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Biodiversity Development Assessment Report

(Streamlined Assessment)

Upper Australia Exhibit at Taronga Zoo, Sydney

Report prepared for the Taronga Conservation Society Australia

June 2020

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environmental

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Table of Contents

Figures

Tables

Plates

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
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
CEEC	Critically Endangered Ecological Community
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	Hectare
HTE	High Threat Exotic
IPA	Inner Protection Area
km	Kilometre
LGA	Local Government Area
Locality	The area within a 10km radius of the Subject Land. The same meaning when describing a local population of a species or local occurrence of an ecological community.
m	Metres
MNES	Matters of National Environmental Significance
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)
OPA	Outer Protection Area
PCT	NSW Plant Community Type
Proposal	The development, activity or action proposed.
SAII	Serious and Irreversible Impacts
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
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.
SSD	State Significant Development
Subject Land	The footprint of the proposed activity.
Subject Property	Taronga Zoo Sydney; 2A Bradleys Head Road Mosman 2088 (Lot 22/-/DP843294)
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016.
TPZ	Tree Protection Zone: A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development
VIS Plot	Vegetation Integrity Survey Plot in accordance with the BAM Methodology

Executive Summary

Narla Environmental Pty Ltd was commissioned by Taronga Conservation Society Australia to prepare this Biodiversity Development Assessment Report (BDAR). This BDAR will accompany an Environmental Impact Statement (EIS) as part of the Secretary's Environmental Assessment Requirements (SEARs) for the proposed redevelopment of the Upper Australia Exhibit at Taronga Zoo Sydney. The proposed development is located at 2A Bradleys Head Rd, Mosman NSW 2088 (Lot 22/-/DP843294; hereafter referred to as the 'Subject Property').

This BDAR has been prepared by Narla Environmental to identify the potential impacts of the proposed development on biodiversity values. The BDAR was produced using the 'Streamlined Assessment Module' as it does not exceed the area clearing threshold for small area developments as outlined in the Biodiversity Assessment Method (OEH 2017a).

The proposed development includes the modification and development of existing enclosures to facilitate the proposed development which covers an area of approximately 0.32 ha (the 'Subject Land'). The proposed development has been positioned to minimise impacts on native vegetation and habitat as much as possible. The majority of the proposed development is to be located within historically cleared land which over time has been modified by the creation of animal enclosures comprised of man-made structures and planted, landscaped vegetation.

The proposed development is expected to impact upon one (1) Plant Community Type (PCT): *PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney*. Four (4) ecosystem credits for PCT 1778 are required to be offset to mitigate impacts upon biodiversity as a result of 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 to be implemented in accordance with the Construction Environmental Management Plan (CEMP) produced for the site. This includes assigning an experienced, suitably qualified and licenced wildlife expert (Ecologist or Zoo Keeper) to undertake pre-clearing survey, dewatering supervision of the wetland ponds, and clearing supervision all vegetation in relation to the proposed development.

1. Introduction

1.1 Overview

Narla Environmental Pty Ltd (Narla) was commissioned by Taronga Conservation Society Australia ('the proponent') to prepare this Biodiversity Development Assessment Report (BDAR). This BDAR will accompany an Environmental Impact Statement (EIS) as part of the Secretary's Environmental Assessment Requirements (SEARs) for the proposed redevelopment of the Upper Australia Exhibit at Taronga Zoo Sydney. The proposed development is located at 2A Bradleys Head Rd, Mosman NSW 2088 (Lot 22/-/DP843294; hereafter referred to as the 'Subject Property').

The proposed development is comprised of the construction of a new tree house and the installation of new paths and landscaping in the design of the new macropod and koala exhibits.

The Upper Australia Exhibit redevelopment is a State Significant Development (SSD). Part 4, Division 4.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) establishes the assessment framework for SSD's. The preparation of this BDAR is in response to Item 14 'Biodiversity' of the SEARs issued for the EIS by the NSW Department of Planning, Industry and Environment (DPIE 2020).

This BDAR has been prepared as a 'Streamlined assessment module- small area development that requires consent' as it does not exceed the area clearing threshold for small area developments as outlined in the Biodiversity Assessment Method (BAM) (OEH 2017a; **Table 1**). Narla have produced this report in order to assess any potential impacts to biodiversity associated with the proposal and recommend appropriate measures to mitigate these impacts that are in line with the requirements of the Consent Authority.

Table 1. Area limits for application of small area development threshold on land not shaded on the biodiversity values map. Dark border indicates clearing 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

1.2 The Proposed Development

The Subject Land covers a small area (0.32 ha) within the Subject Property (**Figure 1**). Vegetation within the Subject Land is largely comprised of planted vegetation that is subject to landscaping, regular maintenance and historic clearing for the purpose of creating suitable animal enclosures and wetlands. The development proposal within the Subject Land is displayed in **Figure 2** and has been designed in a way that will minimise potential impacts on biodiversity where possible.

1.3 Site Location and Description

The Subject Property is situated within the suburb of Mosman within the Mosman Council Local Government Area (LGA), covering an area of approximately 28 ha on land zoned as 'SP1 - Special Activities: Zoological Gardens'. The Subject Property is situated within the northern area of Bradleys Head, and is surrounded by Sydney Harbour National Park on the eastern and southern boundaries, and low density residential to the north (**Figure 4**).

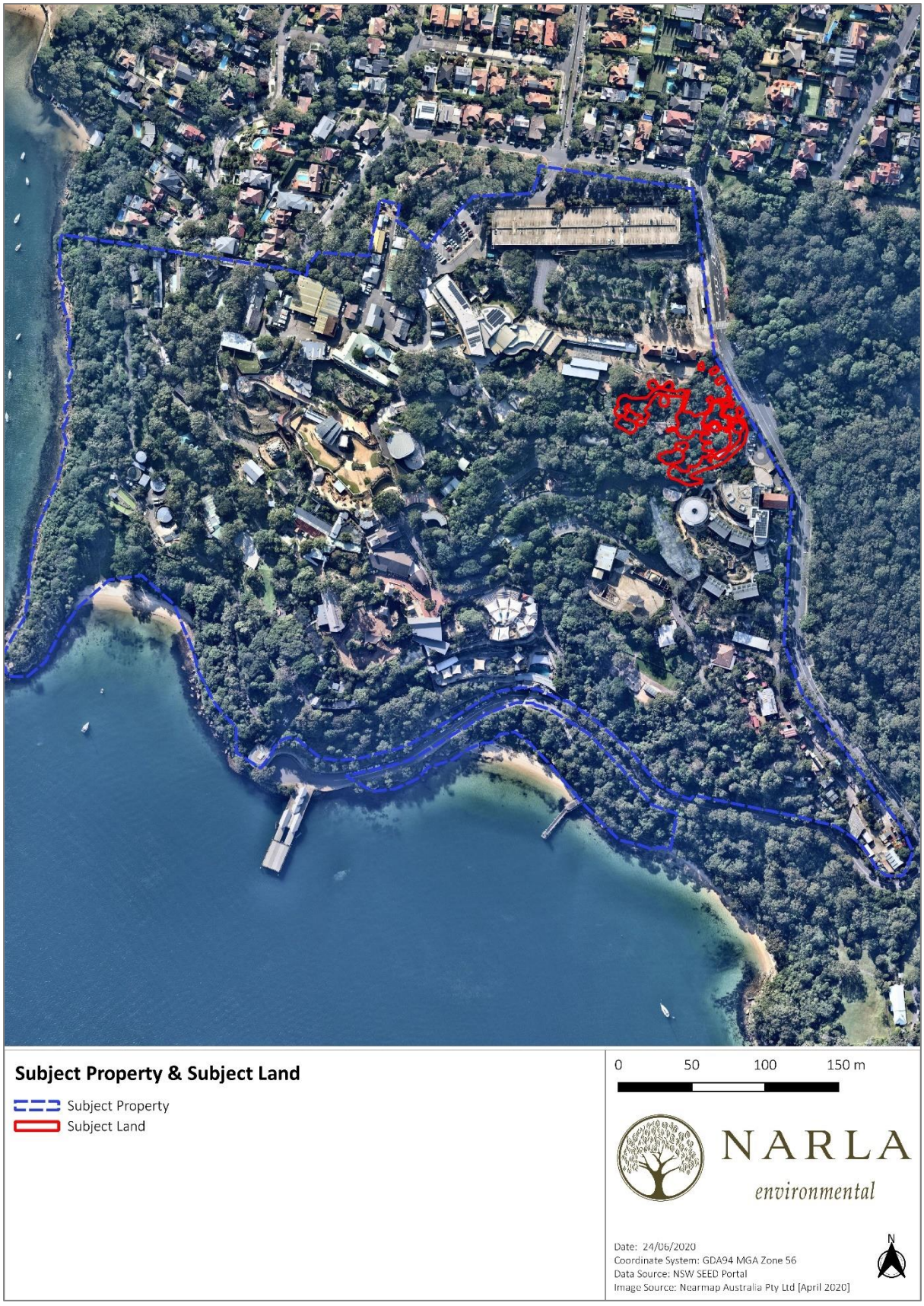

Figure 1. The Subject Land

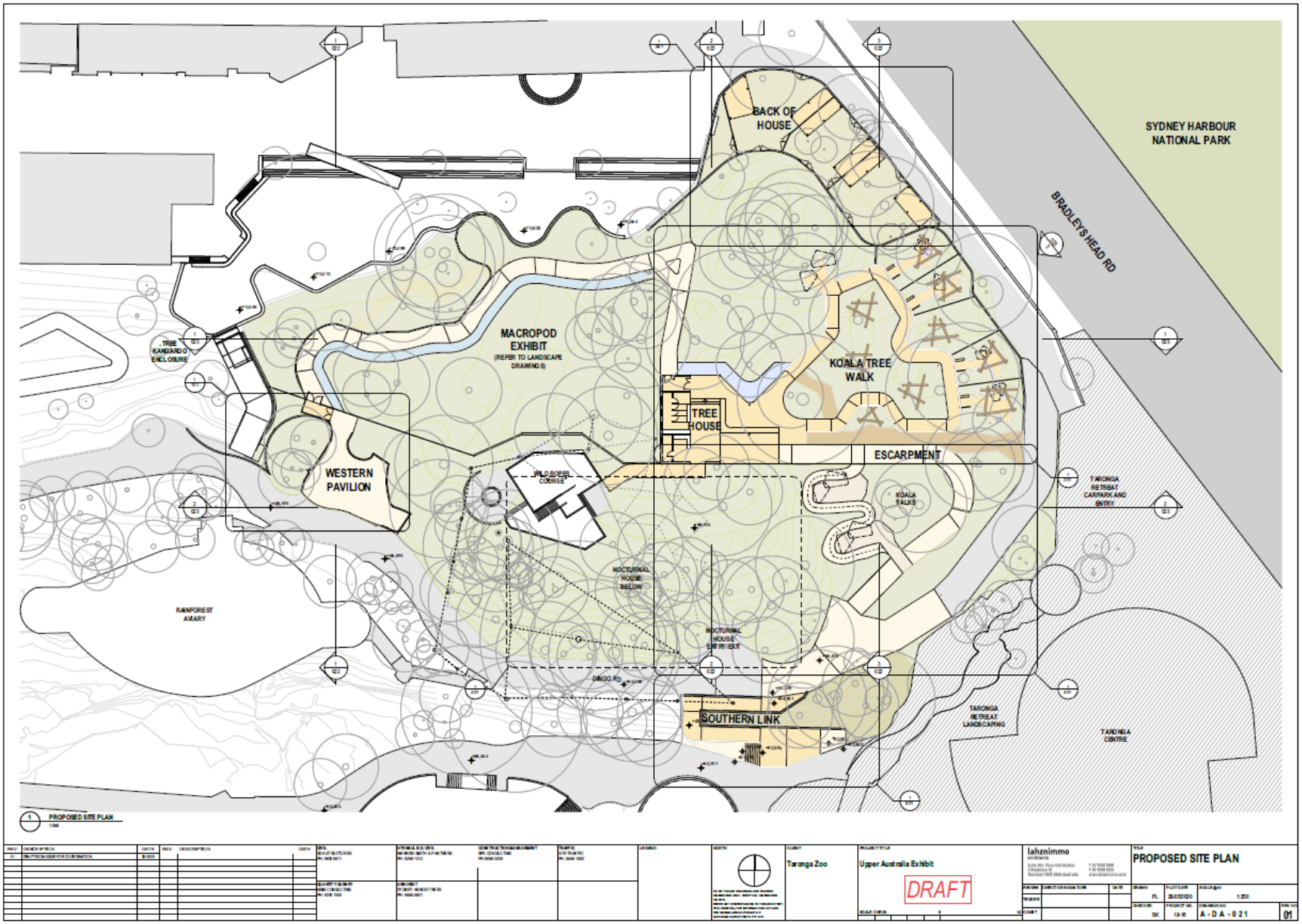

Figure 2. The proposed development (Lahznimmo Architects 2020a)

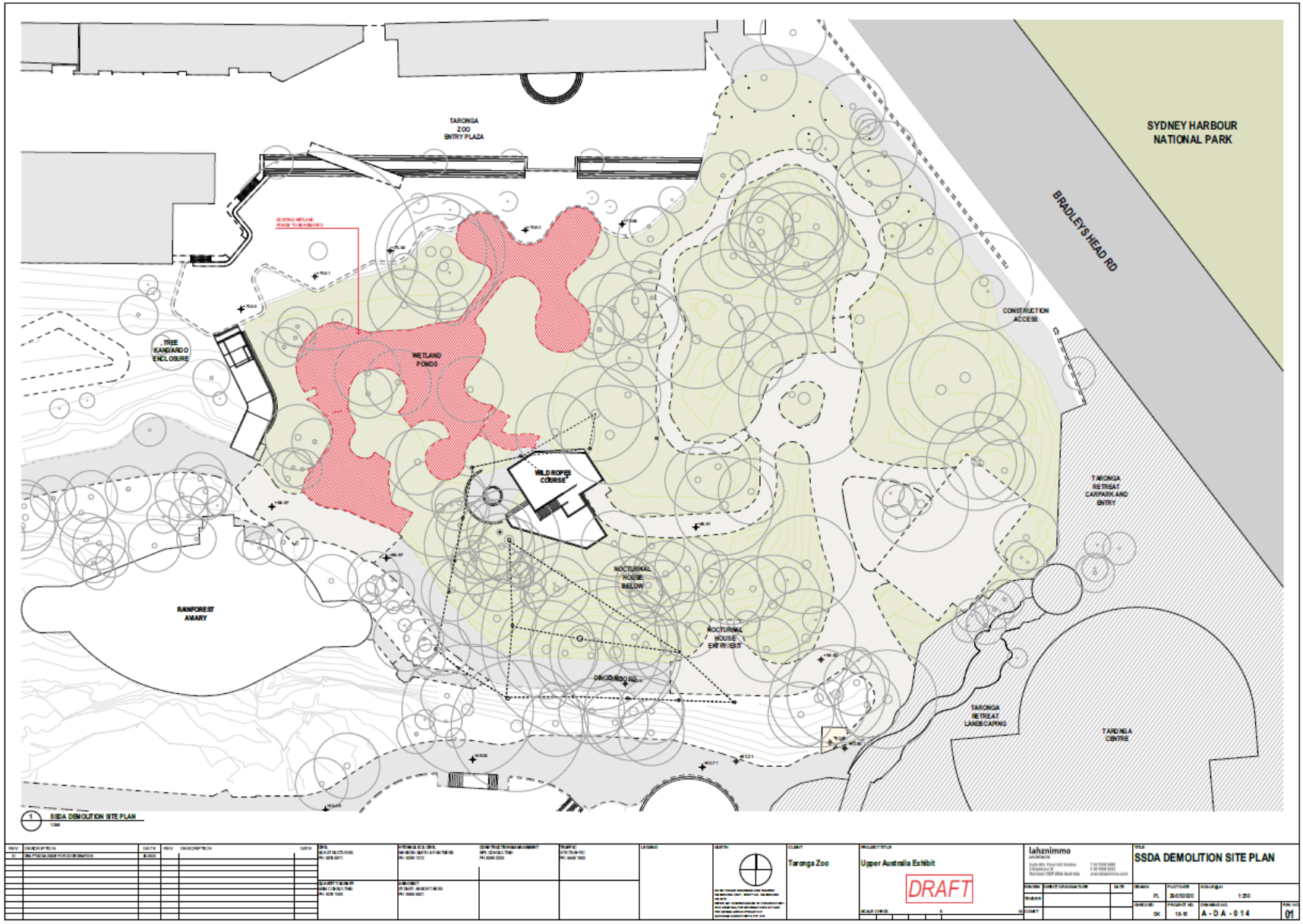

Figure 3. Proposed removal (infill) of the man-made wetland ponds

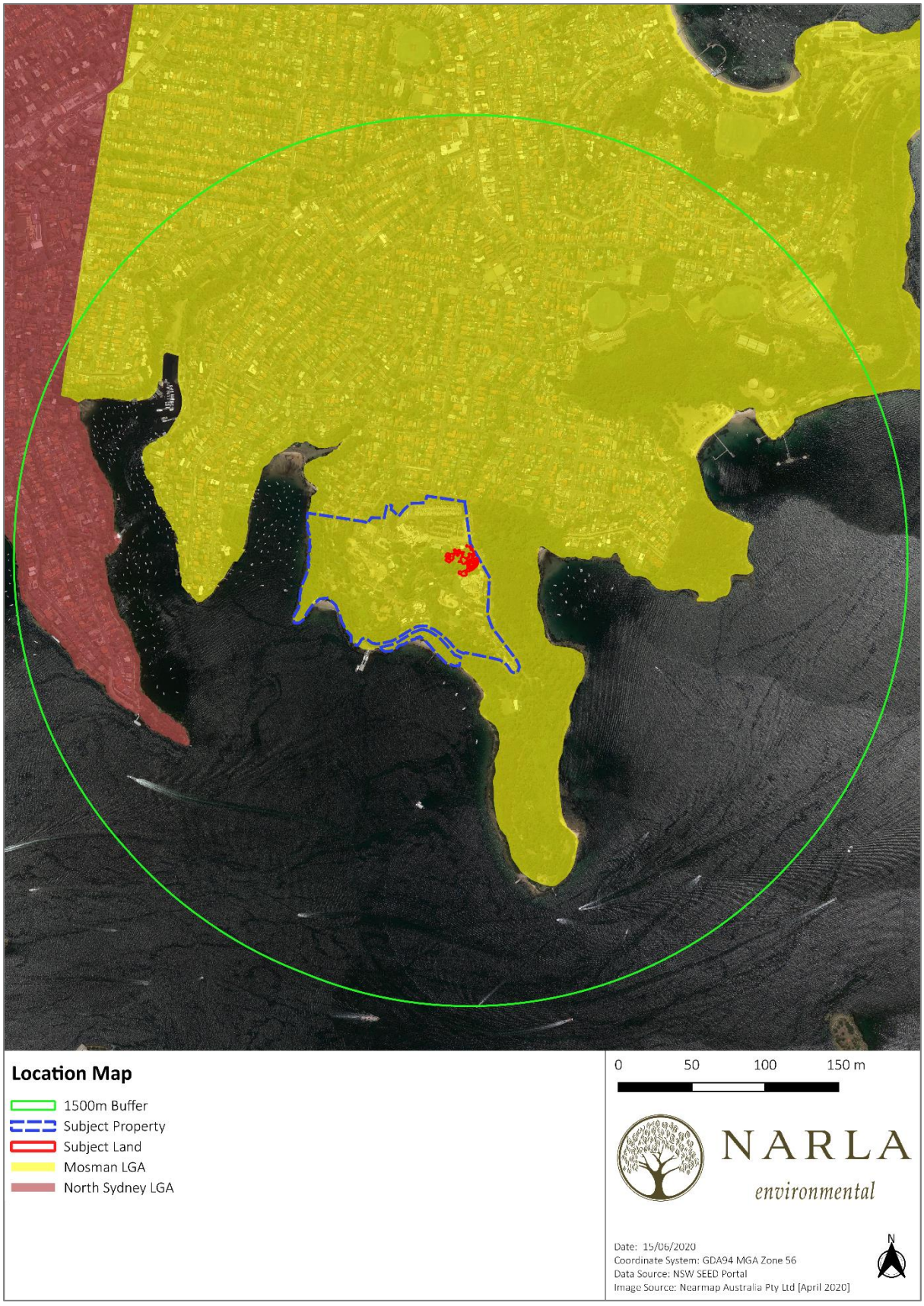

Figure 4. Location of the Subject Land

1.4 Sources of Information Used

A thorough literature review was undertaken to gain an insight into the ecology and applicable legislation within A thorough literature review was undertaken to review the ecology within the locality and the Mosman Local Government Area (LGA). Relevant data and literature reviewed in preparation of this report included:

- Relevant State and Commonwealth Databases:
  - Atlas of Living Australia Spatial Portal (ALA 2020)
  - NSW BioNet. The website of the Atlas of NSW Wildlife (DPIE 2020a)
  - NSW Bionet. Threatened Biodiversity Data Collection (DPIE 2020b)
  - NSW BioNet Vegetation Classification System (DPIE 2020c)
  - Protected Matters Search Tool (DAWE 2020)
  - NSW Biodiversity Values Map (DPIE 2019)
- Relevant State and Commonwealth Datasets:
  - NSW Government Spatial Services: Six Maps Clip & Ship (NSW Government Spatial Services 2019)
  - NSW State Environmental Planning Policy (Coastal Management)
  - NSW State Environmental Planning Policy No. 19—Bushland in Urban Areas (SEPP 19)
  - NSW State Environment Planning Policy (Sydney Harbour Catchment) 2005
- Vegetation Mapping:
  - The Native Vegetation of the Sydney Metropolitan Area and Vegetation Information System (VIS) 3.1 (OEH 2016a)
- NSW State Guidelines:
  - Biodiversity Assessment Method (OEH 2017a)
  - Biodiversity Assessment Method Calculator (BAMC) (OEH 2019a)
  - Biodiversity Assessment Method Operation Manual – Stage 1 (OEH 2018)
  - Biodiversity Assessment Method Operation Manual – Stage 2 (OEH 2019b)
  - NSW Guide to Surveying Threatened Plants (OEH 2016b)
  - Biodiversity Offsets and Agreement Management System (BOAMS) (DPIE 2020)
- Council Documents:
  - Mosman Local Environmental Plan (LEP) 2013
  - Mosman Development Control Plan (DCP) 2013
  - Weeds Declared in the Greater Sydney Region (DPI 2019)

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

- Upper Australia Exhibit – Draft Proposed Site Plan (Drawing A-DA-021-01) (Lahznimmo Architechts 2020a)
- Upper Australia Exhibit – Draft Tree Protection and Removal Plan (Drawing A-DA-701) (Lahznimmo Architechts 2020b)
- Upper Australia – Tree Survey Report (Sydney Arbor Trees 2020)
- Planning Secretary's Environmental Assessment Requirements (SEARs) (DPIE 2020)

Online databases and literature review were utilised to gain an understanding of the natural environment and ecology of the Subject Land and its surrounds to an area of approximately 10 km². Searches utilising NSW Wildlife Atlas (BioNet) and the Commonwealth Protected Matters Search Tool were conducted to identify current threatened and migratory flora and fauna records within a 10km² search area centred on the Subject Land. These data were used to assist in establishing the presence or likelihood of any such ecological values as occurring on or adjacent to the Subject Land, and helped inform our Ecologist on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment on the Subject Land and assist in determining whether any threatened flora or ecological communities may occur there (Chapman et al. 2009)

1.5 Aim and Approach

This report has been prepared in accordance with the BAM (OEH 2017a) 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 Features

2.1 IBRA bioregion and subregion

The Subject Land occurs within the 'Sydney Basin' Interim Biogeographic Regionalisation (IBRA) 7 for Australia, specifically occurring within the 'Pittwater' IBRA 7 Subregion (**Figure 5**).

2.2 Topography, geology and soils

The Subject Land is mapped as occurring on the Gymea/Lambert Soil Landscapes, in which the landscapes are typically characterised by undulating to rolling rises and low hills on Hawkesbury Sandstone. The Gymea soil landscape occurs extensively throughout the Hornsby Plateau and along the foreshores of Sydney Harbour and the Parramatta and Georges Rivers. Examples include areas of Northbridge, Forestville, Drummoyne, Balmain, Arcadia and Berrilee. The underlying geology is typical of Hawkesbury Sandstone, which is a medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Soils are shallow to moderately deep (30-100 cm) Yellow Earths and Earthy Sands on crests and inside of benches; shallow (Siliceous Sands on leading edges of benches; localised Gleyed Podzolic Soils and Yellow Podzolic Soils on shale lenses; shallow to moderately deep (<100cm) Siliceous Sands and Leached Sands along drainage lines (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 and is not mapped as occurring on acid sulfate soils nor mapped as having risk/ probability of exhibiting occurrence of acid sulfate soils. There is a small area of land within the 1500m buffer that is mapped as having a low probability of occurrence of acid sulfate soil risk (**Figure 6**).

2.3 Hydrology

No natural watercourses are located within the Subject Land; however, a series of man-made wetlands exist within the Subject Land, which are part of the 'wetland birds' exhibit.

The Subject Land and the immediate surrounds (within the 1500 m buffer) do not contain any areas of native vegetation identified as 'Coastal Wetlands' as per the State Environmental Planning Policy (Coastal Management) 2018.

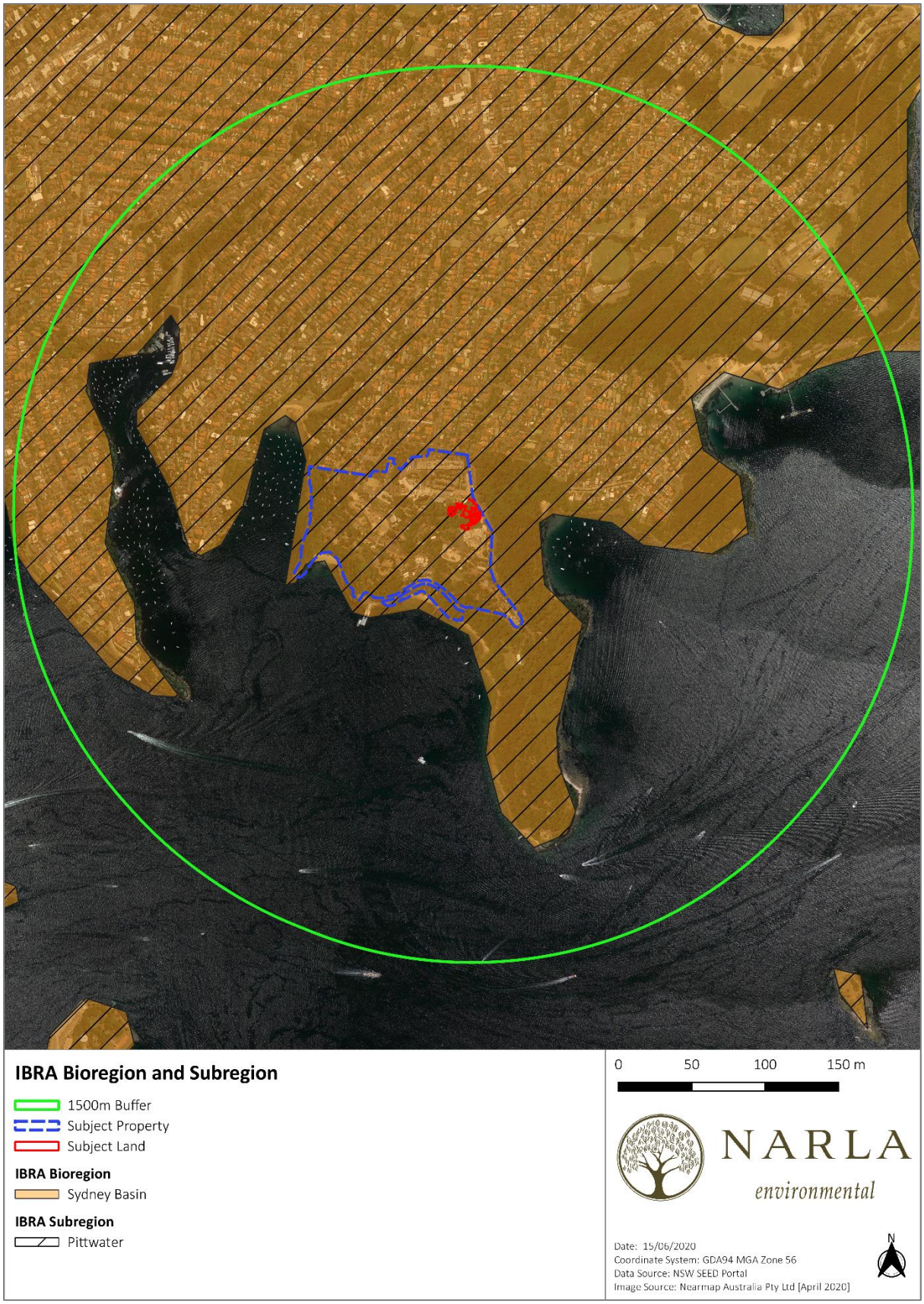

Figure 5. IBRA Bioregion and Subregion of the Subject Property, Subject Site, and within a 1500m buffer.

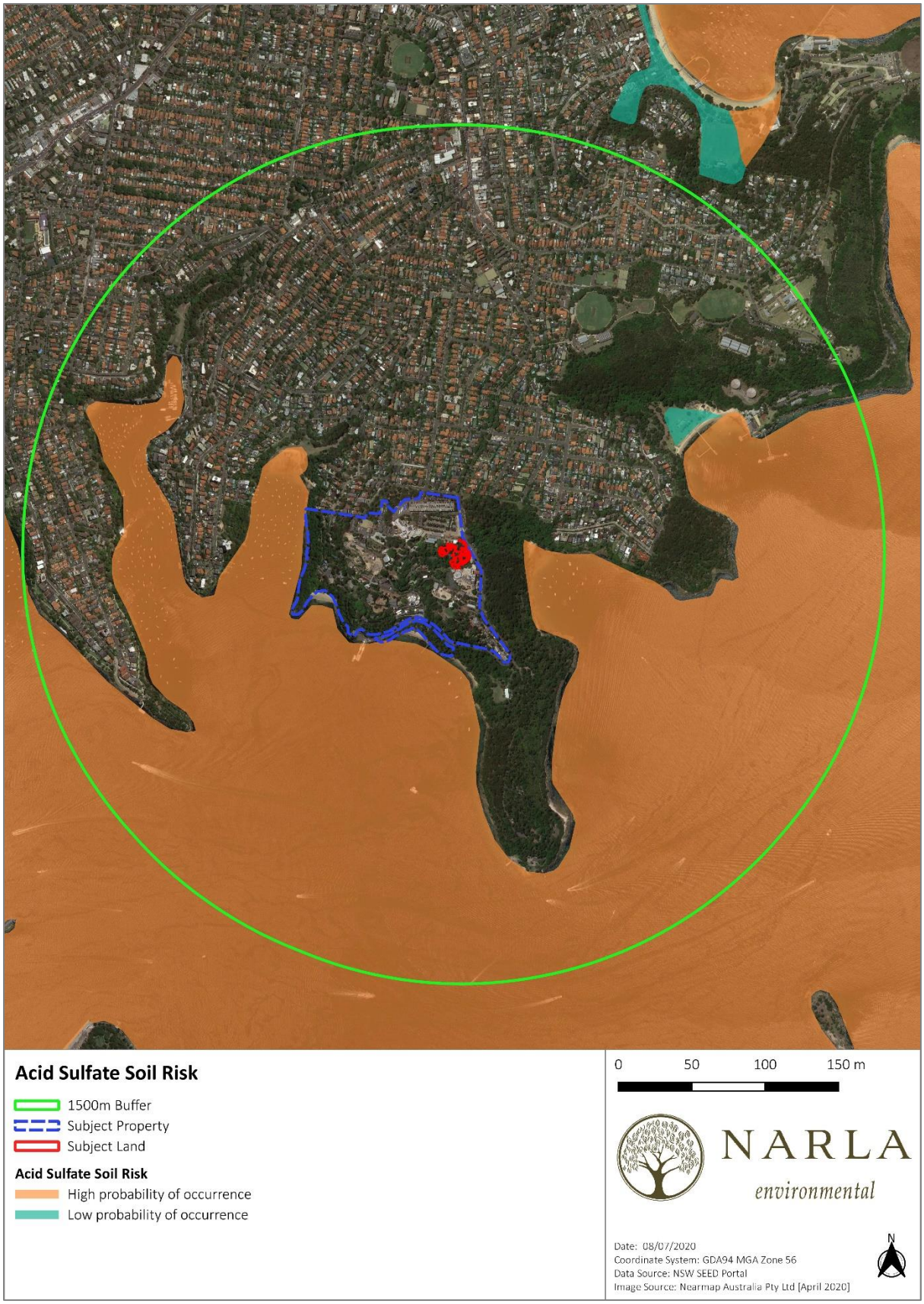

Figure 6. Acid sulfate soil risk within the 1500m buffer.

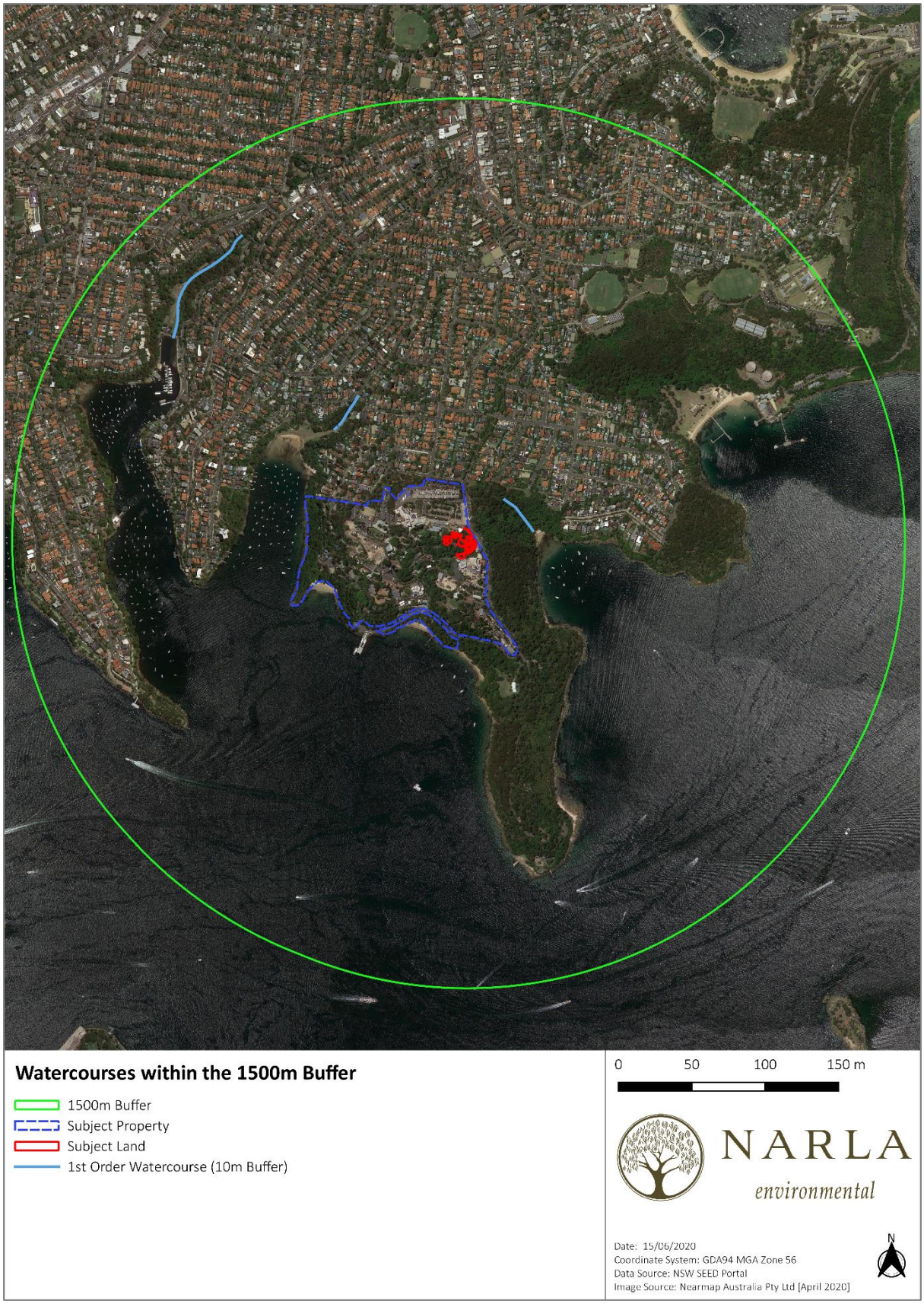

Figure 7. Rivers and streams (with associated riparian buffers) occurring within the 1500m buffer.

3. Native Vegetation

3.1 Plant Community Types

3.1.1 Historically Mapped Vegetation

The Native Vegetation of the Sydney Metropolitan Area Version 2.0 (OEH 2016a) indicated the presence of two (2) vegetation types within the Subject Land:

- Urban Exotic / Native
- Weeds and Exotics

No native Plant Community types (PCTs) were historically mapped within the Subject Land. However, in the broader Subject Property and immediately adjacent surrounding areas the following PCT was historically mapped:

- PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney

3.1.2 Plant Community Types Identified within the Subject Land

Historically, the Subject Land has undergone development and the majority (if not all) of vegetation within the Subject Land has been planted, however it is representative of a single locally-indigenous Plant Community Type (PCT). Flora species assemblage, structure and landscape interpretation data collected from the site assessment were compared against all potentially occurring PCTs in order to determine the most likely candidates that occur within the Subject Land. Selection was undertaken using information and databases provided in the BioNet Vegetation Classification System (DPIE 2020c).

A single PCT was assigned to vegetation within the Subject Land as the assessment is a streamlined assessment, in which only the dominating PCT is assigned to vegetation. Best-fit PCT selection for the vegetation was undertaken using information and databases provided in the BioNet Vegetation Classification System (DPIE 2020c).

The PCT identified within the Subject Land included the following:

- PCT 1778: Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney

3.1.3 PCT Selection Process

The selection criteria outlined in **Table 2** were used to develop the PCT shortlist.

Table 2. Selection Criteria for Selection of Best-Fit PCT

Section Criteria	Search Tool
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
Vegetation Formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Dominant Upper Stratum Species	*Eucalyptus botryoides*

This process delivered a number of potential PCTs, however only three (3) provided a match of more than two (2) criteria. The justification for the presence or absence of each of these PCT's within the Subject Land is provided in **Table 3.**

Table 3. PCT Selection Criteria. Dark border indicates the selected PCT.

Candidate PCT	Characteristics (OEH 2016a)		Justification
PCT 1775 - Smooth-barked Apple - Old-man Banksia - Red Bloodwood open forest on pleistocene sand dunes around Sydney and the Central Coast	Landscape Position / Geology	One of several vegetation communities found on the large sand dunes associated with the prominent headlands of the Sydney coastline. The surface soil is generally deeply podsolised, inferring that the dune systems upon which this forest grows have been stable for a long time. These forests are found on the larger headland systems at Jibbon Head near Bundeena, Kurnell and La Perouse. The massive dune systems that once covered the Botany-Randwick area would have once supported a network of these low-growing forests amongst the treeless sandplain heaths.	This PCT was not chosen as the 'best-fit' PCT for vegetation within the Subject Land. In terms of the landscape position and geology, the Subject Land is not situated on sand dunes; the underlying geology is Hawkesbury Sandstone. Although a number of the species within this PCT were present, a higher number of characteristic species were represented in other PCT's. In addition, the vegetation within the Subject Land was lacking a number of diagnostic species in the characteristic canopy layer, including *Eucalyptus haemastoma* and *Eucalyptus piperita*.
	Characteristic Canopy	*Angophora costata; Banksia aemula; Banksia serrata; Corymbia gummifera; Eucalyptus botryoides; Eucalyptus haemastoma; Eucalyptus piperita;*	
	Characteristic Shrub / Groundcover	*Acacia longifolia; Acacia suaveolens; Banksia integrifolia; Banksia serrata; Elaeocarpus reticulatus; Xylomelum pyriforme; Acacia ulicifolia; Aotus ericoides; Banksia ericifolia subsp. ericifolia; Bossiaea heterophylla; Breynia oblongifolia; Leucopogon ericoides; Monotoca elliptica; Dianella caerulea; Entolasia stricta; Gonocarpus teucrioides; Imperata cylindrica var. major; Lepidosperma laterale; Lomandra longifolia; Pomax umbellata; Pteridium esculentum; Themeda australis;*	

Candidate PCT	Characteristics (OEH 2016a)		Justification
PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	Landscape Position / Geology	Found on sheltered sandstone slopes along the foreshores of Sydney's major waterways and coastal escarpments. It is restricted to sandstone soils derived from either Hawkesbury or Narrabeen geology. The distribution is coastal and requires a combination of low elevation (between two and 45 metres above sea level) and mean annual rainfall that exceeds 1100 millimetres per annum.	This PCT was chosen as the 'best-fit' PCT for vegetation within the Subject Land. The Subject Land is situated on sheltered sandstone slopes along the foreshores of Sydney's major waterways (Sydney Harbour) and coastal escarpments. The underlying geology is Hawksbury Sandstone. The majority of the Subject Land is situated at an elevation of approximately 70m above sea level, which is approximately 25m above the elevation of PCT 1778. However, this PCT has been historically mapped as occurring within Sydney Harbour National Park, which is directly adjacent the Subject Land across Bradleys Head Road. Mean annual rainfall recorded at the closest weather station (Sydney Botanic Gardens; which is approximately 4.5km from Mosman) is 1226 mm.
	Characteristic Canopy	*Banksia integrifolia; Eucalyptus botryoides;*	
	Characteristic Shrub / Groundcover	*Acacia longifolia; Allocasuarina littoralis; Breynia oblongifolia; Dodonaea triquetra; Elaeocarpus reticulatus; Glochidion ferdinandi; Myrsine variabilis; Notelaea longifolia; Pittosporum undulatum; Polyscias sambucifolia; Dianella caerulea; Entolasia stricta; Imperata cylindrica var. major; Lepidosperma laterale; Lomandra longifolia; Microlaena stipoides var. stipoides; Poa affinis; Pratia purpurascens; Pteridium esculentum; Themeda australis; Xanthorrhoea arborea.*	
PCT 1841: Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region.	Landscape Position / Geology	The distribution of this forest is widespread though patchy across the Sydney area. Typically it is situated in sandstone gullies and sheltered slopes enriched by clay material. This material is sourced from shale bands in the sandstone bedrock associated with Narrabeen sandstone on the Pittwater escarpment or Hawkesbury sandstone in the Lane Cove River valley. At other places the material is sourced from shale caps situated on ridgelines above the creek. Outcropping rocks and benches are common. It occurs at elevations between 10 and 120 metres above sea level and mean annual rainfall of 850-1250 millimetres per annum. A small disjunct location occurs in a shale-enriched gully near Campbelltown.	This PCT was not chosen as the 'best-fit' PCT for vegetation within the Subject Land. Vegetation within the Subject Land does conform to the general landscape position and geology; it is situated at an elevation within the general range, and falls within the mean annual rainfall. However, soils within the Subject Land have typically been mapped as loamy sand, in contrast to PCT1841 which is typically enriched in clay. Furthermore, the vegetation within the VIS plots typically had more floristic species represented in PCT 1778 than 1841.

Candidate PCT	Characteristics (OEH 2016a)		Justification
	Characteristic Canopy	*Angophora costata; Eucalyptus botryoides; Eucalyptus pilularis; Eucalyptus piperita; Eucalyptus saligna; Syncarpia glomulifera;*	
	Characteristic Shrub / Groundcover	*Elaeocarpus reticulatus; Notelaea longifolia; Pittosporum undulatum; Ceratopetalum apetalum; Dodonaea triquetra; Allocasuarina torulosa; Leucopogon lanceolatus var. lanceolatus; Glochidion ferdinandi; Polyscias sambucifolia; Pittosporum revolutum; Breynia oblongifolia; Myrsine variabilis; Calochlaena dubia; Dianella caerulea; Entolasia marginata; Entolasia stricta; Gonocarpus teucrioides; Lepidosperma laterale; Lomandra longifolia; Microlaena stipoides var. stipoides; Poa affinis; Pseuderanthemum variabile; Pteridium esculentum.*	

3.1.3.1 Vegetation Zones within PCT 1778

Within PCT 1778, two (2) vegetation zones were identified within the Subject Land that consisted of differing condition classes:

- Zone 1: PCT 1778 – Low Condition
- Zone 2: PCT 1778 – Moderate Condition

These vegetation zones are detailed in **Table 4** and displayed in **Figure 8**.

Table 4. Vegetation identified within the Subject Land: PCT 1778.

PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney		
Vegetation class	Sydney Coastal Dry Sclerophyll Forests	
Total area	0.17 ha	
Description in VIS		
Coastal Sandstone Foreshores Forest is found on sheltered sandstone slopes along the foreshores of Sydney's major waterways and coastal escarpments. It is an open forest with a moist shrub layer and a ground cover of ferns, rushes and grasses. The flora of this community has a maritime influence given its exposure to prevailing sea breezes. The canopy can be dominated by pure stands of smooth-barked apple (*Angophora costata*), though more regularly this is found in combination with other tree species. Localised patches of bangalay (*Eucalyptus botryoides*) and coast banksia (*Banksia integrifolia*) occur closest to the coast, whereas Sydney peppermint (*Eucalyptus piperita*) and blackbutt (*Eucalyptus pilularis*) prefer more protected locations and in the case of the latter some minor shale enrichment in the soil. A prominent layer of hardy mesic small trees and shrubs is present. These include sweet pittosporum (*Pittosporum undulatum*), cheese tree (*Glochidion ferdinandi*) and blueberry ash (*Elaeocarpus reticulatus*). In the suburban environment the proliferation of these species in the understorey at long unburnt sites has generated considerable debate, particularly as there appears to be strong correlation between time since fire and their density (Rose and Fairweather 1997). It is also appears that these species are more common in these littoral zones than in other sheltered sandstone forests situated further away from the coast. This forest is restricted to sandstone soils derived from either Hawkesbury or Narrabeen geology. The distribution is coastal and requires a combination of low elevation (between two and 45 metres above sea level) and mean annual rainfall that exceeds 1100 millimetres per annum. It is noticeable that most sites are exposed to salt-laden winds. Samples are situated up to 10 kilometres from the coastline, but still in close proximity to major waterways.		
Condition Class	**Vegetation Zone 1: Moderate Condition**	**Vegetation Zone 2: Low Condition**
Approximate Extent within Subject Land	0.05 ha	0.12 ha
Field survey effort	A site assessment was conducted on 1st May 2020. One (1) VIS plot was established.	A site assessment was conducted on 28th May 2020. One (1) VIS plot was established.

PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney		
Description of vegetation	Vegetation within this zone consisted of a mixture of remnant and planted locally indigenous and non-locally indigenous native species, with low levels of weed infestation. Native species located in the VIS Plot included *Eucalyptus botryoides, Eucalyptus microcorys, Lophostemon confertus, Banksia integrifolia, Toona ciliata*, *Banksia serrata* and *Glochidion ferdinandi, Melaleuca styphelioides, Dianella caerulea, Cissus antarctica* and *Oplismenus aemulus* (**Plate 1**).	This vegetation zone has been historically cleared, and planted with a mixture of locally indigenous and non-locally indigenous native trees. Native species located in the VIS plots included *Eucalyptus botryoides*, *Stenocarpus sinuatus*, *Eucalyptus microcorys*, *Corymbia maculata* and *Banksia integrifolia*. The shrub and groundcover strata were largely absent; consisting of *Melaleuca styphelioides, Elaeocarpus reticulatus,* and *Leptospermum petersonii,* and one grass/grasslike species; *Lomandra longifolia* (**Plate 2**). Vegetation within this zone was largely within animal enclosures and/or planted garden beds with canopy species over a bare or mulched understory.
Structure of vegetation	All stratum (canopy, shrub and groundcover) were generally present within the areas associated with this zone. Vegetation was relatively dense and less managed through maintenance than vegetation within Zone 2, thus the higher levels of weed infestation were present within the zone. Native vegetation within the BAM plot was comprised of trees (22.6%), shrubs (31.6% cover), as well as groundcovers (32.7%). Litter cover (54% cover) was lower than benchmark. The vegetation zone contained a large diversity of tree stem sizes, although no large trees (>80cm DBH) were recorded. No hollow bearing trees were recorded the VIS Plot.	The structure of the vegetation within this zone was almost entirely canopy species, excluding some small shrubs with tree guards surrounding them. This was due to the presence of macropod species within the enclosure that restrict the growth of any groundcover species. As a result, the groundcover was entirely bare, or mulched. The native vegetation within the BAM plot was comprised of trees (29.2% cover). All other cover was <1%. Litter cover was low (9.8% cover) in comparison to the benchmark. No hollow bearing trees were located within the BAM plot. Approximately 42m of fallen logs were recorded.
Scientific Reference from VIS (OEH 2020c)	OEH (2016a) The Native Vegetation of the Sydney Metropolitan Area Version 2.0 NSW Office of Environment and Heritage Sydney.	
TEC Status (BC Act 2016)	Not listed	
Estimate of percent cleared value of PCT in the major catchment area	90.00 %	

Plate 1. Representative photos of Vegetation Zone 1 (Moderate Condition) within the Subject Land.

Plate 2. Representative photos of Vegetation Zone 2 (Low Condition) within the Subject Land.

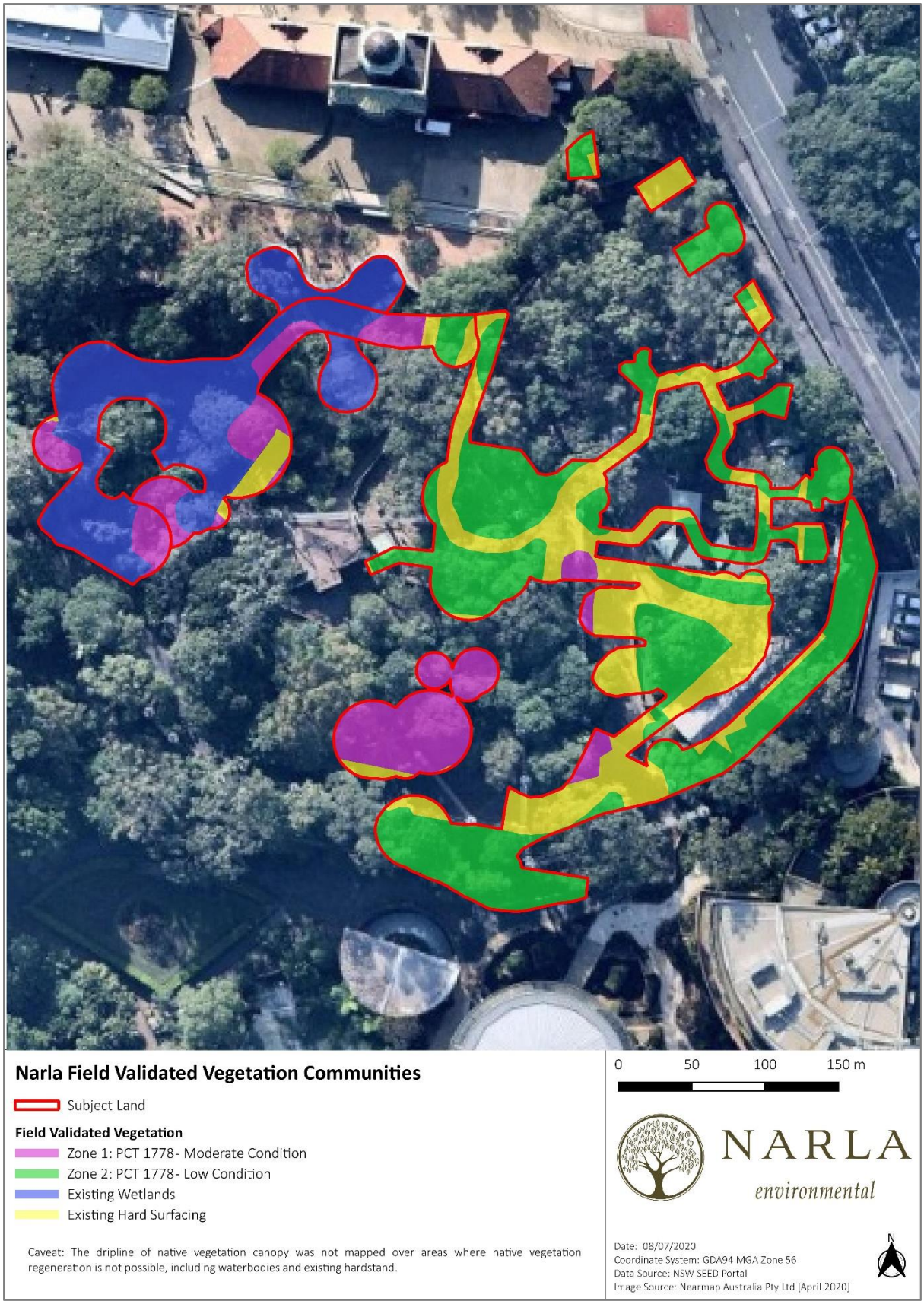

Figure 8. Vegetation Proposed for Removal within the Subject Land

3.1.4 Vegetation Integrity Survey (VIS) Plots

Two (2) Biodiversity Assessment Method (BAM) Vegetation Integrity Survey (VIS) Plots were undertaken within the Subject Land. Plot data gathered for each attribute used to assess the function of the Subject Land vegetation is detailed in **Appendix B.** Vegetation Integrity (VI) scores represented by existing vegetation within each vegetation zone is detailed in **Table 4**.

Table 5. Vegetation integrity scores for each identified zone.

PCT	Vegetation Zone	Area (ha) in the Subject Land	Survey Effort	Composition Condition Score	Structure Condition Score	Function Condition Score	VI Score	Future VI Score	Change in VI Score	Hollow bearing trees
PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	Zone 1 (Moderate Condition)	0.05	One 1000m^2 (20m x 50m) Vegetation Integrity Survey Plot	56.4	53.1	54.4	54.7	0	-54.7	Absent
	Zone 2 (Low Condition)	0.12	One 1000m^2 (20m x 50m) Vegetation Integrity Survey Plot	15.2	23.5	85.4	31.2	0	-31.2	Absent

3.2 Assessing Patch Size

Patch size is defined by the BAM as '*an area of native vegetation that:*

- *occurs on the development site or biodiversity stewardship site,* and
- *includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems)*

Patch size may extend onto adjoining land that is not part of the development site' (OEH 2017a).

Patch size was calculated according to the above guidelines, and equated to >100 ha.

3.1 Native Vegetation Cover & Habitat Connectivity

Native vegetation cover was assessed in accordance with Section 4.2 and 4.3 of the BAM (OEH 2017a). The native vegetation cover is used to assess the habitat suitability of the Subject Land for threatened species. A 1500m buffer around the boundary of the Subject Land was calculated to determine the extent of native vegetation and habitat connectivity. Native vegetation covered approximately 125 ha of the land mass within the buffer circle (total land area = 400 ha) and was assigned the >10-30% class. Total cleared areas were approximately 275 ha, which equated to approximately 68% of the total land area within the 1500m buffer (Figure 9).

Areas of connectivity will determine the extent of habitat that may facilitate the movement of threatened species across their range. Large areas of connectivity that may facilitate the movement of threatened species were evident within the 1500m surrounding the Subject Land (Figure 10).

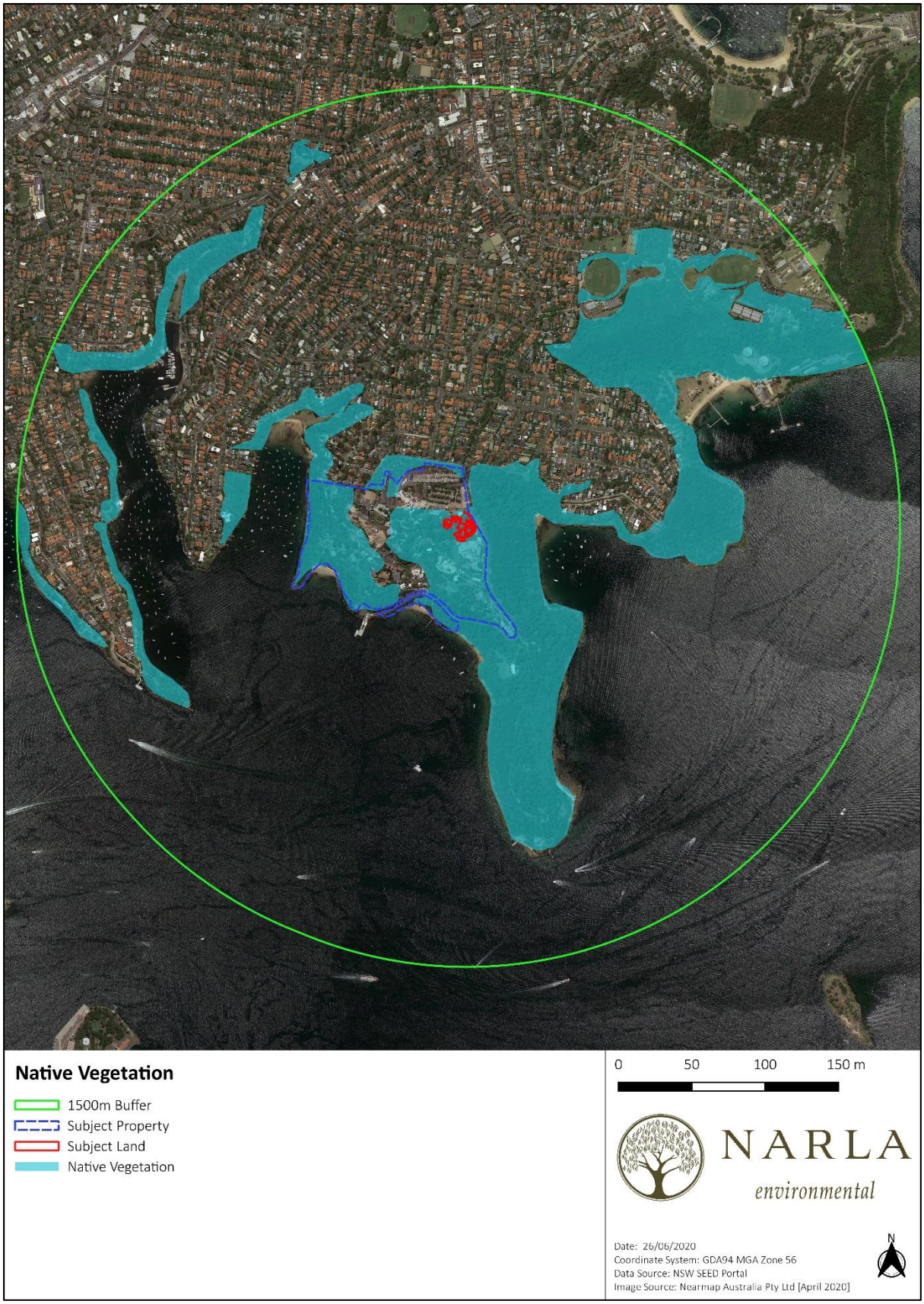

Figure 9. Native vegetation within the 1500m buffer

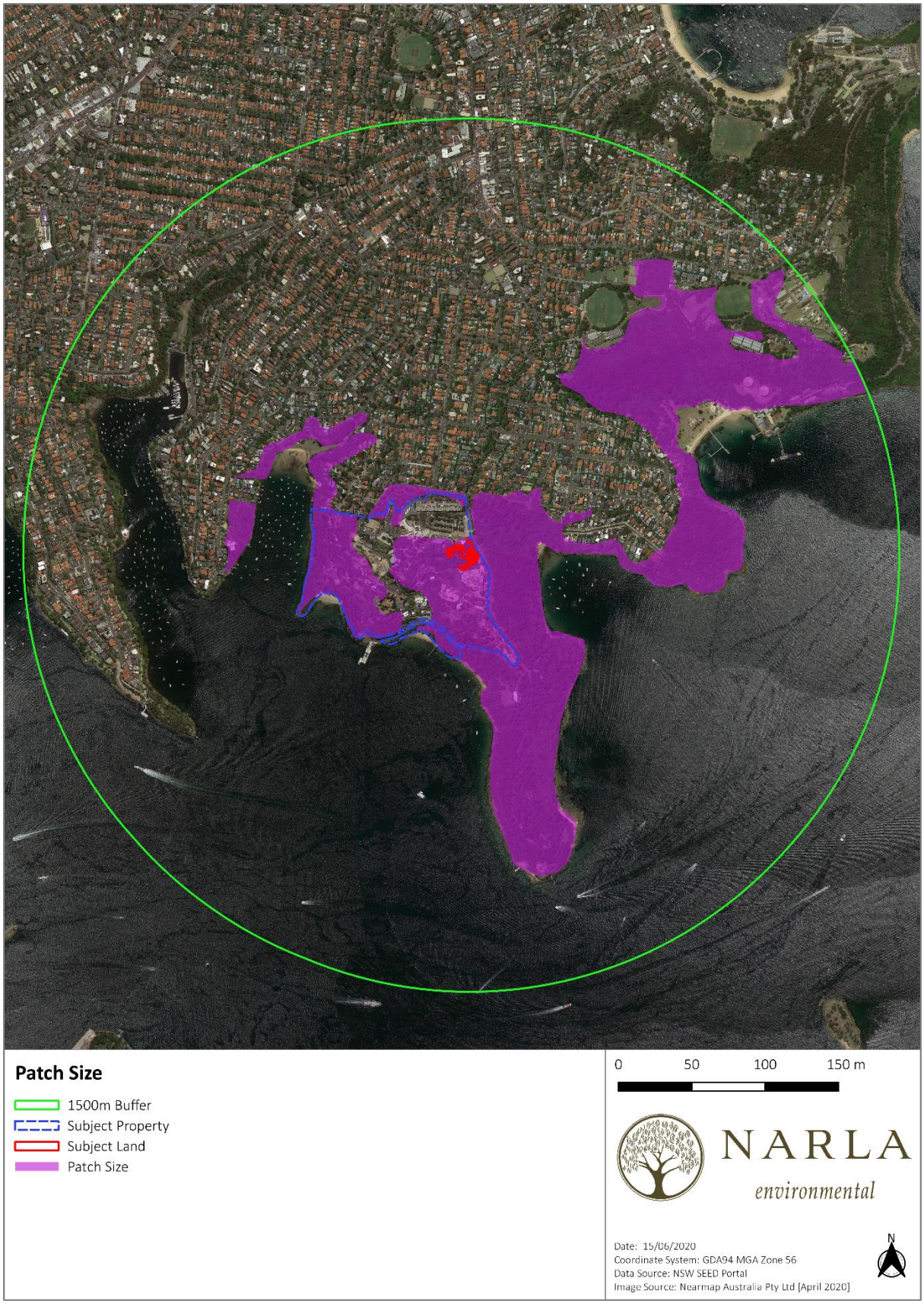

Figure 10. Patch size and habitat connectivity within a 1500m buffer surrounding the Subject Land.

4. Threatened Species

4.1 Candidate Ecosystem Credit Species

Ecosystem credit species associated with the Subject Land are listed below in **Table 6.** No species predicted by the BAM calculator as potential ecosystem credits were excluded from the results displayed.

Table 6. Candidate ecosystem credits predicted to occur within the Subject Land.

Scientific Name	BC Act Status	Excluded from Assessment
Anthochaera phrygia	Critically Endangered	No
Artamus cyanopterus cyanopterus	Vulnerable	No
Calyptorhynchus lathami	Vulnerable	No
Daphoenositta chrysoptera	Vulnerable	No
Dasyurus maculatus	Vulnerable	No
Glossopsitta pusilla	Vulnerable	No
Haliaeetus leucogaster	Vulnerable	No
Hieraaetus morphnoides	Vulnerable	No
Lathamus discolor	Endangered	No
Lophoictinia isura	Vulnerable	No
Micronomus norfolkensis	Vulnerable	No
Miniopterus australis	Vulnerable	No
Miniopterus orianae oceanensis	Vulnerable	No
Ninox connivens	Vulnerable	No
Ninox strenua	Vulnerable	No
Pandion cristatus	Vulnerable	No
Phascolarctos cinereus	Vulnerable	No
Pteropus poliocephalus	Vulnerable	No
Tyto novaehollandiae	Vulnerable	No
Varanus rosenbergi	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 2019d). 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 7**; **Table 8**).

As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. Therefore, all non-SAII species were excluded from the assessment.

Table 7. 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	NA	Very High – 3	No
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	High - 2	No
Cercartetus nanus Eastern Pygmy-possum	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	High - 2	No
Chalinolobus dwyeri Large-eared Pied Bat	The Subject Land is not located within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Potential foraging habitat occurs within the Subject Land, however, as foraging habitat is not considered an SAII it has not been assessed in this BDAR. Only one (1) BioNet record within the 10km^2 radius of the Subject Land, located at South Head, Sydney.	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?
Lathamus discolour Swift Parrot (Breeding)	DPIE confirmed there were no areas of Draft important Swift Parrot Habitat within the Subject Land (**Appendix C**).	No	NA	Very High - 3	No
Lophoictinia isura Square-tailed Kite	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	Moderate - 1.5	No
Miniopterus australis Little Bent-winged Bat	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	NA	Very High – 3	No
Miniopterus orianae oceanensis Large Bent-winged Bat	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. Maternity caves utilised by this species have very specific temperature and humidity regimes.	No	NA	Very High - 3	No
Myotis macropus Southern Myotis	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	High – 2	No
Ninox connivens Barking Owl	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	High – 2	No
Ninox strenua Powerful Owl	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	High - 2	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Pandion cristatus Eastern Osprey	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	Moderate -1.5	No
Phascolarctos cinereus Koala	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	High - 2	No
Pseudophryne australis Red-crowned Toadlet	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	Moderate -1.5	No
Pteropus poliocephalus Grey-headed Flying-fox	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	High – 2	No
Tyto novaehollandiae Masked Owl	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	NA	High - 2	No
Hieraaetus morphnoides Little Eagle	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	Moderate -1.5	No
Phascolarctos cinereus - endangered population Koala in the Pittwater Local Government Area	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	High – 2	No
Haliaeetus leucogaster White-bellied Sea-Eagle	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	High – 2	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Eudyptula minor - endangered population Little Penguin in the Manly Point Area (being the area on and near the shoreline from Cannae Point generally northward to the point near the intersection of Stuart Street and Oyama Cove Avenue, and extending 100 metres offshore from that shoreline)	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	High – 2	No
Perameles nasuta - endangered population Long-nosed Bandicoot, North Head	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	No	High – 2	No

Table 8. 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?
Leptospermum deanei Leptospermum deanei	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	N/A	High - 2	No
Melaleuca biconvexa Biconvex Paperbark	As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. This species is not an SAII species and was therefore excluded from the assessment.	No	N/A	High - 2	No
Allocasuarina portuensis Nielsen Park She-oak	Yes.	Yes	No	Very High - 3	No

4.3 Targeted Species Credit Surveys

4.3.1 Fauna Species Credit Survey

A total of twenty-one (21) threatened fauna species were identified within the BAMC (DPIE 2019b) as having the potential to occur within the Subject Land. None of these species were surveyed for due to the following:

- Species are considered unlikely to occur and no further assessment is required for that species if it is determined that no habitat constraints are present on the entire Subject Site for the threatened species (as per Section 6.4.1.13 of the BAM) (OEH 2017a), or
- As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. Therefore, all non-SAII species were excluded from the assessment.

4.3.2 Flora Species Credit Survey

A total of three (3) threatened flora species were identified within the BAMC (DPIE 2019b) as having the potential to occur within the Subject Land. Two (2) of these species; *Leptospermum deanei* and *Melaleuca biconvexa* were not surveyed for due to the following:

- As per Appendix 2 of the BAM (OEH 2017a), the Streamlined Assessment Module only requires surveying for SAII species. Therefore, all non-SAII species were excluded from the assessment.

One (1) species; *Allocasuarina portuensis*, was surveyed for within the Subject Land. The species was not located.

4.4 Species Polygons

No species credit species were assumed to be present within the Subject Land. Therefore, no species polygons were assigned.

5. Avoid and Minimise Impacts

5.1 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 project (**Table 9**).

Table 9. Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the project.

Action	Outcome	Timing	Responsibility
Avoid and Minimise Impact - Project Location and Design	The development has been positioned to minimise impacts on native vegetation and habitat as much as possible. The majority of the proposed development is to be located within a highly modified environment. To mitigate the removal of native vegetation within the Subject Land, a landscape plan has been designed to incorporate native planting within disturbed areas.	Pre-construction phase	▪ Proponent
Assigning an Ecologist (or suitably qualified person) for vegetation clearing and restoration	Prior to construction, the applicant should commission the services of a suitably qualified and licensed wildlife handler; such as an Ecologist. The Ecologist should have a minimum of 3 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 and/or Zoo Keeper

Action	Outcome	Timing	Responsibility
Preparation of a Construction Environmental Management Plan (CEMP)	A Construction Environmental Management Plan (CEMP) will 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
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 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.	Pre-construction phase	▪ Proponent ▪ Arborist

Action	Outcome	Timing	Responsibility
Wetland Pond Dewatering	The man-made wetland ponds should be dewatered prior to any construction activities within the zone. Dewatering should be undertaken by pumping the water from the ponds, and steadily irrigating the water across vegetated areas. It is recommended that dewatering be undertaken in winter when native frogs that may be utilising the ponds are not spawning. Water must only be released once appropriate water contamination tests have been undertaken by an appropriately qualified person, and it has been confirmed that water quality is in line with relevant state health guidelines (e.g. ANZECC 2000), or in accordance with relevant site-specific management plans. All dewatering works including fauna capture and relocation are to be undertaken by a suitably qualified and licensed Ecologist experienced in species identification and fauna handling skills. The Ecologist must be licensed to undertake works by the NSW Department of Primary Industries and NSW Fisheries. Prior to dewatering commencement, a comprehensive search will be undertaken for bird nests, as well as sheltering frogs and frog spawn. This involves careful inspection of the entire bank and all associated vegetation. Prior to pumping, the inlet of the pump will be fitted with mesh to exclude any fauna from entering. The use of fine mesh (3-5mm) will exclude even the smallest fauna (tadpoles) from entering the pump inlet. This inlet point will be carefully monitored by the Ecologist throughout the duration of pump use. All pumping will take place under the supervision of the ecologist. All native fauna captured from within the ponds should relocated to a pre-determined release sites within one hour of capture.	Pre-construction phase	▪ Proponent ▪ Project Ecologist
Relocation of woody debris	Any woody debris (fallen trees and logs) within the Subject Land are to be relocated to an area of native vegetation adjacent to the Subject Land.	Construction phase	▪ Project Ecologist ▪ Proponent ▪ Bush regeneration contractor

Action	Outcome	Timing	Responsibility
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)	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. 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

6. Impact Summary

6.1 Impacts on Native Vegetation

The following native vegetation within the Subject Land is proposed to be impacted as a result of the proposed development and will require the purchase and retirement of Biodiversity Offset Credits:

- 0.17 ha representative of PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney

Trees proposed for removal include those listed in **Table 10**.

Table 10. Trees proposed for Removal

Tree No. (Sydney Arbor Trees 2020)	Scientific Name	Common Name
1	*Hymenosporum flavum*	Native Frangipani
3	*Melaleuca quinquenervia*	Broad-leaved Paperbark
9	*Casuarina cunninghamiana*	River She-oak
26	*Dead Tree*	Dead Tree
27	*Melaleuca quinquenervia*	Broad-leaved Paperbark
29	*Archontophoenix cunninghamiana*	Bangalow Palm
30	*Melaleuca quinquenervia*	Broad-leaved Paperbark
59	*Brachychiton acerifolius*	Illawarra Flame Tree
63	*Toona ciliata*	Red Cedar
64	*Pittosporum undulatum*	Sweet Pittosporum
75	*Castanospermum australe*	Blackbean
78	*Archontophoenix cunninghamiana*	Bangalow Palm
78a	*Pittosporum undulatum*	Sweet Pittosporum
78b	*Glochidion ferdinandi*	Cheese Tree
79	*Elaeocarpus reticulatus*	Blueberry Ash
80	*Acacia fimbriata*	Fringed Wattle
89	*Hibiscus sp*	Hibiscus
99	*Polyscias murrayi*	Pencil Cedar
100	*Eucalyptus punctata*	Grey Gum
101	*Polyscias murrayi*	Pencil Cedar
102	*Acacia implexa*	Lightwood
103	*Flindersia schottiana*	Bumpy Ash
118	*Eucalyptus saligna*	Sydney Blue Gum
119	*Eucalyptus microcorys*	Tallowwood
120	*Eucalyptus microcorys*	Tallowwood
122	*Stenocarpus sinuatus*	Fire Wheel Tree

Tree No. (Sydney Arbor Trees 2020)	Scientific Name	Common Name
131	*Casuarina cunninghamiana*	River She-oak
154	*Banksia integrifolia*	Coast Banksia
155	*Buckinghamia celsissima*	Ivory Curl Tree
155a	*Elaeocarpus reticulatus*	Blueberry Ash
166	*Casuarina glauca*	Swamp she-oak
167	*Casuarina glauca*	Swamp she-oak
168	*Casuarina glauca*	Swamp she-oak
175	*Lophostemon confertus*	Queensland Box
176	*Banksia integrifolia*	Coast Banksia
196	*Syzygium smithii*	Lilly Pilly
197	*Elaeocarpus reticulatus*	Blueberry Ash
198	*Elaeocarpus reticulatus*	Blueberry Ash

6.2 Impacts on Threatened Species

No threatened species are predicted to be impacted as a result of the proposed development.

6.3 Serious and Irreversible Impacts (SAII's)

No SAII species are predicted to be impacted as a result of the proposed development.

6.4 Other Impacts

6.4.1 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 11.**

Table 11. Indirect impacts associated with the proposed development.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	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. In particular, vegetation directly adjacent to the existing wetlands that are proposed for infill (of soil and mulch) may experience inadvertent trampling during the construction phase of development. Such areas have been included in the proposed Landscape Plan (Lahznimmo 2020c) for infill planting.	No threatened ecological communities occur within the surrounding area. There is potential that threatened species may use habitat within the surrounding area. Such species may be impacted by increased weed infestations.	While weed infestations may have a localised impact to threatened species and their habitats, this is not expected to impact on their bioregional persistence.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction and on-going operation may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects. This may in turn reduce the viability of such habitats, with the impact expected to be restricted to a couple of metres into adjacent vegetation. As the vegetation is within animal enclosures/ that undergoes routine maintenance, it is likely that weed infestations will be maintained and kept at a low level.	No threatened ecological communities occur directly adjacent to the Subject Land and as such will not be affected. There is potential that threatened species use habitat adjacent to the Subject Land. Such species may be impacted by edge effects leading to a reduced viability in habitat.	While edge effects may have a localised impact to threatened species, this is not expected to impact on their bioregional persistence, considering the large areas of habitat connectivity surrounding the Subject Land.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	An increase in noise is to be expected during construction. However, as the Subject Land is located within an urban area, such noise issues would already be present, and as such the impact to threatened species would be minimal. Dust is expected to increase during construction works, and as such may impact on vegetation adjacent to the Subject Land. Dust can impact on a plants ability to photosynthesise and may increase plant mortality in the adjacent vegetation. It is however not expected that this would have such an impact to decrease the viability of adjacent habitat.	No threatened ecological communities occur directly adjacent to the Subject Land and as such won't be impacted by increases in dust spill. There is potential that threatened species use habitat adjacent to the Subject Land. Such species may be impacted by an increase in dust spill into adjacent habitats.	While the proposed development may have a localised impact to threatened species, this is not expected to impact on their bioregional persistence, considering large areas of habitat connectivity allowing their movement away from impacted areas.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	As the proposed development is to develop suitable animal enclosures, it is likely that indirect impacts will be limited to the construction phase of development. It is expected that constructions works would occur during normal working hours and as such, light spill is not expected to affect adjacent habitat during this period.		
(d) transport of weeds and pathogens from the site to adjacent vegetation	As previously discussed, the proposed development may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects. It is however not expected that weeds will be transported via human or vehicular traffic into surrounding areas during and post-construction. Temporary fencing will be erected around retained native vegetation to avoid such indirect impacts occurring during construction. It is not expected that such areas would be accessible post-construction.	N/A	N/A
(e) increased risk of starvation, exposure and loss of shade or shelter	It is highly unlikely that any threatened fauna would be exposed to increased risks from starvation, exposure, and loss of shade and shelter beyond the Subject Land as a result of the proposed development. No habitat is to be removed beyond the Subject Land, although disturbances from other indirect impacts may deem such habitats unsuitable for certain species. However, due to the large areas of habitat	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	connectivity adjoining the Subject Land, it is unlikely that this impact will be significant as such habitats will continue to provide food resources and shelter for fauna species.		
(f) loss of breeding habitats	It is highly unlikely that any threatened fauna will lose breeding habitat in vegetation within and adjacent to the Subject Land as a result of the proposed development. The vegetation within the Subject Land provides sub-optimal breeding habitat for threatened species. In addition, the watercourse within the Subject Land may provide breeding habitat to common amphibian species, but due to the urbanised nature of the Subject Land, it is not expected to support any threatened species. In addition, no habitat is to be removed beyond the Subject Land, although disturbances from other indirect impacts may deem such habitats unsuitable for certain species. However, due to the large areas of habitat connectivity adjoining the Subject Land, it is unlikely that this impact will be significant as such areas will continue to provide breeding habitat. It is unlikely that the loss of the man-made wetlands (water component) will result in a loss of breeding habitat for threatened species.	The Subject Land provides sub-optimal breeding habitat for threatened species and as such no impacts from loss of breeding habitats are expected. There is potential that threatened fauna species use habitat adjacent to the Subject Land for breeding. Such species may be impacted by increased weed infestations and a reduction in habitat viability, which may in turn impact on their breeding habitat.	Any impacts to threatened species adjacent to the Subject Land is expected to be localised and will not have an overall impact on the bioregional persistence of threatened species.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(g) trampling of threatened flora species	No threatened flora species were recorded within the Subject Land. Although no threatened flora species have been historically recorded directly adjacent to the Subject Land, there is still the potential for such species to exist in these areas, as these areas were not surveyed. In order to prevent the trampling of threatened flora species that could potentially occur within adjacent habitat, such habitats will be delineated with temporary fencing to avoid such impacts occurring during construction. It is not expected that such areas would be accessible post-construction.	N/A	N/A
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely that the inhibition of nitrogen fixation will affect vegetation adjacent to the Subject Land. 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 as such is not expected to affect vegetation directly adjacent to the Subject Land.	N/A	N/A
(i) fertiliser drift	This issue is not likely to affect the vegetation within or surrounding the Subject Land. Although fertiliser may be used in gardens, no fertiliser drift is expected to impact on adjacent vegetation.	N/A	N/A
(j) rubbish dumping	Large scale rubbish dumping is not considered to be an issue within the Subject Land as it is regularly maintained.	There is potential that threatened fauna species use habitat adjacent to the Subject	This impact is expected to be localised and will not have an overall

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	The minor dumping/littering of food resources within existing hard surface areas may provide a food source for fauna, including threatened species. However, this may also encourage invasive species into such habitats.	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.	impact on the bioregional persistence of threatened species.
(k) wood collection	Wood collection is not considered to be an issue within the Subject Land. No wood collection is proposed within the development. Any logs proposed for removal from within an area should be relocated to an area outside the Subject Land for retention as potential habitat for threatened species.	The collection of wood from habitat within the Subject Land may impact on threatened species that rely on such habitat for survival.	This impact is expected to be localised and will not have an overall impact on the bioregional persistence of threatened species.
(l) bush rock removal and disturbance	This issue is not likely to affect the vegetation surrounding the Subject Land. It is unlikely that any bush rock will require removal from within the Subject Land, however should any require removal, replacement will be required. Additional rock/boulder installation has been proposed in the Landscape Plan (Lahznimmo 2020c).	N/A	N/A
(m) increase in predatory species populations	It is unlikely that introduced predators have access to the Subject Land as the proposed development is to develop animal enclosures.	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(n) increase in pest animal populations	There is potential that pest animal populations already inhabit areas within and surrounding the Subject Land. The proposed development is not likely to increase this potential risk.	N/A	N/A
(o) increased risk of fire	The Subject Land is identified by Mosman Council as occurring within bushfire prone land. A Bushfire Hazard Assessment Report was not prepared for the Proposed Development. It is not expected that the proposed development will alter the bushfire risk of vegetation surrounding the Subject Land.	N/A	N/A
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	It is highly unlikely that specialist breeding and foraging habitat will be disturbed within and adjacent to the Subject Land as a result of the proposed development. The vegetation within the Subject Land provides sub-optimal habitat for the specialist breeding and foraging of threatened species. In addition, the watercourse within the Subject Land may provide breeding habitat to common amphibian species, but due to the urbanised nature of the Subject Land, it is not expected to support specialist breeding and foraging. In addition, no habitat is to be removed beyond the Subject Land, although disturbances from other indirect impacts may deem such habitats unsuitable for certain species. This habitat is however not expected to support specialist breeding and foraging habitat as it is already exposed to various disturbances.	N/A	N/A

6.4.2 Prescribed and Uncertain 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 12** below.

Table 12. 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 9.2.1 of the BAM
Species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance	No	There is no karst, caves, crevices, cliffs and other features of geological significance on or near the Subject Land.
Habitat of threatened species or ecological communities associated with rocks	No	No threatened species or ecological communities associated with rocks were located on the Subject Land.
Habitat of threatened species or ecological communities associated with human made structures	No	A series of human made wetland ponds are proposed for removal. There are no threatened species identified as potential candidate species credits within this BDAR that have the potential to utilise the human made wetland ponds.
Habitat of threatened species or ecological communities associated with non-native vegetation	No	There will be no impact to the habitat of threatened species or ecological communities associated with non-native vegetation. Non-native vegetation existed in the form of herbaceous weeds, exotic grasses and shrubs.
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	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.

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Movement of threatened species that maintains their life cycle	No	It is unlikely that the area of impact will interrupt the movement of threatened fauna or flora species that maintains their life cycle, considering the extensive areas of habitat connectivity surrounding the Subject Land.
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development)	No	A series of human made wetland ponds are proposed for removal. There are no threatened species identified as potential candidate species credits within this BDAR that have the potential to utilise the human made wetland ponds.
Wind turbine strikes on protected animals	No	There are no wind turbines proposed on the Subject Land.
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	No	The Subject Land has the potential to provide suitable foraging habitat for threatened species. However, due to the nature of the proposed development in an urban area, it is highly unlikely the proposed development will exacerbate vehicle strikes on threatened species. No threatened ecological communities were located within the Subject Land.

Figure 11. Man-made wetland ponds proposed for removal

6.5 Other Relevant Legislation and Planning Policies

6.5.1 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The proposed development will abide by the environmental objectives of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) (2005) which are to:

- Ensure that the catchment, foreshores, waterways and islands of Sydney Harbour are recognised, protected, enhanced and maintained:
  - As an outstanding natural asset, and
  - As a public asset of national and heritage significance, for existing and future generations
- Ensure a healthy, sustainable environment on land and water;
- Achieve a high quality and ecologically sustainable urban environment
- Ensure a prosperous working harbour and an effective transport corridor;
- Encourage a culturally rich and vibrant place for people;
- Ensure accessibility to and along Sydney Harbour and its foreshores;
- Ensure the protection, maintenance and rehabilitation of watercourse, wetlands, riparian lands, remnant vegetation and ecological connectivity; and
- Provide a consolidated, simplified and updated legislative framework for future planting.

The Subject Land is located within the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 Foreshores and Waterways Area Map. Division 2 Section 21 'Biodiversity, ecology and environment protection' identifies a number of matters to be taken into consideration in relation to biodiversity, ecology and environment protection, including:

- Development should have a neutral or beneficial effect on the quality of water entering the waterways;
- Development should protect and enhance terrestrial and aquatic species, populations and ecological communities and, in particular, should avoid physical damage and shading of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities);
- Development should promote ecological connectivity between neighbouring areas of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities);
- Development should avoid indirect impacts on aquatic vegetation (such as changes to flow, current and wave action and changes to water quality) as a result of increased access;
- Development should protect and reinstate natural intertidal foreshore areas, natural landforms and native vegetation;
- Development should retain, rehabilitate and restore riparian land;
- Development on land adjoining wetlands should maintain and enhance the ecological integrity of the wetlands and, where possible, should provide a vegetative buffer to protect the wetlands;
- The cumulative environmental impact of development; and
- Whether sediments in the waterway adjacent to the development are contaminated, and what means will minimise their disturbance.

6.5.2 State Environmental Planning Policy (Koala Habitat Protection) 2019

This SEPP seeks to address the declining status of koalas in NSW through better conservation and management of koala habitat as part of the planning and assessment process. The overarching aim of the SEPP is 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" (DPIE 2020b). This SEPP applies to local government areas that are listed in Schedule 1 'Local government areas' of the SEPP. As Mosman LGA is not included in Schedule 1, this SEPP does not apply to the Subject Land.

6.5.3 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 Subject Land does not adjoin land zoned or reserved for public open space, this SEPP does not apply to the proposed development.

6.5.4 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 is located within the SEPP's 'coastal environment area', however, 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. As such, this SEPP is not triggered by the proposed development.

6.6 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.

6.6.1 Offset Requirement for Ecosystem Credits

A total of four (4) ecosystem credits are required to offset the biodiversity impacts of the proposed development (**Table 13**). 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 2019c).

Table 13. Ecosystem credits required to offset the proposed development.

Plant Community Type (PCT)	BC Act Status	Zone	Total Area (ha)	Ecosystem Credits Required
PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	Not a TEC	Zone 1	0.05	2
		Zone 2	0.12	2
Total Ecosystem Credits				**4**

6.6.2 Offset Requirement for Species Credits

No candidate species credit species will require offsetting through the retiring of biodiversity offset species credits under the BOS as a result of the proposed development.

7. References

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Sydney Arbor Trees (2020) Upper Australia Tree Survey Report

8. Appendices

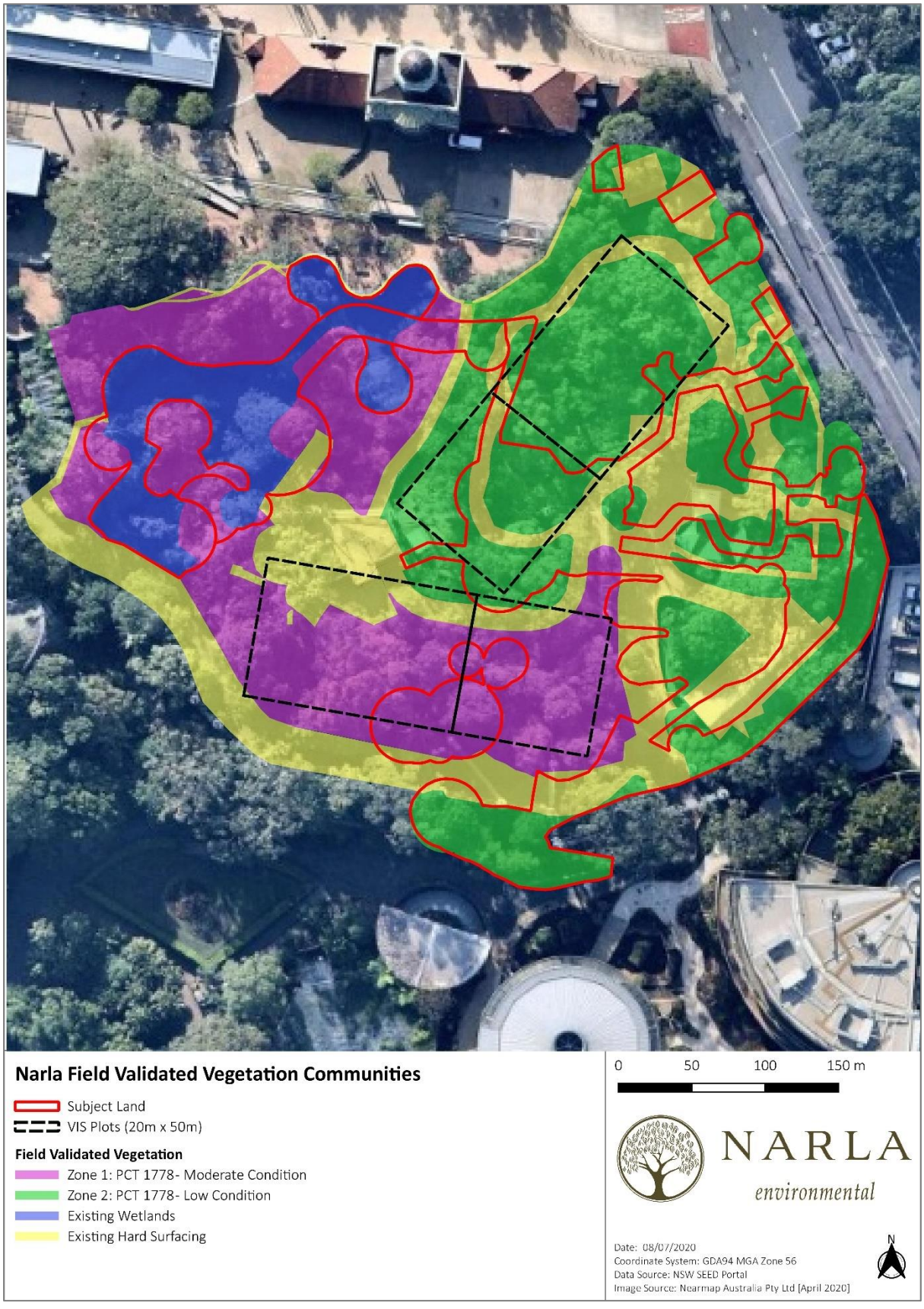
Appendix A. Narla field validated vegetation mapping within the Subject Land.

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

Appendix C. BAMC Generated Biodiversity Credit Report.

Appendix C. Response from BAM Support regarding Mapped Important Areas for Swift Parrot

Appendix A. Narla field validated vegetation mapping within the Subject Land.



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

BAM Site – Field Survey Form					
Date:	1st May 2020	**Plot ID:**	Plot 1	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20 x 50m	**Easting:**	337486.05 E
Datum:	GDA94	**Middle bearing from 0m:**	282°	**Northing:**	6253842.72 S
PCT:	PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney [Vegetation Zone 1]				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	*Glochidion ferdinandi*	5	4
Shrub (SG)	*Melaleuca styphelioides*	10	N/A
Exotic	*Sida rhombifolia*	0.1	10
High Threat Exotic	*Ehrharta erecta*	15	N/A
Shrub (SG)	*Dodonaea triquetra*	0.5	1
Forb (FG)	*Commelina cyanea*	20	N/A
Other (OG)	*Calochlaena dubia*	2	15
Forb (FG)	*Dianella caerulea*	3	25
Shrub (SG)	*Banksia marginata*	3	3
Other (OG)	*Cissus antarctica*	3	10
Shrub (SG)	*Breynia oblongifolia*	0.5	5
Shrub (SG)	*Exocarpos cupressiformis*	1	1
Tree (TG)	*Banksia serrata*	0.5	3
Other (OG)	*Xanthorrhoea spp.*	0.1	3
Shrub (SG)	*Leptospermum polygalifolium*	3	3
Shrub (SG)	*Acacia floribunda*	1	1
Exotic	*Solanum nigrum*	1	15
Tree (TG)	*Toona ciliata*	5	4
Fern (EG)	*Asplenium australasicum*	1	1
Grass & grasslike (GG)	*Oplismenus aemulus*	6	N/A
Other (OG)	*Doryanthes excelsa*	30	N/A
Shrub (SG)	*Elaeocarpus reticulatus*	2	1
Forb (FG)	*Plectranthus parviflorus*	0.5	15
Grass & grasslike (GG)	*Lomandra longifolia*	2	5

BAM Site – Field Survey Form			
Shrub (SG)	*Banksia ericifolia*	0.5	1
Forb (FG)	*Pratia purpurascens*	0.1	15
Shrub (SG)	*Pittosporum undulatum*	5	2
Tree (TG)	*Brachychiton acerifolius*	3	1
Shrub (SG)	*Ficus coronata*	5	10
Tree (TG)	*Banksia integrifolia*	2	1
Other (OG)	*Cayratia clematidea*	0.1	100
Tree (TG)	*Eucalyptus botryoides*	10	2
Tree (TG)	*Eucalyptus microcorys*	1	1
Tree (TG)	*Lophostemon confertus*	1	1
Other (OG)	*Stephania japonica*	0.1	1
Forb (FG)	*Dichondra repens*	0.1	30
Shrub (SG)	*Ozothamnus diosmifolius*	0.1	1

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	1	0
30-49cm	Present	0
20-29cm	Present	0
10-19cm	Present	0
5-9cm	Present	0
<5cm	Present	0

Length of Logs (m)	4

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	90
2 (15m)	60
3 (25m)	40
4 (35m)	15
5 (45m)	65
Average	**54**

BAM Site – Field Survey Form		
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	8	22.6
Shrub	12	31.6
Grass	2	8
Forb	5	23.7
Fern	1	1
Other	6	35.3
High Threat Exotics	1	15

BAM Site – Field Survey Form					
Date:	28th May 2020	**Plot ID:**	Plot 2	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20 x 50m	**Easting:**	337470.22 E
Datum:	GDA94	**Middle bearing from 0m:**	38°	**Northing:**	6253859.59 S
PCT:	PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney [Vegetation Zone 2]				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	*Eucalyptus botryoides*	20	N/A
Tree (TG)	*Stenocarpus sinuatus*	6	N/A
Tree (TG)	*Eucalyptus microcorys*	1	1
Other (OG)	*Cyathea spp.*	0.5	3
Shrub (SG)	*Melaleuca styphelioides*	0.3	1
Shrub (SG)	*Elaeocarpus reticulatus*	0.3	1
Other (OG)	*Xanthorrhoea spp.*	0.3	1
Tree (TG)	*Corymbia maculata*	2	1
Shrub (SG)	*Leptospermum petersonii*	0.1	1
Tree (TG)	*Banksia integrifolia*	0.2	1
Grass & grasslike (GG)	*Lomandra longifolia*	0.1	1

BAM Site – Field Survey Form		
DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	4	0
30-49cm	Present	0
20-29cm	Present	0
10-19cm	Present	0
5-9cm	Present	0
<5cm	Present	0

Length of Logs (m)	42

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	1
2 (15m)	1
3 (25m)	1
4 (35m)	1
5 (45m)	45
Average	**9.8**

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	5	29.2
Shrub	3	0.7
Grass	1	0.1
Forb	0	0
Fern	0	0
Other	2	0.8
High Threat Exotics	0	0

Appendix C. BAMC Generated Biodiversity Credit Report.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00020062/BAAS19070/20/00021014	Proposal Name Taronga Zoo Upper Australia Exhibit - Major Project	BAM data last updated * 18/06/2020
Assessor Name Emily Rix	Assessor Number BAAS19070	BAM Data version * 29
Proponent Names	Report Created 08/07/2020	BAM Case Status Open
Assessment Revision 0	Assessment Type Major Projects	Date Finalised To be finalised

* 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

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

BAM Biodiversity Credit Report (Like for like)

Predicted Threatened Species Not On Site

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	Number of credits to be retired
1778-Coastal sandstone foreshores forest	Not a TEC	0.2	4.00

1778-Coastal sandstone foreshores forest

Like-for-like credit retirement options

Class	Trading group	HBT	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1778	Sydney Coastal Dry Sclerophyll Forests >=90%	Yes	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

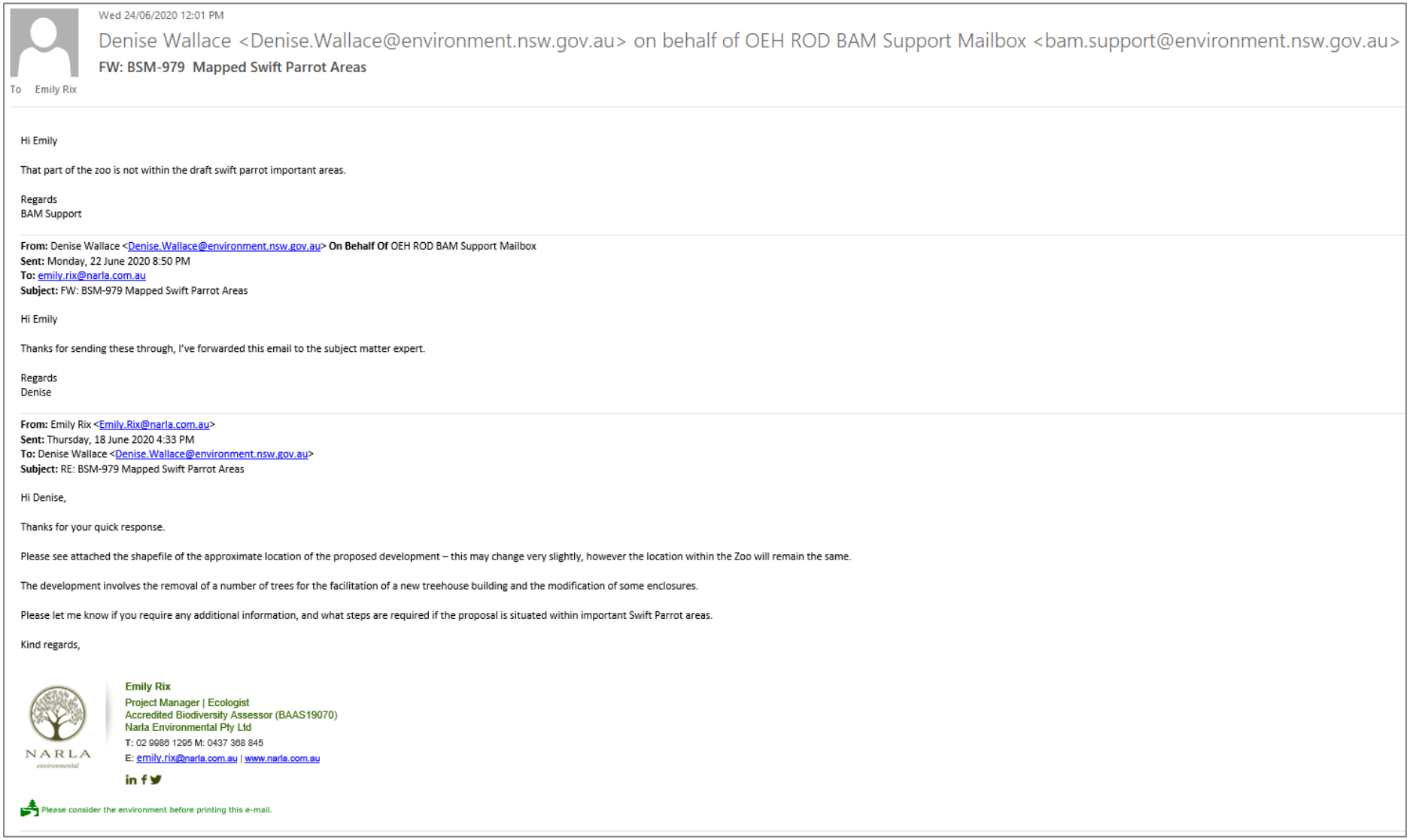
No Species Credit Data

Assessment Id: 00020062/BAAS19070/20/00021014

Proposal Name: Taronga Zoo Upper Australia Exhibit - Major Project

Page 2 of 3

Appendix D. Response from BAM Support regarding Mapped Important Areas for Swift Parrot



Wed 24/06/2020 12:01 PM

Denise Wallace <Denise.Wallace@environment.nsw.gov.au> on behalf of OEH ROD BAM Support Mailbox <bam.support@environment.nsw.gov.au>

FW: BSM-979 Mapped Swift Parrot Areas

To Emily Rix

Hi Emily

That part of the zoo is not within the draft swift parrot important areas.

Regards
BAM Support

From: Denise Wallace <Denise.Wallace@environment.nsw.gov.au> **On Behalf Of** OEH ROD BAM Support Mailbox
Sent: Monday, 22 June 2020 8:50 PM
To: emily.rix@narla.com.au
Subject: FW: BSM-979 Mapped Swift Parrot Areas

Hi Emily

Thanks for sending these through, I've forwarded this email to the subject matter expert.

Regards
Denise

From: Emily Rix <Emily.Rix@narla.com.au>
Sent: Thursday, 18 June 2020 4:33 PM
To: Denise Wallace <Denise.Wallace@environment.nsw.gov.au>
Subject: RE: BSM-979 Mapped Swift Parrot Areas

Hi Denise,

Thanks for your quick response.

Please see attached the shapefile of the approximate location of the proposed development – this may change very slightly, however the location within the Zoo will remain the same.

The development involves the removal of a number of trees for the facilitation of a new treehouse building and the modification of some enclosures.

Please let me know if you require any additional information, and what steps are required if the proposal is situated within important Swift Parrot areas.

Kind regards,

Emily Rix
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Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00020062/BAAS19070/20/00021014	63	0	08/07/2020

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Emily Rix	BAAS19070	Taronga Zoo Upper Australia Exhibit - Major Project	Open

Assessment Type	Date Finalised
Major Projects	To be finalised

PCT list

Price calculated	PCT common name	Credits
Yes	**1778 -** Coastal sandstone foreshores forest	4

Species list

Price calculated	Species	Credits

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

Biodiversity payment summary report

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Pittwater	**1778 -** Coastal sandstone foreshores forest	No	Sydney Coastal Dry Sclerophyll Forests >90%	23.58%	$431.50	1.6643	$ 13,762.61	4	$55,050.45

Subtotal (excl. GST)	**$55,050.45**
GST	**$5,505.04**
Total ecosystem credits (incl. GST)	**$60,555.50**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price

No species available

Grand total	**$60,555.50**

Biodiversity payment summary report