destruction or isolation of the available habitat used by the local population	The proposed development will result in the removal of approximately 0.03ha of potential habitat for this species. No direct or indirect impacts associated with the proposed development are expected to impact on a local population of this species. Suitable habitat will continue to exist for this species in all areas surrounding the Subject Land.
	iii. modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.	The proposed development will result in the clearing of 0.03ha of potential habitat for this species. However, it is not expected that the removal of vegetation within the Subject Land will impact on processes important to the species' life cycle, considering that significant more suitable habitat will remain untouched within the Subject Land and surrounding vegetation.
e) the likely impact on the ecology of the local population. At a minimum, address the following: for flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available: ▪ pollination cycle; ▪ seedbanks; ▪ recruitment; and ▪ interactions with other species (e.g. pollinators, host	This species has not been surveyed for and as such has been assumed present within the Subject Land. The removal of vegetation within the Subject Land is not expected to impact on the pollination cycle, seedbanks, recruitment or interactions with other species. The vegetation within the Subject Land is already disturbed with common exotic species and garden escapees. Should surveys reveal that this species occurs within the Subject Land, it would already be experiencing the aforementioned pressures associated with the currently disturbed nature of the Subject Land. The implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of potential habitat for this species in the greater Subject Property.	

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Genoplesium baueri*	
BC Act Status: Endangered	
species, mycorrhizal associations)	
f) a description of the extent to which the local population will become fragmented or isolated as a result of the proposed development.	The removal of vegetation as a result of the proposed development is not expected to fragment or isolate a local population of this species if they are present within the Subject Land. Suitable habitat for this species will remain across the Subject Property. As such, areas of habitat connectivity will continue to exist within the surrounding areas for any individuals/populations that may be present within the area.
g) the relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range.	This species has a patchy distribution throughout its range, recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. Surveys have not been undertaken to ascertain whether individuals are located within the Subject Land. As such, its importance cannot be ascertained. However, should this species be present, it is highly unlikely that it would interact with other populations.
h) the extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population.	The Subject Land already experiences high levels of exotic flora. It is not anticipated that the proposed development will result in any significant direct or indirect impacts that would lead to a decrease in viability, more than is already experienced. Furthermore, the implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of potential habitat for this species in the greater Subject Property.
i) an estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion.	Within NSW, the area of occupancy for *Genoplesium baueri* is estimated to be 168km^2 (NSW Scientific Committee 2012).
i) the measure(s) proposed to contribute to the recovery of the species in the IBRA subregion.	The *Genoplesium baueri* Saving our Species Program (OEH 2014a) has not identified measures for the population within the Northern Beaches LGA; However, it has identified various measures proposed to manage key threats to conserve this species in other LGAs, including: ▪ Liaise with National Parks and Wildlife Service staff and contractors using the road about sensitivity of the species and the need to avoid slashing during December to May; ▪ Count individuals annually one day per year for this site. Take photos at monitoring points;

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Genoplesium baueri*	
BC Act Status: Endangered	
	▪ Install a temporary fence (standard rabbit netting) on the third side of the triangle (30m). Investigate impact of excluding browsers and potentially open the fence after flowering and fruiting is complete (June). Close during flowering period (December - May); ▪ Install Green Post markers to minimise impacts on roadside populations. Increase staff (and contractor) awareness of the location and importance of sites to reduce impacts of slashing and track maintenance; and ▪ Physical and chemical control of weeds.

8.3.3 *Hygrocybe aurantipes*

The threshold of SAII for *Hygrocybe aurantipes* is currently under development. This means that any impact on the potential habitat for this threatened species could be considered 'serious and irreversible'. Due to the potential sensitivity of this threatened species to any impact, a determination of whether or not the proposed impacts are serious and irreversible is to be undertaken in accordance with Section 9.1 of the BAM (DPIE 2020b) as outlined in **Table 18.**

Table 18. Additional impact assessment provisions for threatened species or populations that are associated with a serious and irreversible impact

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Hygrocybe aurantipes*	
BC Act Status: Vulnerable	
a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SAII	The proposed development will result in the removal of approximately 0.03ha of potential habitat for this species. This SAII species has not been surveyed for and as such has been assumed present within the Subject Land. It is deemed unlikely that this species would occupy the Subject Land; However, it is recommended that a targeted survey be conducted for this species during the optimal survey period of May-June to officially rule out its presence. In order to mitigate further damage to potential habitat, the proponent has also opted for a development footprint which will only impact a small area of potential habitat (0.03ha).
b) the size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification.	Currently the species is known only from its type locality in the Lane Cove Bushland Park in the Lane Cove Local Government Area in Sydney and from the Blue Mountains National Park (Mt Wilson) and Hazelbrook. This species has not been surveyed for and has been assumed present within the Subject Land. No records of this species were recorded within the a 100km^2 search area of the Subject Land (DPIE 2021c). It is therefore unlikely that the proposed development would have any direct or indirect impacts on a local population.

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Hygrocybe aurantipes*		
BC Act Status: Vulnerable		
c) the extent to which the impact exceeds any threshold for the potential entity	The impact thresholds for this species are currently under development.	
d) the likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:	i. an estimate of the change in habitat available to the local population as a result of the proposed development	The proposed development will result in the removal of approximately 0.03ha of potential habitat for this species. No direct or indirect impacts associated with the proposed development are expected to impact on the habitat available to a local population of this species.
	ii. the proposed loss, modification, destruction or isolation of the available habitat used by the local population	The proposed development will result in the removal of approximately 0.03ha of potential habitat for this species. No direct or indirect impacts associated with the proposed development are expected to impact on a local population of this species. Suitable habitat will continue to exist for this species in all areas surrounding the Subject Land.
	iii. modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.	The proposed development will result in the clearing of 0.03ha of potential habitat for this species. However, it is not expected that the removal of vegetation within the Subject Land will impact on processes important to the species' life cycle, considering that significant more suitable habitat will remain untouched within the Subject Land and surrounding vegetation.
e) the likely impact on the ecology of the local population. At a minimum, address the following: for flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available: ▪ pollination cycle; ▪ seedbanks; ▪ recruitment; and ▪ interactions with other species (e.g.	This species has not been surveyed for and as such has been assumed present within the Subject Land. The removal of vegetation within the Subject Land is not expected to impact on the pollination cycle, seedbanks, recruitment or interactions with other species. The vegetation within the Subject Land is already disturbed with common exotic species and garden escapees. Should surveys reveal that this species occurs within the Subject Land, it would already be experiencing the aforementioned pressures associated with the current disturbed nature of the Subject Land. The implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of potential habitat for this species in the greater Subject Property.	

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Hygrocybe aurantipes*	
BC Act Status: Vulnerable	
pollinators, host species, mycorrhizal associations)	
f) a description of the extent to which the local population will become fragmented or isolated as a result of the proposed development.	The removal of vegetation as a result of the proposed development is not expected to fragment or isolate a local population of this species if they are present within the Subject Land. Suitable habitat for this species will remain across the Subject Property. As such, areas of habitat connectivity will continue to exist within the surrounding areas for any individuals/populations that may be present within the area.
g) the relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range.	This species is known only from its type locality in the Lane Cove Bushland Park in the Lane Cove Local Government Area in Sydney and from the Blue Mountains National Park (Mt Wilson) and Hazelbrook. Surveys have not been undertaken to ascertain whether individuals are located within the Subject Land. As such, its importance cannot be ascertained. However, should this species be present, it is highly unlikely that it would interact with other populations.
h) the extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population.	The Subject Land already experiences high levels of exotic flora. It is not anticipated that the proposed development will result in any significant direct or indirect impacts that would lead to a decrease in viability, more than is already experienced. Furthermore, the implementation of the VMP will see the overall rehabilitation (weed removal) and revegetation of potential habitat for this species in the greater Subject Property.
i) an estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion.	The estimated area of occupancy of *Hygrocybe aurantipes* is unknown. Two (2) populations are currently known within Lane Cove Bushland Park in the Lane Cove Local Government Area in Sydney and from the Blue Mountains National Park (Mt Wilson) and Hazelbrook. However, the size of the population is unknown given that this species is a fungus.
i) the measure(s) proposed to contribute to the recovery of the species in the IBRA subregion.	The *Hygrocybe aurantipes* Saving our Species Program (OEH 2014b) has not identified measures for the population within the Northern Beaches LGA; However, it has identified various measures proposed to manage key threats to conserve this species in other LGAs, including: ▪ Keep species records and known/predicted fire regime requirements up to date and concur in all appropriate databases. Liaise with Rural Fire Service (or other relevant agency) to incorporate species requirements into Operations Plan;

Serious and Irreversible Impact (SAII) Impact assessment provisions for threatened species or populations: *Hygrocybe aurantipes*	
BC Act Status: Vulnerable	
	▪ Liaise with local council to incorporate species' requirements into Crown Reserve Plan of Management. Minimise impacts of recreational activities by closing secondary tracks off the main waterfall track, and encouraging walkers to keep to the main walking track through the use of brush matting of secondary tracks. Improving track drainage to discourage secondary track formation around boggy areas into *Hygrocybe* sp. habitat; ▪ Ongoing weed control; ▪ Assess bird spread weed density before and after weed control; ▪ Targeted habitat surveys to determine presence/absence and distribution across the reserve. Surveys to be routinely conducted during fruiting period but also timed to occur post significant rainfall events. Samples will be collected for morphological identification and DNA analysis to develop and maintain a reference collection. If fruiting does not occur for several consecutive years, consider the need to sample soil to determine presence of mycelium; ▪ Implement fungi protection works including track repairs, boardwalk and improved track drainage; ▪ Liaison with landholders, especially new residents to educate about harmful activities and seek permission to implement weed control on their properties; ▪ Conduct education activities (workshops, leaflets) with local business ensuring they are aware of Protection of the Environment Operations Act 1997, fines for pollution incidents and appropriate chemical disposal methods; ▪ Design and implement a stormwater improvement program for Bushland Park to minimise impacts to fungi habitat. Includes seeking advice on the most appropriate approach to manage stormwater (flow, quality, direction); ▪ Liaise with Sydney Water to have systematic assessment of status of pipes/pop-tops in close proximity to sites with species. Repair/replace pipes where sewage is leaching into habitat and monitor and maintain pipes/pop-tops; and ▪ Test water quality within the catchment quarterly and after significant wet weather events. Initially results will be assessed and incorporated into Stormwater Improvements - Investigations and design study then used to improve stormwater quality management as design is implemented.

9. Biodiversity Offset Credit Requirements

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate species credits from registered Biodiversity Stewardship Sites that comply with the trading rules of the NSW BOS in accordance with the 'like for like' report generated by the BAM calculator. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the Biodiversity Conservation Trust (BCT) would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

Estimated costs to purchase these credits, or alternatively, to allocate offset funds directly into the NSW BCT are available in the NSW Biodiversity Offsets Payment Calculator (DPIE 2020a).

9.1 Offset Requirement for Ecosystem Credits

A total of one (1) ecosystem credit is required to offset the biodiversity impacts of the proposed development (**Table 19**).

Table 19. Ecosystem credits required to offset the proposed development.

PCT	BC Act Status	Zone	Total Area (ha)	Ecosystem Credits Required
PCT 1214: Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion	Endangered Ecological Community	Zone 1: Moderate condition (remnant canopy)	0.03	1
Total Ecosystem Credits				**1**

9.2 Offset Requirement for Species Credits

Two (2) candidate species credits that have been 'assumed present' will require offsetting through the retiring of biodiversity offset species credits under the BOS as a result of the proposed development (**Table 20**).

Table 20. Species credits required to offset the proposed development

Species	BC Act Status	Zone	Total Area (ha)	Species Credits Required
Genoplesium baueri (Bauer's Midge Orchid)	Endangered	Zone 1: Moderate condition (remnant canopy)	0.03	1
		Subtotal		**1**
Hygrocybe aurantipes	Vulnerable	Zone 1: Moderate condition (remnant canopy)	0.03	1
		Subtotal		**1**

10. Other Relevant Legislation and Planning Policies

10.1 State Environmental Planning Policy (Koala Habitat Protection) 2021

This Policy aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. This SEPP applies to LGAs that are listed in Schedule 1 'Local government areas' of the SEPP. The Northern Beaches LGA is included in Schedule 1, however, the development control provisions of Part 2, Clause 11 of the SEPP do not apply to the proposed development as the land does not have an area of at least 1 hectare (including adjoining land within the same ownership). As such, the Koala Habitat Protection SEPP 2021 does not apply to the proposed development.

10.2 State Environmental Planning Policy No 19—Bushland in Urban Areas

SEPP 19 – Bushland in Urban Areas applies to the areas and parts of areas specified in Schedule 1 of the SEPP that adjoin bushland zoned or reserved for public open space purposes. As the Northern Beaches (former Pittwater) LGA is not listed in Schedule 1 of the SEPP, 'Areas and Part Areas to Which the Policy Applies', this SEPP does not apply to the Subject Land.

10.3 State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 applies to land within the coastal zone. The coastal zone means the area of land comprised of the following coastal management areas:

- The coastal wetlands and littoral rainforests area;
- The coastal vulnerability area;
- The coastal environment area; or
- The coastal use area.

The Subject Land occurs on areas identified as 'Coastal Environment Area' and 'Coastal Use Area' as per the State Environmental Planning Policy (Coastal Management) 2018 (**Figure 10**). As such, the following development controls set out in 'Part 2 Development Controls for Coastal Management Areas' of the Coastal Management SEPP 2018 apply.

Coast Environment Area (Clause 13):

- Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:
    - The integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment;
    - Coastal environmental values and natural coastal processes;
    - The water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1;
    - Marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms;
    - Existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability;
    - Aboriginal cultural heritage, practices and places; and
    - The use of the surf zone;

- Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:
    - The development is designed, sited and will be managed to avoid an adverse impact referred to above;
    - If that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact; or
    - If that impact cannot be minimised—the development will be managed to mitigate that impact;
- This clause does not apply to land within the Foreshores and Waterways Area within the meaning of Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

The proposed works will have minimal impacts on the biophysical and ecological environment of the coastal environment area. The proposed works will require the clearing of only 0.03ha of PWSGF. The implementation of the VMP will ensure the rehabilitation and revegetation of PWSGF in the greater Subject Property. Given the small area of impact and the distance of the Subject Land from the foreshore, there will be no adverse impacts on the marine environment including water quality, marine vegetation, headlands and rock platforms, and the proposed works will not impact upon existing public open spaces, access to the marine environment or use of the surf zone.

Coastal Use Area (Clause 14):

- Development consent must not be granted to development on land that is within the coastal use area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:
    - Existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability;
    - Overshadowing, wind funnelling and the loss of views from public places to foreshores;
    - The visual amenity and scenic qualities of the coast, including coastal headlands;
    - Aboriginal cultural heritage, practices and places;
    - Cultural and built environment heritage; and
- Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:
    - The development is designed, sited and will be managed to avoid an adverse impact referred to above;
    - If that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact; or
    - If that impact cannot be minimised—the development will be managed to mitigate that impact; and
    - Has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development;
- This clause does not apply to land within the Foreshores and Waterways Area within the meaning of Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

The proposed development is situated within a highly urbanised area and is situated back from the Pittwater foreshore. As such, there will be no adverse impacts on existing access, loss of views from public places, the visual amenity and scenic qualities, or aboriginal cultural heritage of the foreshore.

10.4 Pittwater Local Environmental Plan (LEP) 2014

10.4.1 Biodiversity (Clause 7.6)

The Subject Land is located within land mapped as 'Biodiversity' on the Pittwater LEP Biodiversity Map. As such, clause 7.6 of the Pittwater LEP applied to the proposed development. The objective of this clause is to maintain terrestrial, riparian and aquatic biodiversity by:

- Protecting native fauna and flora;
- Protecting the ecological processes necessary for their continued existence; and
- Encouraging the conservation and recovery of native fauna and flora and their habitats.

Before determining a development application, the consent authority must consider:

- Whether the development is likely to have:
    - Any adverse impact on the condition, ecological value and significance of the fauna and flora on the land;
    - Any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna;
    - Any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land; and
    - Any adverse impact on the habitat elements providing connectivity on the land;
- Any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Development consent must not be granted unless the consent authority is satisfied that:

- The development is designed, sited and will be managed to avoid any significant adverse environmental impact;
- 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
- If that impact cannot be minimised—the development will be managed to mitigate that impact.

The proposed development has been purposefully designed to minimise impacts on biodiversity values as much as possible. Due to the vegetated nature of the property, there are limited alternate locations for the proposed development. In order to avoid and minimise potential impacts of the proposal on local biodiversity values, a series of mitigation and management measures have been identified, which are to be implemented as part of any Construction Environmental Management Plan (CEMP) produced for the site. This includes assigning a Project Ecologist to undertake an extensive pre-clearing survey, and to supervise the clearing of all vegetation in relation to the proposed development. Additionally, a Vegetation Management Plan (VMP) has been produced to guide the rehabilitation and revegetation of PWSGF within the greater Subject Property (Narla 2021).

10.5 Pittwater Development Control Plan (DCP) 2003

10.5.1 Pittwater Spotted Gum Forest – Endangered Ecological Community (Part B4.7)

The Subject Land contains Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (formerly Pittwater Spotted Gum Forest), an EEC. As the proposed development involves the clearing of this EEC, part B4.7 of the Pittwater DCP applies. The following controls apply to the proposed development:

- Development shall not have an adverse impact on Pittwater Spotted Gum Endangered Ecological Community;
- Development shall restore and/or regenerate Pittwater Spotted Gum Endangered Ecological Community and provide links between remnants;

- Development shall be in accordance with any Pittwater Spotted Gum Forest Recovery Plan;
- Development shall result in no significant onsite loss of canopy cover or a net loss in native canopy trees;
- Development shall retain and enhance habitat and wildlife corridors for locally native species, threatened species and endangered populations;
- Caretakers of domestic animals shall prevent them from entering wildlife habitat;
- Fencing shall allow the safe passage of native wildlife;
- Development shall ensure that at least 80% of any new planting incorporates native vegetation (as per species found on the site or listed in Pittwater Spotted Gum Endangered Ecological Community); and
- Development shall ensure any landscaping works are outside areas of existing Pittwater Spotted Gum Endangered Ecological Community and do not include Environmental Weeds.

Although the proposed development will have an impact on PWSGF, a series of mitigation and management measures have been identified in order to avoid, minimise and offset potential impacts of the proposal on PWSGF (Table 14). In particular, the implementation of the VMP will result in the rehabilitation and revegetation of PWSGF within the greater Subject Property (Narla 2021).

11. References

Abacus Tree Services (2021) Arborist Report Client: Uday Bonu & Kavita Bonu, Address: 141 Riverview Road, Avalon Beach N.S.W 2107

Aboriginal Land Council (2021) Land Council Interactive Map https://alc.org.au/land-council-map/

Australian Government Department of the Environment and Energy (2018) Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions)

Australian Bureau of Meteorology (BOM) (2021) Terrey Hills, New South Wales. April 2021 Daily Weather Observations http://www.bom.gov.au/climate/dwo/202104/html/IDCJDW2154.202104.shtml

Australian Standard 4970 (2009) Protection of Trees on Development Sites

Biodiversity Conservation Act (2016) https://legislation.nsw.gov.au/#/view/act/2016/63/full

Biodiversity Conservation Regulation (2017) https://www.legislation.nsw.gov.au/#/view/regulation/2017/432

Chapman G.A., Murphy C.L., Tille P.J., Atkinson G. and Morse R.J. (2009) Soil Landscapes of the Sydney 1:100,000 Sheet map, Ed. 4, Department of Environment, Climate Change and Water, Sydney

Department of Environmental Conservation (DEC) (2004) Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft), New South Wales Department of Environment and Conservation, Hurstville, NSW

Department of Planning, Industry and Environment (DPIE) (2019a) Guidance to assist a decision-maker to determine a serious and irreversible impact https://www.environment.nsw.gov.au/-media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/guidance-decision-makers-determine-serious-irreversible-impact-190511.pdf

Department of Planning, Industry and Environment (DPIE) (2019b) Saving our Species Program – Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion

Department of Planning, Industry and Environment (DPIE) (2020a) Biodiversity Assessment Method Calculator Version 1.3.0.00

Department of Planning, Industry and Environment (DPIE) (2020b) Biodiversity Assessment Methodology

Department of Planning, Industry and Environment (DPIE) (2020c) Biodiversity Offset Payment Calculator Version 2.0 https://www.lmbc.nsw.gov.au/offsetpaycalc

Department of Planning, Industry and Environment (DPIE) (2020d) Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method

Department of Planning, Industry and Environment (DPIE) (2021a) Biodiversity Values Map and Threshold Tool

Department of Planning, Industry and Environment (DPIE) (2021b) eSPADE v2.1 https://www.environment.nsw.gov.au/eSpade2Webapp#

Department of Planning, Industry and Environment (DPIE) (2021c) NSW BioNet. The website of the Atlas of NSW Wildlife http://www.bionet.nsw.gov.au/

Department of Planning, Industry and Environment (DPIE) (2021d) NSW BioNet. Threatened Biodiversity Data Collection

Department of Planning, Industry and Environment (DPIE) (2021e) NSW BioNet. Vegetation Classification System

DP Surveying (2020) Boundary Identification and Detail Plan of Lot 2 in DP833902 at No. 141 Riverview Rd, Avalon Beach

Fyffe Design (2021) Proposed Residential Development, 141 Riverview Road, Avalon, Plans Master Set

Google Earth (2021) 141 Riverview Road, Avalon Beach NSW 2107. Accessed May 2021

Key Urban Planning (2021) Development Application, Statement of Environmental Effects, Lot 2 DP 833902 No.141 Riverview Road, Avalon Beach, Construction of a Dwelling House including tree removal

Landcom (2004) Managing Urban Stormwater: Soils and Construction 'The Blue Book', Volume 1, Fourth Edition, New South Wales Government, ISBN 0-9752030-3-7

Mitchell, P.B (2002) NSW Ecosystems Study: Background and Methodology (Unpublished)

Narla Environmental (2021) Vegetation Management Plan, 141 Riverview Road, Avalon

Nastasi & Associates (2021) Proposed Residential Development, 141 Riverview Road, Avalon, Stormwater Management Plans

Naylor, S.D (1995) Acid Sulfate Soil Risk Map Sheet, Department of Land and Water Conservation, Sydney.

Nearmap Australia Pty Ltd (2021) 141 Riverview Road, Avalon Beach NSW 2107. Accessed May 2021

Northern Beaches Council (2003) Pittwater Development Control Plan

Northern Beaches Council (2014) Pittwater Local Environmental Plan

Northern Beaches Council (2021a) Natural Environment Referral Response – Biodiversity, DA2021/0317, Lot 2 DP 833902, 141 Riverview Road Avalon Beach NSW 2107

Northern Beaches Council (2021b) Natural Environment Referral Response – Coastal, DA2021/0317, Lot 2 DP 833902, 141 Riverview Road Avalon Beach NSW 2107

NSW Government Spatial Services (2021) Six Maps Clip & Ship https://maps.six.nsw.gov.au/clipnship.html

NSW Legislation (2018) State Environmental Planning Policy (Coastal Management) 2018

NSW Legislation (2021) State Environmental Planning Policy (Koala Habitat Protection) 2021

NSW Scientific Committee (2002) Hygrocybe aurantipes (an Agaric Fungus) – Vulnerable Species Listing

NSW Scientific Committee (2012) Genoplesium baueri – Endangered Species Listing

NSW Scientific Committee (2013) Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion – Endangered Ecological Community Listing

Office of Environment and Heritage (OEH) (2014a) Saving our Species Program – Bauer's Midge Orchid (Genoplesium baueri)

Office of Environment and Heritage (OEH) (2014b) Saving our Species Program – Hygrocybe aurantipes (Hygrocybe aurantipes)

Office of Environment and Heritage (OEH) (2016a) The Native Vegetation of the Sydney Metropolitan Area - Version 3.1

Office of Environment and Heritage (OEH) (2016b) The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0. VIS_ID 4489

Office of Environment and Heritage (OEH) (2017) Biodiversity Conservation Regulation 2017: Ancillary rules: Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules

PlantNET (2021) The NSW Plant Information Network System, Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au

Robinson, L. (2003) 'Field Guide to the Native Plants of Sydney', Third Edition, Kangaroo Press

12. Appendices

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

Appendix B. Species Polygon for *Genoplesium baueri* and *Hygrocybe aurantipes* (assumed present).

Appendix C. BAMC Generated Biodiversity Credit Report.

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

BAM Site – Field Survey Form					
Date:	27/04/2021	**Plot ID:**	Plot 1	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20 x 20m	**Easting:**	343872.23m E
Datum:	GDA94	**Middle bearing from 0m:**	243°	**Northing:**	6278572.80m N
PCT:	PCT 1214: Moderate condition (remnant canopy)				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	*Allocasuarina torulosa*	10	8
Tree (TG)	*Brachychiton acerifolius*	4	5
Tree (TG)	*Corymbia maculata*	5	3
Exotic	*Grevillea cultivar*	1	3
Exotic	*Jacaranda mimosifolia*	4	5
Shrub (SG)	*Pittosporum undulatum*	2	5
Exotic	*Sporobolus africanus*	0.1	1
Exotic	*Sida rhombifolia*	0.2	10
Exotic	*Solanum nigrum*	0.2	10
Grass & grasslike (GG)	*Oplismenus aemulus*	30	1000
Exotic	*Alstroemeria psittacina*	2	100
Forb (FG)	*Desmodium rhytidophyllum*	0.2	20
Other (OG)	*Eustrephus latifolius*	0.1	2
Exotic	*Taraxacum officinale*	0.1	1
Tree (TG)	*Eucalyptus paniculata*	1	1
High Threat Exotic	*Ligustrum lucidum*	2	2
Other (OG)	*Cayratia clematidea*	0.1	4
Forb (FG)	*Oxalis perennans*	0.1	10
High Threat Exotic	*Asparagus aethiopicus*	0.2	5
High Threat Exotic	*Ehrharta erecta*	7	500
High Threat Exotic	*Bidens pilosa*	1	100
Other (OG)	*Glycine tabacina*	1	100
Exotic	*Conyza bonariensis*	0.5	15
Exotic	*Erigeron karvinskianus*	0.2	10
Forb (FG)	*Centella asiatica*	0.3	100

BAM Site – Field Survey Form			
Forb (FG)	*Commelina cyanea*	0.2	20
Exotic	*Solanum mauritianum*	0.2	5
Exotic	*Euphorbia pulcherrima*	4	10
Forb (FG)	*Youngia japonica*	2	100
High Threat Exotic	*Cotoneaster spp.*	0.1	5
High Threat Exotic	*Ochna serrulata*	0.5	3
High Threat Exotic	*Phyllostachys* spp.	1	15
Other (OG)	*Macrozamia communis*	1	5
Tree (TG)	*Stenocarpus sinuatus*	0.1	1
Exotic	*Monstera deliciosa*	0.3	10
High Threat Exotic	*Chlorophytum comosum*	2	20
Exotic	*Grevillea baileyana*	0.1	1
High Threat Exotic	*Tradescantia fluminensis*	0.1	10
Fern (EG)	*Nephrolepis cordifolia*	0.1	5
Tree (TG)	*Notelaea longifolia*	0.1	1
Grass & grasslike (GG)	*Cyperus laevis*	0.1	1
Grass & grasslike (GG)	*Entolasia marginata*	0.2	20
Other (OG)	*Stephania japonica*	0.1	1
Other (OG)	*Passiflora herbertiana* subsp. *herbertiana*	0.1	1
Exotic	*Wisteria sinensis*	0.2	2
Exotic	*Rhododendron indicum*	0.1	1
Exotic	*Callisia fragrans*	3	30
Exotic	*Jasminum polyanthum*	0.1	5
High Threat Exotic	*Schefflera actinophylla*	0.2	2
High Threat Exotic	*Canna indica*	0.4	15
Exotic	*Dietes grandiflora*	0.1	1
Forb (FG)	*Dichondra repens*	0.1	20
Grass & grasslike (GG)	*Carex inversa*	0.1	1
Grass & grasslike (GG)	*Digitaria* spp.	0.2	10
High Threat Exotic	*Ageratina adenophora*	0.1	3
High Threat Exotic	*Senna pendula*	0.1	1

BAM Site – Field Survey Form		
DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	
30-49cm	Present	
20-29cm	Present	
10-19cm	Present	
5-9cm	Present	
<5cm	Present	
Length of Logs (m)	0	

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	90
2 (15m)	45
3 (25m)	60
4 (35m)	15
5 (45m)	40
Average	**50**

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	6	20.2
Shrub	1	2
Grass	5	30.6
Forb	6	2.9
Fern	1	0.1
Other	6	2.4
High Threat Exotics	13	14.7

Appendix B. Species Polygon for *Genoplesium baueri* and *Hygrocybe aurantipes* (assumed present).

Appendix C. BAMC Generated Biodiversity Credit Report.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00025482/BAAS21006/21/00025483	Proposal Name 141 Riverview Road Avalon Beach	BAM data last updated * 29/03/2021
Assessor Name	Assessor Number BAAS21006	BAM Data version * 38
Proponent Names Uday Bonu	Report Created 17/05/2021	BAM Case Status Finalised
Assessment Revision 0	Assessment Type Part 4 Developments (Small Area)	Date Finalised 17/05/2021
BOS entry trigger BOS Threshold: Biodiversity Values Map	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

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

Species
Hygrocybe aurantipes / Hygrocybe aurantipes
Genoplesium baueri / Bauer's Midge Orchid

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1214-Pittwater Spotted Gum forest	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	0.0	0	1	1

BAM Biodiversity Credit Report (Like for like)

1214-Pittwater Spotted Gum forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion This includes PCT's: 1214, 1589	-	1214_Moderate_condition	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
Genoplesium baueri / Bauer's Midge Orchid	**1214_Moderate_condition**	0.0	1.00
Hygrocybe aurantipes / Hygrocybe aurantipes	**1214_Moderate_condition**	0.0	1.00

Credit Retirement Options

Like-for-like credit retirement options

Genoplesium baueri / Bauer's Midge Orchid	Spp	IBRA subregion
	Genoplesium baueri / Bauer's Midge Orchid	Any in NSW

Hygrocybe aurantipes / Hygrocybe aurantipes	Spp	IBRA subregion
	Hygrocybe aurantipes / Hygrocybe aurantipes	Any in NSW

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