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Biodiversity Development Assessment Report (BDAR)

Marist College Redevelopment

North Shore Precinct

Report prepared for Carmichael Tompkins Property Group

October 2021

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Prepared for:	Carmichael Tompkins Property Group
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Executive Summary

Carmichael Tompkins Property Group are currently undertaking the Masterplan phase of the redevelopment of the Marist College in North Sydney on behalf of Sydney Catholic Schools (Lots 1-3/DP561243, 101/DP1110805, 1/DP310326, 1/DP86012, 1/DP747691, 13-14/DP1133414, 1,2,4-6, & 8/DP1860, A-C/DP312439, 7/DP176556, 6/DP64401, 1/DP782363, 7-10/DP1137247). The redevelopment consists of 7 stages which will be programmed over the forthcoming 8-10 years.

As the proposed development is a State Significant Development (SSD), the Secretary's Environmental Assessment Requirements (SEARs) issued for the Environmental Impact Statement (EIS) by the NSW Department of Planning, Industry and Environment (DPIE) requires a Biodiversity Development Assessment Report (BDAR) to be undertaken by an accredited assessor to assess the impacts of the proposed development.

This BDAR has been prepared by Narla Environmental Pty Ltd to identify the potential impacts of the proposed development on biodiversity values within the Subject Land. The Subject Land has been significantly historically cleared and altered. The majority of the Subject Land consists of buildings and paved areas (courtyards, walkways, driveways, and carparking). Some native vegetation exists in the form of the odd canopy tree and sparse groundcovers that have been planted in garden beds.

The proposed development is expected to result in impacts to one (1) Plant Community Type (PCT), with the planned removal of 0.24ha of PCT1776 - Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast. This plant community does not form part of a Threatened Ecological Community (TEC) under the Biodiversity Conservation Act (BC Act) 2016.

Biodiversity offset credit calculations have been performed in accordance with the BAM (OEH 2017a) and using the Biodiversity Assessment Method Calculator (BAMC) version 1.3.0.00 (OEH 2017b). Since the Vegetation Integrity Score (VIS) of the native vegetation proposed to be impacted is <17, no biodiversity offset credits will be required as a result of the proposed development.

In order to avoid and minimise potential impacts of the proposed development 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. These include measures to ensure all contractors employed to work within and around identified biodiversity values within the Subject Land are suitably qualified and experienced, assign a Project Ecologist to be present during the clearing of all vegetation (both native and exotic) related to the proposed development to capture, treat and relocate any displaced fauna and implement all relevant biological hygiene protocols and requirements as per NSW Government guidelines.

It is unlikely the proposed development will indirectly impact on adjacent fauna habitat or vegetation, considering the Subject Land and surrounded area is within a highly developed and modified landscape. Vegetation is only in the form of native and exotic garden beds. This report addresses all aspects of item 18 (Biodiversity Assessment) of the SEARs.

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Glossary

Acronym/ Term	Definition
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, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
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	Department of Planning, Industry and Environment (formerly OEH)
Ecosystem credit	A 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
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 or any scrub), (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.
Priority weed	Priority weed in the Greater Sydney Region as per the *Biosecurity Act 2015*
Proposal	The development, activity or action proposed.
SEPP	State Environmental Planning Policy.
Species Credit	The class of biodiversity credits created or required for the impact on 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.
Study Area	The area that was subject to a site survey and assessed for direct or indirect impacts arising from construction and operation of the proposal.

Acronym/ Term	Definition
Subject Land	The location of the proposed development and the subject of this report, within Marist College, Miller Street, North Sydney.
Subject Property	Marist College, North Sydney (Lots 1-3/DP561243, 101/DP1110805, 1/DP310326, 1/DP86012, 1/DP747691, 13-14/DP1133414, 1,2,4-6, & 8/DP1860, A-C/DP312439, 7/DP176556, 6/DP64401, 1/DP782363, 7-10/DP1137247).
Threatened biota	Threatened species, populations or ecological communities listed under the BC Act and/or the EPBC Act.
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1, 1A and 2 and '*threatened species, population or ecological community*' means a species, population or ecological community specified in any of those Schedules.
VIS Plot	Vegetation Integrity Survey Plot.

1. Introduction

1.1 Overview

Narla Environmental Pty Ltd (Narla) was commissioned by Carmichael Tompkins Property Group ('the proponent') to prepare this Biodiversity Development Assessment Report (BDAR) as part of the Secretary's Environmental Assessment Requirements (SEARs) for the redevelopment of Marist College, North Sydney (Lots 1-3/DP561243, 101/DP1110805, 1/DP310326, 1/DP86012, 1/DP747691, 13-14/DP1133414, 1,2,4-6, & 8/DP1860, A-C/DP312439, 7/DP176556, 6/DP64401, 1/DP782363, 7-10/DP1137247; hereafter referred to as the 'Subject Property').

This report supports a Stage Significant Development (SSD) Development Application (DA) for the expansion and redevelopment of Marist Catholic College North Shore, which is submitted to the Department of Planning, Industry and Environment (DPIE) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (the Act). Sydney Catholic Schools is the proponent of the SSD DA. The preparation of this BDAR is in response to Item 18 'Biodiversity Assessment' of the SEARs issued for the EIS by the NSW Department of Planning, Industry and Environment.

A 24-month study undertaken by Sydney Catholic Schools has identified a major deficiency in the provision of affordable, non-government education within the North Sydney Local Government Area (LGA). The study also identified that the choice for families is extremely limited, as almost all of the schools in North Sydney provide single-sex education, with co-educational schools significantly underrepresented. Sydney Catholic Schools, as operators of St Mary's Catholic Primary School and Marist College North Shore, is responding to this challenge and has identified a strategic response that can positively support the future of North Sydney.

1.2 Site Location, Description and Proposed Development

The site is located at 270 Miller Street, North Sydney within North Sydney LGA. It is bound by Carlow Street to the north, Ridge Street to the south, Miller Street to the east, and Ridge Lane to the west. It is surrounded by a mix of civic, residential and commercial uses. It is approximately 700m north of the North Sydney CBD and located opposite St Leonards Park and North Sydney Oval. The site is strategically located between the Crows Nest and North Sydney, which will soon be connected by the Sydney Metro. The site is approximately 250m to the north of the future Sydney Metro Station at the corner of Miller and McLaren Streets.

Existing development on the site includes St Mary's Primary School, Marist College North Shore, St Mary's Church and Parish Centre, the former Presbytery and Monastery, as well as the two acquired terraces along Miller Street and a childcare centre known as the Jacaranda Centre. The site comprises 26 lots and has a total area of 22,420m2. The locational context of the site is shown at **Figure 3** and an aerial photograph of the site is shown at **Figure 2**.

The proposed area to be impacted (hereafter the 'Subject Land') covers an area of approximately 1.69ha within the precinct of Marist College and is predominately comprised of buildings, paved courtyards and walkways, and carparking, with some vegetation existing in garden beds (**Figure 3**). Narla have produced this report in order to assess any potential impacts associated with the SSD and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority, the Minister for Energy and the Environment.

The SSD DA seeks approval for:

- Retention of key buildings including St Mary's Church and Parish Centre, the former Presbytery and Monastery, St Mary's Primary School and some existing buildings on the western boundary.

- Demolition of existing buildings along Miller Street and Carlow Street, including the childcare centre and terrace houses.
- Construction of a mixed-use education precinct comprising a high school and early learning centre, including:
    - adaptive reuse of the existing Presbytery, and alterations and additions to retained educational buildings;
    - construction of a multistorey educational building on the corner of Miller Street and Carlow Street;
    - construction of a multistorey mixed-use building along Miller Street, accommodating teaching facilities, an early learning centre and an auditorium;
    - construction of a new basement car park;
    - provision of ancillary canteen/café uses.
- Landscaping and public domain works, including the creation of a new plaza along Miller Street, adjoining St Mary's Church.

1.3 Secretary's Environmental Assessment Requirements

DPIE has issued Secretary's Environmental Assessment Requirements (SEARs) for the proposed development. This report has been prepared having regard to the relevant SEARs as follows:

SEAR	Comment / Reference
Biodiversity impacts related to the proposed development are to be assessed in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method (BAM).	Satisfied by the preparation of this report.
The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	Section 5, 6 and 7 of this report.
The BDAR must include details of the measures proposed to address the offset obligation as follows:	
- the total number and classes of biodiversity credits required to be retired for the development.	Section 6.1.1
- the number and classes of like-for-like biodiversity credits proposed to be retired.	NA. No offsetting required.
- the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules.	NA. No offsetting required.
- any proposal to fund a biodiversity conservation action.	NA. No offsetting required.
- any proposal to make a payment to the Biodiversity Conservation Fund.	NA. No offsetting required.
If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	NA. No offsetting required.
The BDAR must be submitted with all spatial data associated with the survey and assessment as per the BAM.	All spatial data has been provided.
The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.	This BDAR was prepared by Alexander Graham (BAAS19040)
Where a BDAR is not required, engage a suitably qualified person to assess and document the flora and fauna impacts related to the proposal.	NA

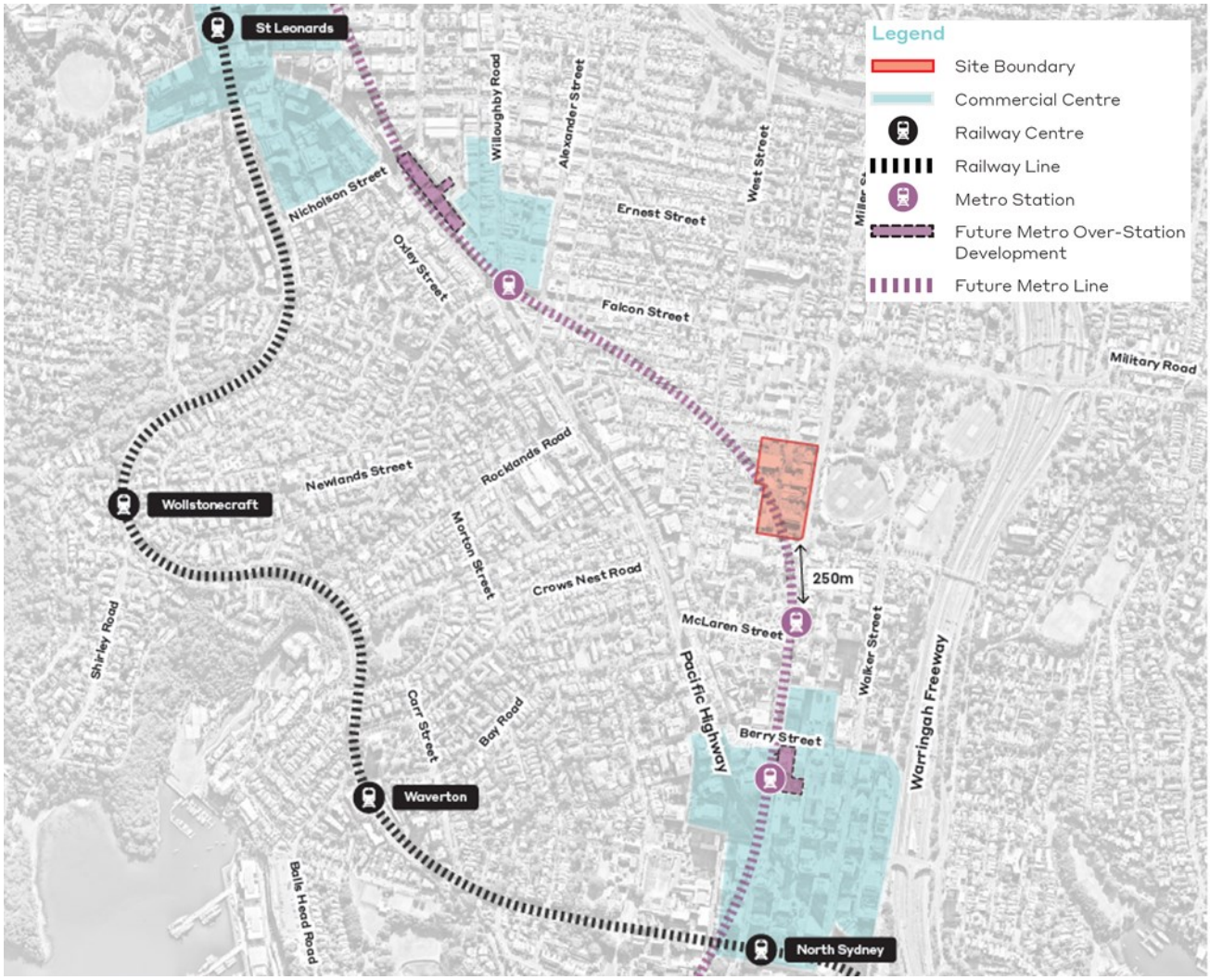

Figure 1. Site context (Ethos Urban).

Figure 2. Site aerial (Ethos Urban).

1.4 Sources of Information Used

A thorough literature review was undertaken to review the ecology within the locality and the North Sydney 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 2019)
    - NSW BioNet. The website of the Atlas of NSW Wildlife (OEH 2019c)
    - Protected Matters Search Tool (Department of the Environment and Energy 2019)
- Relevant State and Commonwealth Datasets:
    - NSW Government Spatial Services: Six Maps Clip & Ship
    - NSW State Environmental Planning Policy No. 19—Bushland in Urban Areas (SEPP 19)
- Vegetation Mapping:
    - The Native Vegetation of the Sydney Metropolitan Area and Vegetation Information System (VIS) 3.1 (OEH 2016)
- NSW State Guidelines:
    - Biodiversity Assessment Method Calculator (BAMC) (OEH 2017b);
    - BioNet Threatened Biodiversity Data Collection (TBDC) (OEH 2019d);
    - Threatened Species Survey and Assessment: Guidelines for developments and activities. Working Draft (DEC 2004)
    - Biodiversity Offsets and Agreement Management System (BOAMS)

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

- North Shore Precinct – Project Overview
- Marist Catholic College North Shore Masterplan (WMK Architects 2020)

Online databases and literature reviews were utilised to gain an understanding of the natural environment and ecology of the Subject Land and its surrounds to an area of approximately 100 km². Searches utilising NSW Wildlife Atlas (BioNet) and the Commonwealth Protected Matters Search Tool were conducted to identify current threatened flora and fauna, and migratory fauna, records within a 100 km² 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 and Murphy 1989).

1.5 Aim and Approach

This report has been prepared in accordance with the Biodiversity Assessment Methodology (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;
- 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.

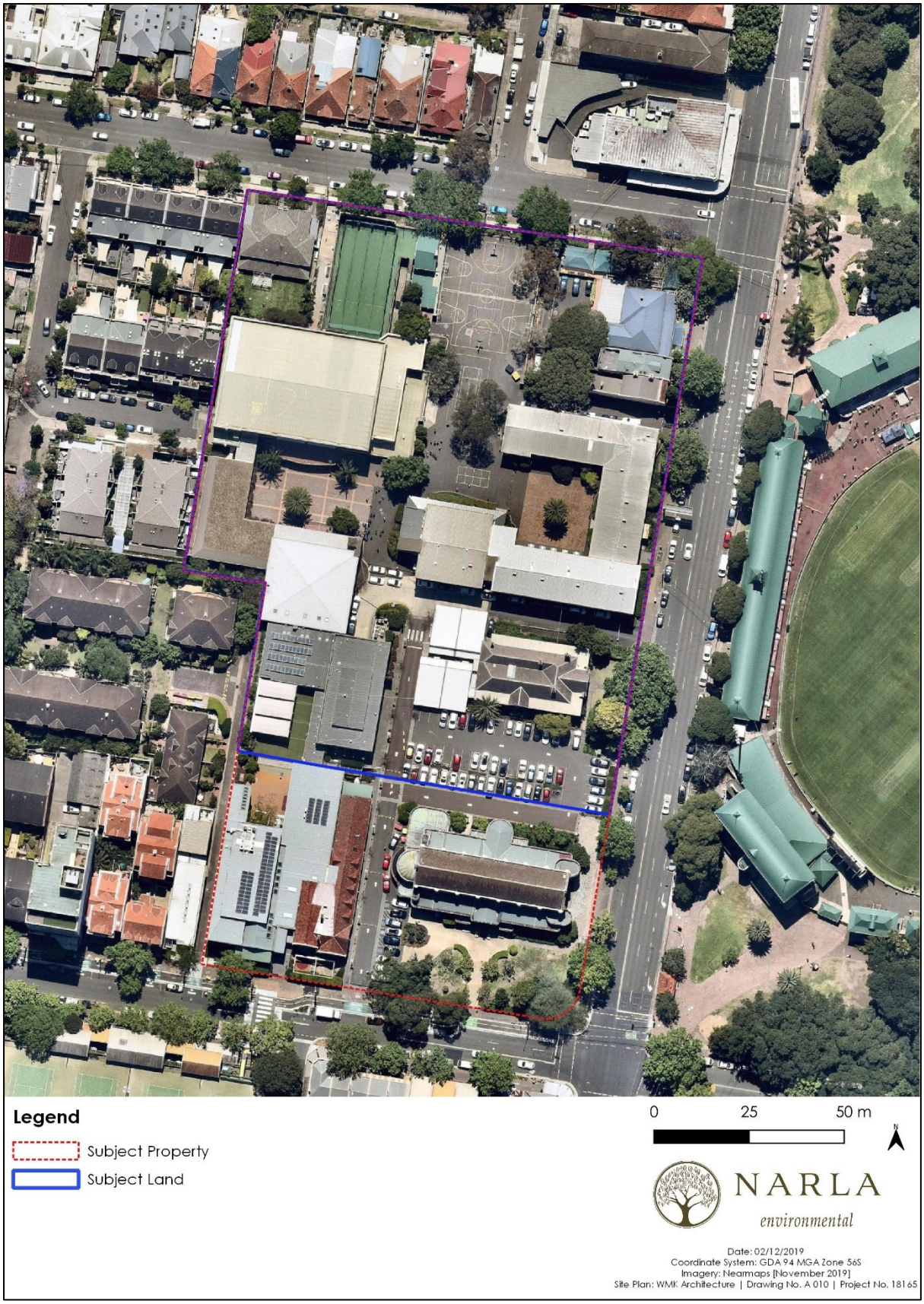

Figure 3. The location of Subject Property and Subject Land.

2. Methodology

2.1 IBRA Bioregions and Subregions

The Subject Land occurs within the 'Sydney Basin' Interim Biogeographic Regionalisation (IBRA) 7 for Australia, specifically occurring within the 'Pittwater' IBRA 7 Subregion (**Figure 4**).

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 location information and a meaningful descriptive landscape term. The Subject Land occurs within the Pennant Hills Ridges Mitchell Landscape Ecosystem (**Figure 5**).

2.2.1 NSW Mitchell Landscape Ecosystem – Pennant Hills Ridges

Rolling to moderately steep hills on horizontal Triassic shales and siltstones. General elevation 10 to 90m, local relief 60m. Deep red texture-contrast soils on narrow hillcrests, red and brown to yellow texture-contrast soils on slopes becoming slightly harsher in drainage lines. Tall open forest of Sydney blue gum (*Eucalyptus saligna*), turpentine (*Syncarpia glomulifera*), blackbutt (*Eucalyptus pilularis*), white stringybark (*Eucalyptus globoidea*), grey ironbark (*Eucalyptus paniculata*), forest oak (*Allocasuarina torulosa*) and rough-barked apple (*Angophora floribunda*). Rainforest elements in protected moist gully heads with *sweet* pittosporum (*Pittosporum undulatum*), cheese tree (*Glochidion ferdinandi*), sandpaper fig (*Ficus* coronata) and black wattle (*Callicoma serratifolia*).

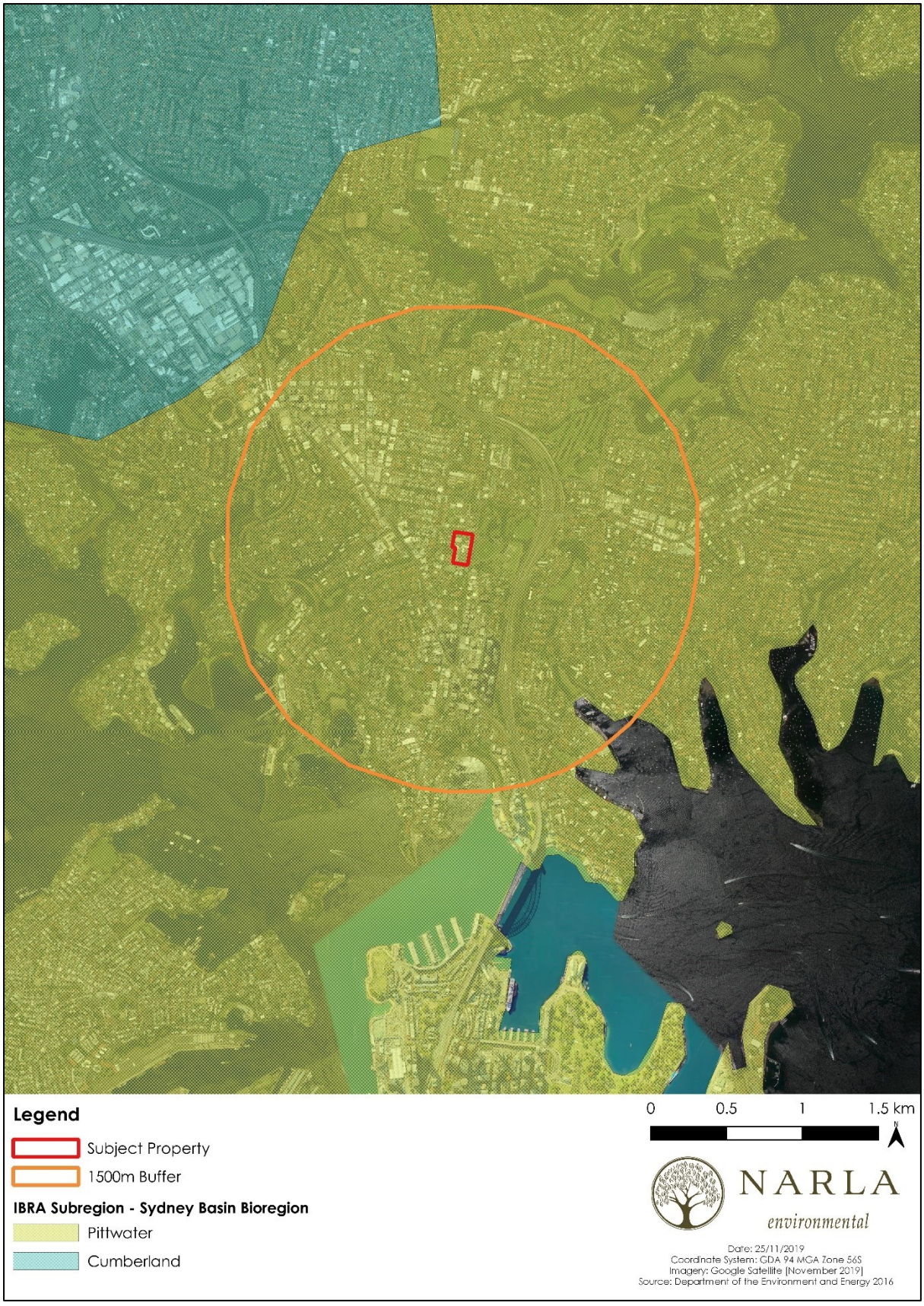

Figure 4. IBRA Bioregion and Subregion of the Subject Property and within a 1500m radius.

2.3 Landscape Features

The landscape features identified within and surrounding the Subject Land are listed in **Table 1.** Further details on topography, geology, soils and hydrology are detailed below.

2.3.1 Topography, geology and soils

The Subject Land is mapped as occurring within the Blacktown, Gymea and Lambert Soil Landscapes (OEH 2019b).

The Blacktown Soil Landscape is typically characterised by: gently undulating rises on Wianamatta Group shales and Hawkesbury shale local relief to 30 m and slopes are usually <5% Broad rounded crests and ridges with gently inclined slopes Cleared eucalypt woodland and tall open-forest (wet sclerophyll forests). The Gymea Soil Landscape is typically characterised by: undulating to rolling rises and low hills on Hawkesbury Sandstone local relief 20-80 m and slopes 10-25% rock outcrop <25%. Broad convex crests, moderately inclined sideslopes with wide benches, localised rock outcrop on low broken scarps extensively cleared open-forest (dry sclerophyll forest) and eucalypt woodland. The Lambert Soil Landscape is typically characterised by: undulating to rolling rises and low hills on Hawkesbury Sandstone local relief 20-120 m and slopes 20% rock outcrop >50%. Broad ridges, gently to moderately inclined slopes, wide rock benches with low broken scarps, small hanging valleys and areas of poor drainage open and closed heathland, scrub and occasional low eucalypt open-woodland.

2.3.2 Hydrology

No existing watercourses, riparian corridors, wetlands, swales or soaks have been mapped, nor were observed within the Subject Land by the Narla Ecologist during site assessment. Three first order watercourses are mapped as occurring over 1km from the Subject Land (Six Maps 2019). The 1500m buffer around the Subject Land also partially intersects with Sydney Harbour, which is a fourth order watercourse (**Figure 5**).

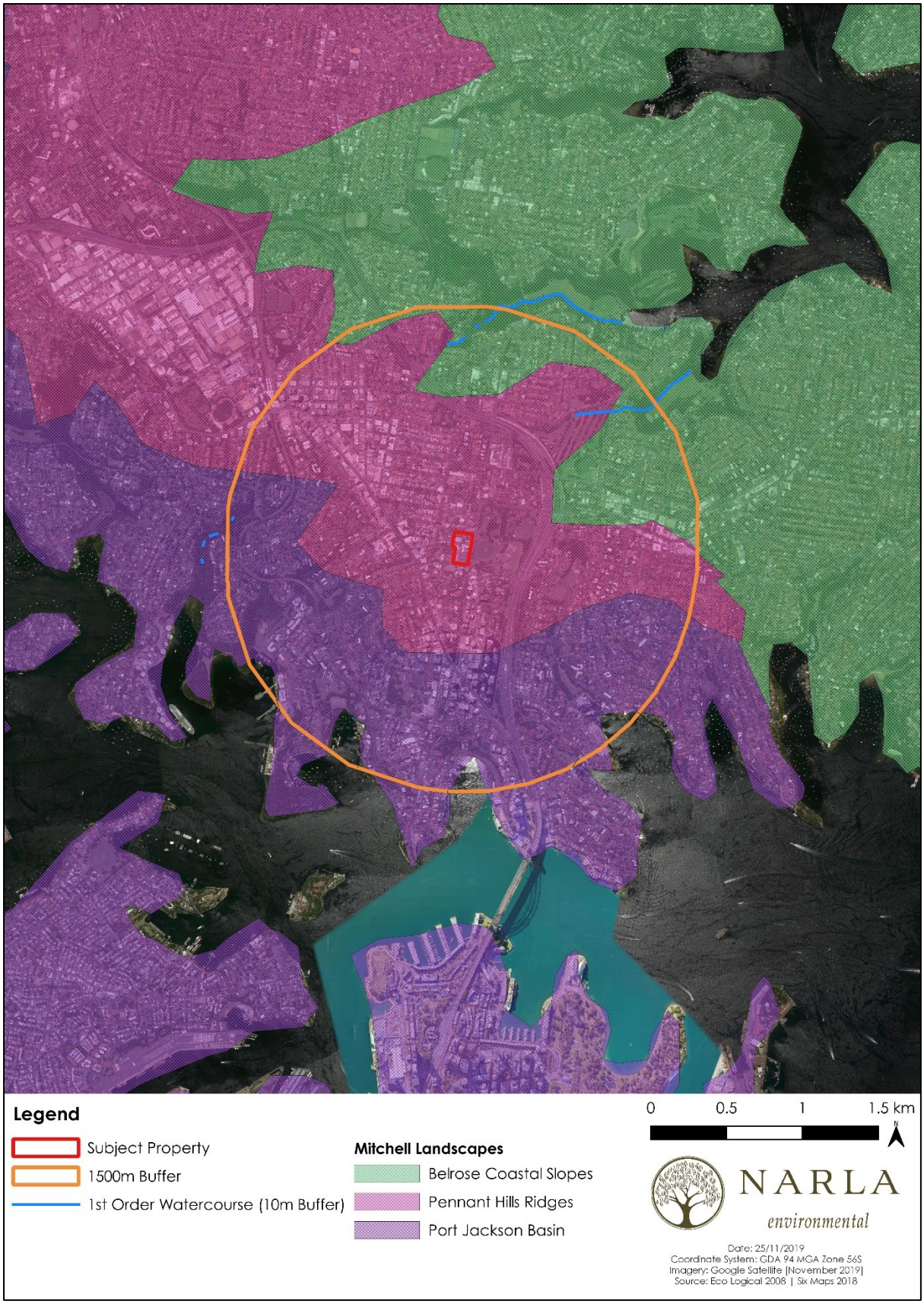

Figure 5. NSW Mitchell Landscape Ecosystem of the Subject Property and within a 1500m buffer; first-order watercourse within 1500m buffer.

Figure 6. Coastal wetlands within the surrounding 1500m buffer of the Subject Property

Table 1. Landscape features identified within the Subject Land and surrounding 1500m buffer

Landscape Feature	Identification of Landscape Feature on Site
Native vegetation extent in 1500m buffer area	The circular 1500m buffer zone covers an area of 793.5ha. Within this circle native vegetation covers approximately 90.2 ha. This area of native vegetation represents 11.4% of the 1500m buffer zone. The native vegetation cover observed results in the assessment area being assigned to the >10-30% cover class (**Figure 7**).
Cleared area within 1500m buffer	The total area of cleared land within the assessment area surrounding the Subject Land is approximately 703ha. This area of cleared land accounts for approximately 88.6% of the land within the 1500m buffer zone (**Figure 7**).
Rivers and Streams (classified according to stream order)	No mapped watercourses occur within the Subject Land (**Figure 5**). Three (3) mapped, first order, watercourses occur within the 1500m buffer of the Subject Land. Sydney Harbour, a fourth order watercourse, partially occurs within the 1500m buffer.
Wetlands (within, adjacent to and downstream of site)	The Subject Land does not contain any areas of native vegetation identified as 'Coastal Wetlands' as per the State Environmental Planning Policy (Coastal Management) 2018. A small section at the western extent of the 1500m buffer is identified as Coastal Wetlands (**Figure 6**).
Connectivity features	The identified area of habitat connectivity between the Subject Land and native vegetation within the 1500m buffer does not have the potential to provide suitable habitat for a number of threatened species, endangered populations or migratory species. However, there is the potential that 'flyways' used by a suite of both terrestrial and migratory avian species encompass the Subject Land as well as land within the 1500m buffer zone (**Figure 9**).
Areas of geological significance and soil hazard features	No areas of geological significance (karsts, caves, crevices or cliffs) were identified within the Subject Land. This was determined as a result of a comprehensive site-based assessment. Within the area surrounding the Subject Land (within the 1500m buffer), Acid Sulphate soils have been mapped with a high probability of occurrence. However, these areas are aligned with Sydney Harbour and occur on the periphery of the 1500m buffer.

3. Native Vegetation

3.1 Assessing Native Vegetation Cover

Native vegetation cover and patch size have been assessed in accordance with Section 4.3 of the Biodiversity Assessment Methodology (BAM) (OEH 2017a). Components of the site context will be used in order to assess the suitability of habitat for threatened species within the Subject Land.

A buffer area of 1500m surrounding the outside edge of the boundary of the Subject Land was prepared in order to determine the extent of native vegetation within the surrounding locality. Native vegetation was considered to cover approximately 90.2 ha within the 1500m buffer and was assigned the >10-30% class (**Figure 7**).

3.2 Assessing Patch Size

Patch size as 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 or biodiversity stewardship site' (OEH 2017a). Patch size was calculated according to the above guidelines, and equated to 20.9ha (**Figure 8**).

3.3 Historically Mapped Vegetation Communities

The Office of Environment and Heritage NSW (OEH 2016) 'Native Vegetation of the Sydney Metropolitan Area' mapping indicates that no vegetation communities exist within or adjacent to the Subject Land (**Figure 10**). North Sydney is a heavily urbanised area, where very little remnant vegetation exists- replaced by street and garden plantings of mixed exotic/ native vegetation.

Figure 7. The extent of native vegetation occurring within the Subject Property and surrounding 1500m buffer.

Figure 8. Patch size associated with the Subject Property and surrounding 1500m buffer.

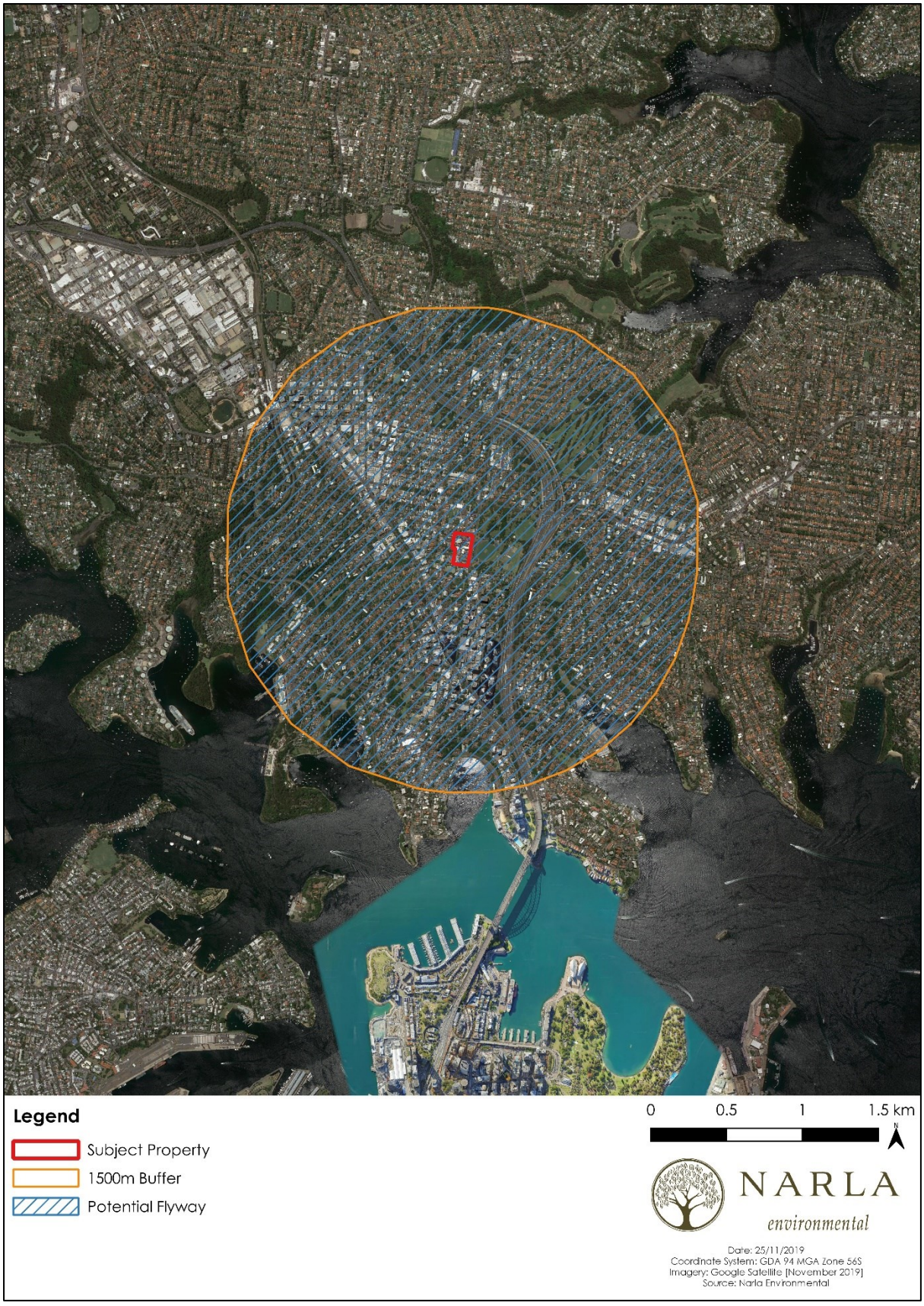

Figure 9. Potential flyway encompassing the entire 1500m buffer surrounding the Subject Land.

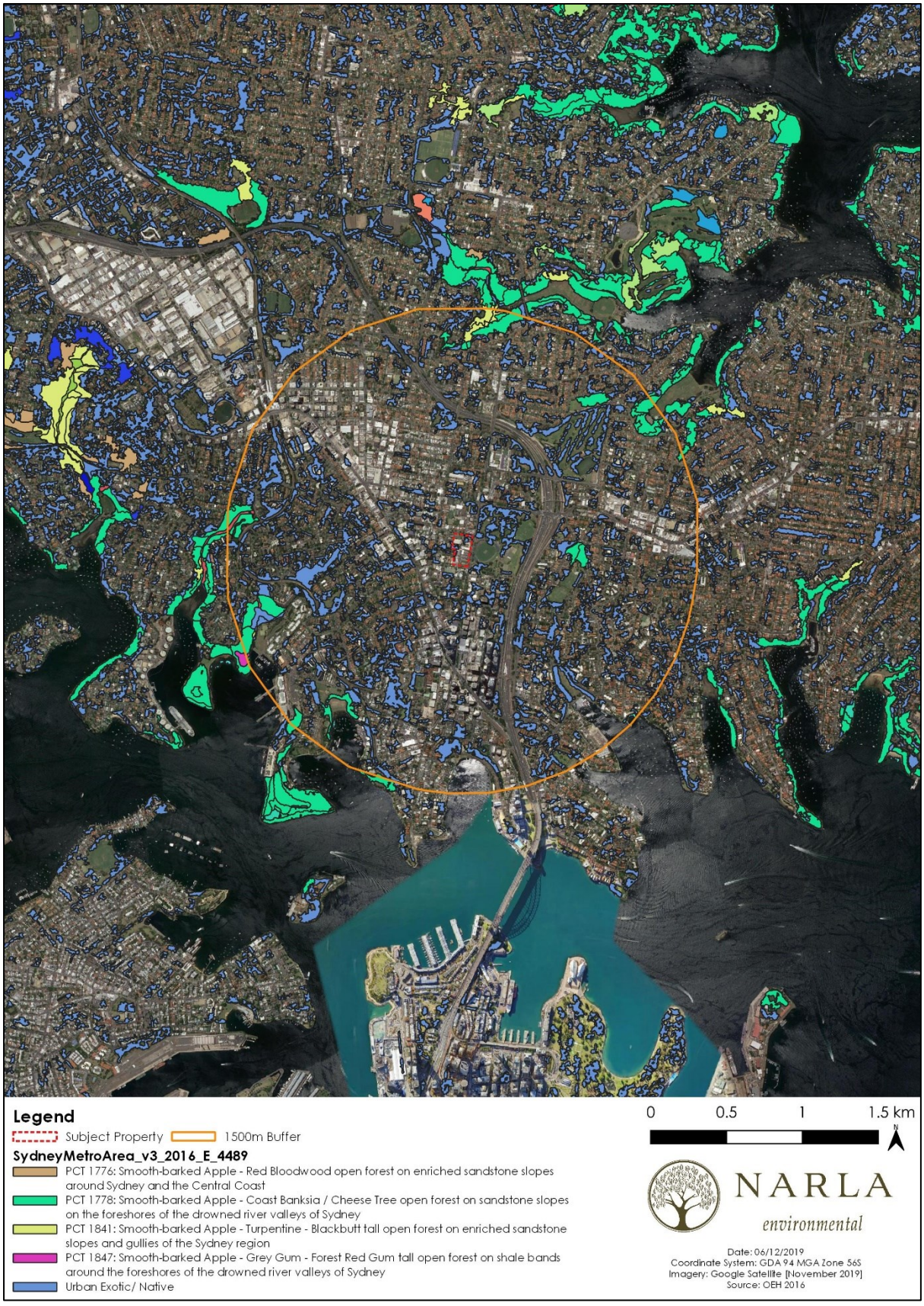

Figure 10. NSW OEH (2016) vegetation mapping of the Subject Property, and the surrounding areas.

3.4 Plant Community Types (PCT) Identified within Subject Land

3.4.1 PCT Selection Process

The Subject Land contained several historically planted native species including *Waterhousea floribunda*, *Archontophoenix cunninghamiana*, *Lomandra longifolia* and *Eucalyptus punctata*. The majority of the plants within the Subject Land were planted exotics such as *Trachelospermum asiaticum* and *Clivia miniata*, weed species such as *Schinus areira* and *Phoenix canariensis*, and native cultivars such as *Syzygium spp*.

As the landscape within the Subject Land is highly altered, and remnant vegetation surrounding the Subject Land is lacking, it is problematic to define a specific PCT, particularly considering the lack of floristics within the Subject Land. Nonetheless, as part of the Subject Land consists of native vegetation, a PCT must be assigned.

PCT selection was undertaken using information and databases provided in the BioNet Vegetation Classification System (OEH 2019a). The steps taken to identify each PCT confirmed within the site is provided, along with evidence of selection, in Table 2.

Table 2. PCT Selection Criteria. Green shading indicates selected PCT.

Steps Involved in Identification of Chosen PCT	
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
Vegetation Type (Keith 2002)	Sydney Coastal Dry Sclerophyll Forests
Vegetation Formation (Keith 2002)	Dry sclerophyll forests (Shrubby sub formation)
Locality	Sydney Metropolitan Area
Elevation	80m
Shortlisted PCT's	Justification
1181 - Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	This PCT is also identified as Hinterland Sandstone Gully Forest, and is an open eucalypt forest with an abundant sclerophyll shrub stratum and a groundcover dominated by sedges. This forest surrounds the Cumberland plain, occurring along the western portion of the Hornsby and Woronora plateaux and in the lower Blue Mountains. Within this distribution Hinterland Sandstone Gully Forest occurs on lower slopes of dry sandstone gullies up to 600m ASL where average annual rainfall ranges from 850 to 1300mm. The geographic location of this PCT does not include North Sydney and as such, it was not assigned to the vegetation within the Subject Land.
1250 - Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion	This PCT is widely distributed along the eastern extent of the Sydney sandstone plateaus. It occupies sheltered aspects on infertile Hawkesbury sandstone in areas that receive more than 1000 millimetres of mean annual rainfall. Sydney peppermint (*Eucalyptus piperita*) and smooth-barked apple (*Angophora costata*) form a moderately tall open forest. These are rocky environments and the understorey is a diverse mix of heath and shrub species such as banksias, tea-trees and wattles. The community is found at elevations up to 500 metres above sea level. This PCT prefers infertile Hawksbury sandstone, which is not consistent with the enriched soils present within the Subject Land.

Steps Involved in Identification of Chosen PCT	
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
Vegetation Type (Keith 2002)	Sydney Coastal Dry Sclerophyll Forests
Vegetation Formation (Keith 2002)	Dry sclerophyll forests (Shrubby sub formation)
Locality	Sydney Metropolitan Area
Elevation	80m
Shortlisted PCT's	Justification
	Therefore, this PCT was not assigned to the vegetation within the Subject Land.
1623 - Narrow-leaved Ironbark - Yellow bloodwood - Rough-barked Apple shrubby open forest on sandstone ranges of the Sydney Basin	This PCT is defined by open forests with a canopy characterised by *Eucalyptus crebra* in association with *Corymbia eximia*. The mid-storey consists of an open shrub layer. The ground layer consists of a mix of grasses and graminoids along with sparse ferns and forbs. This PCT occurs on the slopes of sandstone ranges of the Sydney Basin, which is not consistent with the geology of the Subject Land. As a result, it was not assigned to the vegetation within the Subject Land.
1780 - Sydney Peppermint / Coachwood - Water Gum open forest in protected sandstone gullies around Sydney and the Central Coast	This PCT occurs in narrow sandstone gorges and minor creek lines of the sandstone plateaus and contains a suite of riparian and rainforest species. Often only narrow in width, this forest is dominated by smooth-barked apple (*Angophora costata*) and Sydney peppermint (*Eucalyptus piperita*). The small tree layer tends to feature a mix of species common to riparian scrubs and hardy rainforest communities. This includes low-growing coachwood (*Ceratopetalum apetalum*), water gum (*Tristaniopsis laurina*) and tea-tree (*Leptospermum* spp.). Also present is river lomatia (*Lomatia myricoides*). The ground is invariably rocky and covered in small-leaved ferns such as umbrella fern (*Sticherus flabellatus*) and coral fern (*Gleichenia* spp.). This PCT is widespread along the gully lines of the major sandstone plateaus, although very restricted in extent. As the Subject Land does not occur along a gully line, with mapped watercourses over 1km away, this PCT was not assigned to the vegetation within the Subject Land.
1776 - Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast	This PCT is commonly encountered on the upper slopes and dry gullies of Sydney urban areas. It is a tall open eucalypt forest with an understorey of dry sclerophyll shrubs with ferns and forbs amongst the ground cover. The commonly recorded eucalypts are smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*) and Sydney peppermint (*Eucalyptus piperita*). Blackbutt (*Eucalyptus pilularis*) is common on gully slopes of the north shore and Hacking River valley while broad-leaved white mahogany (*Eucalyptus umbra*) replaces this species along the Warringah and Pittwater escarpments. A sparse layer of small trees such as *Allocasuarina littoralis* and old-man banksia (*Banksia serrata*) is common above a variety of wattles, tea-trees, gee bungs and grass trees. In long unburnt areas sweet pittosporum (*Pittosporum undulatum*) may be prevalent. It is widespread on the Hornsby

Steps Involved in Identification of Chosen PCT	
IBRA Bioregion	Sydney Basin
IBRA Subregion	Pittwater
Vegetation Type (Keith 2002)	Sydney Coastal Dry Sclerophyll Forests
Vegetation Formation (Keith 2002)	Dry sclerophyll forests (Shrubby sub formation)
Locality	Sydney Metropolitan Area
Elevation	80m
Shortlisted PCT's	Justification
	plateau in areas that receive greater than 1000 millimetres of mean annual rainfall and are at elevations less than 200 metres above sea level. It extends north of the Sydney area into the hinterland of the Central Coast. One of the distinguishing features of the community is that it appears to persist in areas that have subtle clay enrichment to the sandstone soils. Typically, sites are located downslope from large residual shale caps or on exposed Narrabeen sandstone or thin clay bands on coastal sandstone ridgetops. This PCT was selected due to the geological attributes matching with those at the Subject Land (enriched sandstone) and the geographic location of known occurrences of this PCT being consistent with North Sydney. Moreover, historically vegetation mapping by OEH (2016) indicates this PCT occurs within 1500m of the Subject Land.

3.4.2 Final PCT Selection

Field surveys conducted by Narla confirmed that one (1) native vegetation community was located within the Subject Land. The native vegetation community was classified to the following PCT that most represented the floristics and typical geology/landscape position of the community:

- PCT 1776 – Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast

One (1) vegetation zone was identified within the Subject Land:

- Vegetation Zone 1 - PCT 1776

This vegetation zone is detailed in Table 3 and displayed in **Figure 11**.

Table 3. Vegetation identified within the proposed development site.

PCT 1776 – Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast	
	
Description in VIS	
Coastal Enriched Sandstone Dry Forest is commonly encountered on the upper slopes and dry gullies of Sydney urban areas. It is a tall open eucalypt forest with an understorey of dry sclerophyll shrubs with ferns and forbs amongst the ground cover. The commonly recorded eucalypts are smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*) and Sydney peppermint (*Eucalyptus piperita*). Blackbutt (*Eucalyptus pilularis*) is common on gully slopes of the north shore and Hacking River valley while broad-leaved white mahogany (*Eucalyptus umbra*) replaces this species along the Warringah and Pittwater escarpments. A sparse layer of small trees such as *Allocasuarina littoralis* and old-man banksia (Banksia serrata) is common above a variety of wattles, tea-trees, gee bungs and grass trees. In long unburnt areas sweet pittosporum (*Pittosporum undulatum*) may be prevalent. It is widespread on the Hornsby plateau in areas that receive greater than 1000 millimetres of mean annual rainfall and are at elevations less than 200 metres above sea level. It extends north of the Sydney area into the hinterland of the Central Coast. One of the distinguishing features of the community is that it appears to persist in areas that have subtle clay enrichment to the sandstone soils. Typically, sites are located downslope from large residual shale caps or on exposed Narrabeen sandstone or thin clay bands on coastal sandstone ridgetops. The clay influence is not immediately discernable at sites but does appear expressed in the plant assemblage, resulting in more prominent mesic and grass species and less abundant heath plants than occur in the sheltered forests found on rockier and more siliceous sandstones.	
Condition class on Subject Land (highly degraded)	One (1) ground layer species, *Lomandra longifolia*, is representative of PCT 1776. The majority of species present within the Subject Land were historically planted native cultivars and exotics.
Extent within Subject	0.24ha

PCT 1776 – Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast	
Land (approximate)	
Survey effort	One (1) BAM plot was established. Floristics encompassed an area of 20m x 20m and a transect of 40m was used. Note that a standard sized BAM plot (20m x 50m) could not be created as the Subject Land was present adjacent to buildings, and vegetation only occurred within sporadic garden beds. An alternate BAM plot was therefore established that best represented the majority of the vegetation within the Subject Land.
Description of the Vegetation on Subject Land	
The vegetation within the Subject Land was severely altered and thus difficult to assign to a PCT. It contained little native floristic diversity, with only a small patch of *Lomandra longifolia* present.	
Structure of Vegetation	
Within the 20m x 20m plot, locally indigenous canopy vegetation was lacking, consisting of scattered cultivars and exotics. The shrub layer within the plot consisted of *Syzygium spp.* cultivars and *Waterhousea floribunda*. The ground layer was sparsely covered, with 0.5% native vegetation.	
Scientific Reference from VIS (OEH 2019)	OEH (2013) The Native Vegetation of the Sydney Metropolitan Area Version 2.0 NSW Office of Environment and Heritage Sydney
TEC Status (Biodiversity Conservation Act 2016)	This PCT does not form part of a Threatened Ecological Community under the BC Act 2016.
Estimate of percent cleared value of PCT in the major catchment area	64.00 %

Figure 11. Narla field validated vegetation mapping and locations of BAM plot within the Subject Land.

3.4.3 Vegetation Integrity Survey (VIS) Plots

One (1) Biodiversity Assessment Method (BAM) Vegetation Integrity Survey (VIS) Plots was 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 C.**

Vegetation Integrity Scores (VIS) represented by existing vegetation within the single vegetation zone is detailed in **Table 4.**

Table 4. Vegetation integrity scores for each identified zone

Vegetation Zone	PCT	Area (ha)	Survey Effort	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score	Future Vegetation Integrity Score	Hollow Bearing Trees
Vegetation Zone 1	1776 - Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast	0.24	One 800m^2 (20m x 40m) Vegetation Integrity Survey Plot	1.2	2.2	32.6	4.4	0	0

4. Threatened Species

4.1 Candidate Ecosystem Credit Species

Ecosystem Credit species associated with the Subject Land are listed below in **Table 5.** No species predicted by the BAM calculator as potential Ecosystem Credits were excluded from the results displayed.

Table 5. Candidate Ecosystem Credits predicted to occur within the Subject Land.

Scientific Name	BC Act Status
Anthochaera phrygia Regent Honeyeater (Foraging)	Critically Endangered
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable
Callocephalon fimbriatum Gang-gang Cockatoo	Vulnerable
Calyptorhynchus lathami Glossy Black-Cockatoo	Vulnerable
Daphoenositta chrysoptera Varied Sittella	Vulnerable
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable
Glossopsitta pusilla Little Lorikeet	Vulnerable
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Vulnerable
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable
Lathamus discolour Swift Parrot (Foraging)	Endangered
Lophoictinia isura Square-tailed Kite	Vulnerable
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	Vulnerable
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	Vulnerable
Miniopterus australis Little Bent-winged Bat	Vulnerable
Miniopterus orianae oceanensis Large Bent-winged bat (Foraging)	Vulnerable
Neophema pulchella Turquoise Parrot	Vulnerable
Ninox strenua Powerful Owl (Foraging)	Vulnerable
Pandion cristatus Eastern Osprey	Vulnerable
Petroica boodang Scarlet Robin	Vulnerable
Phascolarctos cinereus Koala	Vulnerable

Scientific Name	BC Act Status
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	Vulnerable
Tyto novaehollandiae Masked Owl (Foraging)	Vulnerable
Varanus rosenbergi Rosenberg's Goanna	Vulnerable

4.2 Candidate Species Credit Species Summary

This section provides a summary of the candidate Species Credit flora and fauna species for the Subject Land derived from BAMC (OEH 2017b) and a 10km BioNet Atlas Search (OEH 2019c). 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 6**).

Table 6. Candidate Fauna and Flora Credit Species predicted to occur within the Subject Land.

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Acacia bynoeana Bynoe's Wattle	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species occurs in heath or dry sclerophyll forest on sandy soils. Such habitat does not occur on the Subject Land.	High - 2	No
Allocasuarina portuensis Nielsen Park She-oak	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species occurs in tall closed woodland approximately 20m above the harbour. Such habitat does not occur on the Subject Land.	Very High – 3	No
Ancistrachne maidenii Ancistrachne maidenii	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. Although the soil profile of the Subject Land is consistent with the needs of this species, it grows in dry sclerophyll forests. Such habitat does not occur on the Subject Land.	High - 2	No
Anthochaera phrygia Regent Honeyeater (Breeding)	Critically Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. In addition, the Subject Land is not included on the map of important areas for Regent Honeyeater.	Very High – 3	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Burhinus grallarius Bush Stone-curlew	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species inhabits open forests and woodlands. Such habitat does not occur on the Subject Land.	High - 2	No
Caladenia tessellata Thick Lip Spider Orchid	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species inhabits grassy sclerophyll woodland. Such habitat does not occur on the Subject Land.	Very High - 3	No
Calidris ferruginea Curlew Sandpiper (Breeding)	Endangered	No	No – this species does not breed in Australia. It migrates to Australia for the non-breeding period.	Very High – 3	No
Callistemon linearifolius Netted Bottle Brush	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species grows in dry sclerophyll forest on the coast and adjacent ranges. Such habitat does not occur on the Subject Land.	Moderate – 1.5	No
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires eucalypt trees with hollows >9cm for breeding. Such habitat does not occur on the Subject Land.	High - 2	No
Calyptorhynchus lathami Glossy Black- Cockatoo (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires living or dead trees with hollows greater than 15cm diameter and greater than 5m above ground for breeding. This	High - 2	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			species also requires the presence of *Allocasuarina* and *Casuarina* species for foraging. Such habitat does not occur on the Subject Land.		
Cercartetus nanus Eastern Pygmy-possum	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species prefers woodlands and heath, and feeds largely on nectar and pollen from banksias, eucalypts and bottlebrushes. Such habitat does not occur on the Subject Land.	High - 2	No
Chalinolobus dwyeri Large-eared Pied Bat	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species typically roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin. Such habitat does not occur on the Subject Land.	Very High - 3	No
Darwinia biflora	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species occurs on the edges of weathered shale-capped ridges. Such habitat does not occur on the Subject Land.	High - 2	No
Darwinia peduncularis	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone. Such habitat does not occur on the Subject Land.	Very High - 3	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Dichanthium setosum Bluegrass	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species is associated with heavy basaltic black soils and red-brown loams with clay subsoil. Such soils do not occur on the Subject Land.	High - 2	No
Doryanthes palmeri Giant Spear Lily	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. The Giant Spear Lily occurs on exposed rocky outcrops on infertile soils or on bare rock. Such habitat does not occur on the Subject Land.	High - 2	No
Erythrotriorchis radiatus Red Goshawk	Critically Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. Preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers. Such habitats do not occur within the Subject Land.	Very High - 3	No
Eucalyptus camfieldii Camfield's Stringybark	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species occurs in coastal heath, mostly on exposed sandy ridges. Such habitat does not occur on the Subject Land.	High - 2	No
Eucalyptus fracta Broken Back Ironbark	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species is usually the dominant tree in a narrow band along the upper edge of a sandstone escarpment. Such habitat does not occur within the Subject Land.	Very High - 3	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Eucalyptus nicholii Narrow-leaved Black Peppermint	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Such habitat conditions do not occur within the Subject Land.	High - 2	No
Eucalyptus pulverulenta Silver-leafed Gum	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhynca*), Broad-leafed Peppermint (*E. dives*), Silvertop Ash (*E. sieberi*) and Apple Box (*E. bridgesiana*). Such habitat conditions do not occur within the Subject Land.	High - 2	No
Genoplesium baueri Bauer's Midge Orchid	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species grows in dry sclerophyll forest and moss gardens over sandstone. Such habitat does not occur within the Subject Land.	Very High - 3	No
Grevillea caleyi Caley's Grevillea	Critically Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species only occurs on ridgetops between elevations of 170 to 240m above sea level. Such habitat does not occur on the Subject Land.	Very High - 3	No
Haematopus longirostris Pied Oystercatcher	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species	High - 2	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			inhabits intertidal flats of inlets and bays, open beaches and sandbanks. Such habitat does not occur on the Subject Land.		
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. The breeding habitat of this species consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Such habitat does not occur on the Subject Land.	High - 2	No
Hibbertia puberula	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species is usually associated with typically dry sclerophyll woodland communities, although heaths are also occupied. Such habitat does not occur on the Subject Land.	High - 2	No
Hibbertia spanantha Julian's Hibbertia	Critically Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species grows in forest with canopy species including *Eucalyptus pilularis, E. resinifera, Corymbia gummifera* and *Angophora costata*. Such habitat does not occur on the Subject Land.	Very High – 3	No
Hieraaetus morphnoides Little Eagle (Breeding)	Vulnerable	Yes	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species nests in tall living trees within a remnant patch. Such habitat does not occur on the Subject Land.	Moderate - 1.5	No
Lasiopetalum joyceae	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was	Moderate - 1.5	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species grows in heath, which does not occur within the Subject Land.		
Lathamus discolour Swift Parrot (Breeding)	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. Furthermore, this species only breeds in Tasmania.	Very High - 3	No
Leptospermum deanei	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species occurs in woodland on lower hill slopes or near creeks and in sandy alluvial soil or sand over sandstone. Such habitats do not occur within the Subject Land.	High - 2	No
Lophoictinia isura Square-tailed Kite (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. The nesting habitat of this species consists of large trees along or near watercourses, in a fork or on large horizontal limbs. Such habitat does not occur on the Subject Land.	Moderate - 1.5	No
Melaleuca deanei Deane's Paperbark	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species occurs mostly in ridgetop woodland, which does not occur within the Subject Land.	High – 2	No
Miniopterus australis Little Bent-winged Bat (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species typically breeds in caves, but can also use derelict mines and	Very High - 3	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			storm-water tunnels. Such habitat does not occur on the Subject Land.		
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species typically breeds in caves, but can also use derelict mines and storm-water tunnels. Such habitat does not occur on the Subject Land.	Very High - 3	No
Mixophyes iteratus Giant Barred Frog	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires land within 50m of semi-permanent and permanent drainages. Such habitat does not occur on the Subject Land.	High – 2	No
Myotis macropus (Southern Myotis)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires hollow bearing trees within 200 m of a riparian zone or water body. Such habitat does not occur on the Subject Land.	High – 2	No
Ninox connivens Barking Owl (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires living or dead trees with large hollows for breeding. Such habitat does not occur on the Subject Land.	High – 2	No
Ninox strenua Powerful Owl (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires living or dead trees with hollows greater than 20 cm	High - 2	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			diameter for breeding. Such habitat does not occur on the Subject Land.		
Onychoprion fuscata Sooty Tern	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species forages in offshore waters and breeds in large colonies in sand or coral scrapes on offshore islands. Neither of these habitats occur within the Subject Land.	High - 2	No
Pandion cristatus Eastern Osprey (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting. Such habitat does not occur on the Subject Land.	Moderate - 1.5	No
Persoonia hirsuta Hairy Geebung	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Such habitat does not occur within the Subject Land.	Very High - 3	No
Petaurus norfolcensis Squirrel Glider	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species inhabits Blackbutt-Bloodwood forest with heath understorey in coastal areas. Such habitat does not occur on the Subject Land.	High - 2	No
Phascolarctos cinereus Koala (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species	High - 2	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			inhabits eucalypt woodlands and forests. Such habitat does not occur on the Subject Land		
Pimelea curviflora var. curviflora	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species usually occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Such habitat does not occur on the Subject Land.	High - 2	No
Prostanthera marifolia Seaforth Mintbush	Critically Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species is located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses. Such habitat does not occur within the Subject Land.	Very High - 3	No
Pseudophryne australis Red-crowned Toadlet	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species usually inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings.	Moderate – 1.5	No
Pteropus poliocephalus Grey-headed Flying-fox (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. There was no active breeding colony located on the Subject Land.	High – 2	No
Rhodamnia rubescens Scrub Turpentine	Critically Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. Found in littoral, warm temperate and subtropical rainforest and wet	Very High - 3	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			sclerophyll forest usually on volcanic and sedimentary soils. Such habitats do not occur within the Subject Land.		
Sarcochilus hartmannii Hartman's Sarcochilus	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. Favours cliff faces on steep narrow ridges supporting eucalypt forest and clefts in volcanic rock from 500 to 1,000m in altitude. Such habitat do not occur within the Subject Land.	High – 2	No
Sternula albifrons Little Tern (Breeding)	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires low dunes or sandy beaches for breeding. Such habitat does not occur on the Subject Land.	High – 2	No
Syzygium paniculatum Magenta Lilly Pilly	Endangered	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. Such habitat does not occur within the Subject Land.	High – 2	No
Tetratheca glandulosa	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. Although this species occurs in soil landscapes that are present within the Subject Land, topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches.	High – 2	No

Scientific Name	BC Act listing status	Included in Assessment?	Targeted Survey Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Tetratheca juncea Black-eyed Susan	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. Such habitat did not occur within the Subject Land.	High - 2	No
Tyto novaehollandiae Masked Owl (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. This species requires living or dead trees with hollows greater than 20 cm diameter for breeding. Such habitat does not occur on the Subject Land.	High - 2	No
Tyto tenebricosa Sooty Owl (Breeding)	Vulnerable	No	No - after carrying out a field assessment of the habitat constraints or microhabitats on the Subject Land, it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land. Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Such habitats did not occur within the Subject Land.	Very High - 3	No

4.3 Targeted Species Credit Surveys

4.3.1 Flora Species Credit Survey

A total of twenty-eight (28) threatened flora species were identified within the BAMC (OEH 2017b) and historical records (OEH 2019c) as having the potential to occur within the Subject Land.

None of the twenty-eight (28) flora species identified were surveyed for as the habitat within the Subject Land was considered to be 'substantially degraded such that the species is unlikely to utilise the Subject Land' in accordance with Section 6.4.1.17(a) of the BAM (OEH 2017a).

The species excluded from the survey were:

- *Acacia bynoeana* (Bynoe's Wattle)
- *Allocasuarina portuensis* (Nielsen Park She-oak)
- *Ancistrachne maidenii* (Ancistrachne maidenii)
- *Caladenia tessellata* (Thick Lip Spider Orchid)
- *Callistemon linearifolius* (Netted Bottle Brush)
- *Darwinia biflora* (Darwinia biflora)
- *Darwinia peduncularis* (Darwinia peduncularis)
- *Dichanthium setosum* (Bluegrass)
- *Doryanthes palmeri* (Giant Spear Lily)
- *Eucalyptus camfieldii* (Camfield's Stringybark)
- *Eucalyptus fracta* (Broken Back Ironbark)
- *Eucalyptus nicholii* (Narrow-leaved Black Peppermint)
- *Eucalyptus pulverulenta* (Silver-leafed Gum)
- *Genoplesium baueri* (Bauer's Midge Orchid)
- *Grevillea caleyi* (Caley's Grevillea)
- *Hibbertia puberula* (Hibbertia puberula)
- *Hibbertia spanantha* (Julian's Hibbertia)
- *Lasiopetalum joyceae* (Lasiopetalum joyceae)
- *Leptospermum deanei* (Leptospermum deanei)
- *Melaleuca deanei* (Deane's Paperbark)
- *Persoonia hirsuta* (Hairy Geebung)
- *Pimelea curviflora* var. *curviflora*
- *Prostanthera marifolia* (Seaforth Mintbush)
- *Rhodamnia rubescens* (Scrub Turpentine)
- *Sarcochilus hartmannii* (Hartman's Sarcochilus)
- *Syzygium paniculatum* (Magenta Lilly Pilly)
- *Tetratheca glandulosa* (Tetratheca glandulosa)
- *Tetratheca juncea* (Black-eyed Susan)

No targeted surveys were therefore conducted for threatened flora species. As per Section 6.4.1.18 of the BAM, 'A candidate species credit species that is not considered to have suitable habitat on the Subject Land (or specific vegetation zones) in accordance with Paragraph 6.4.1.17 does not require further assessment on the Subject Land (or specific vegetation zones)' (OEH 2017a). Justification for determining that certain predicted Species Credit species were unlikely to have suitable habitat on the Subject Land (or specific vegetation zones) are provided earlier in Table 6.

4.3.2 Fauna Species Credit Survey

A total of twenty-eight (28) threatened fauna species were identified within the BAMC (OEH 2017b) and historical records (OEH 2019c) as having the potential to occur within the Subject Land. Targeted fauna surveys were not undertaken on the Subject Land for any of the twenty-eight (28) candidate Species Credit species as the habitat within the Subject Land was considered to be 'substantially degraded such that the species is unlikely to utilise the Subject Land' in accordance with Section 6.4.1.17(a) of the BAM (OEH 2017a).

As per Section 6.4.1.18 of the BAM, 'A candidate species credit species that is not considered to have suitable habitat on the Subject Land (or specific vegetation zones) in accordance with Paragraph 6.4.1.17 does not require further assessment on the Subject Land (or specific vegetation zones)' (OEH 2017a). Justification for determining that certain predicted species credit species were unlikely to have suitable habitat on the Subject Land (or specific vegetation zones) are provided earlier in Table 6.

4.3.3 Species Polygons

No Species Credit species were identified as having potential to utilise the site and none 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 7**).

Table 7. 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, Design and Planning	The proposed development has avoided and minimised impacts to native vegetation and habitat. The development site is located within an area of minimal biodiversity value, emphasised by the very low VI score of 4.4. In addition, many areas within the site comprised of hardstand areas (i.e. playgrounds and carparks). The site does not contain any threatened flora species and there are no anticipated impacts to threatened fauna species, including threatened microbats. In addition, no threatened ecological communities occur within the site, and therefore will not be impacted as part of the proposed development. Due to the nature of the development being within a highly urbanised area, the project will not impact on habitat connectivity within the wider locality. As the site chosen comprises poor biodiversity values, an exploration of alternative designs or locations was not required. Although some native vegetation will require removal, the Subject Land predominately comprised of exotic vegetation. It is not anticipated that the removal of such vegetation will impact on habitat for threatened species in the wider area, particularly due to the degraded nature of the site and limited habitat for threatened species in the wider locality. In addition, no prescribed impacts on threatened species or ecological communities are anticipated.	Pre-construction phase	▪ Proponent
Assigning a Project Ecologist	Prior to construction, the applicant should commission the services of a qualified and experienced Ecologist Consultant (minimum 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.	Prior to vegetation clearance works	▪ Proponent

Action	Outcome	Timing	Responsibility
	The Ecologist will be commissioned to: 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.		
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 proposed development 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
Clearing of vegetation/ fauna habitat	In preparation for the authorised clearing of native vegetation, the following conditions should be adhered to in order to minimise all potential impacts to native biodiversity values within the Subject Land:	Prior to vegetation clearance works	▪ Proponent ▪ Project Ecologist

Action	Outcome	Timing	Responsibility
	Before any vegetation is damaged or removed, a qualified Ecologist with flora identification experience should be assigned to undertake a pre-clearing survey to delineate areas permitted to be cleared, from areas that must be retained. Brightly coloured bunting or strong flagging tape should be used. Prior to vegetation being damaged or removed, a qualified Ecologist with fauna identification experience should determine the presence of any suitable habitat for roosting microbats, nesting birds or other fauna in the area of the Subject Land due to be cleared. All trees (including dead trees) should be felled by qualified Arborists using chainsaw and pulleys only. No heavy machinery is permitted for removal of any tree. A qualified Project Ecologist with experience in handling wildlife should be present on the Project Site during all vegetation clearing in order to supervise clearing and capture and relocate any displaced, healthy animals, or care for / rehabilitate any injured or orphaned animals.		▪ Arboricultural Professional
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
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 Construction Environmental Management Plan (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 Biodiversity Values

6.1.1 Native Vegetation Clearance Requiring Offsetting

The following native vegetation within the Subject Land is proposed to be impacted as a result of the proposed development.

- 0.24 ha of native vegetation representative of PCT 1776 – Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast

The assessor has determined that the vegetation integrity score of the proposed action is 4.8. In accordance with section 3.1.1.3 of the BAM, a vegetation zone has a vegetation integrity score <17 where the PCT is associated with threatened species habitat (as represented by Ecosystem Credits), or is representative of a vulnerable ecological community, requires no further assessment of native vegetation beyond Section 5.4 of the BAM, and an assessment of threatened species habitat according to Section 6.2 and Paragraph 6.2.1.4 is not required.

No Biodiversity Offset Credits will be required.

7. Other Impacts

7.1 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 8.

Table 8. Indirect Impacts.

Indirect Impact	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	It is unlikely that the proposed development will impact adjacent habitat or vegetation considering the Subject Land and surrounding area is highly developed and modified. Vegetation is only present in the form of native and exotic garden beds surrounded by roads and tall buildings.	N/A	N/A
(b) reduced viability of adjacent habitat due to edge effects	It is unlikely the proposed development will reduce viability of adjacent habitat due to edge effects, as the adjacent vegetation is only in the form of native and exotic garden beds in a highly developed and modified area.	N/A	N/A
(c) reduced viability of adjacent habitat due to noise, dust or light spill	Construction works may increase noise and dust exposure to adjacent habitat. However, given the vegetation is located in a heavily urbanised and disturbed area, such issues are already present within and surrounding the Subject Land. It is therefore unlikely the proposed works will significantly exacerbate any of these issues.	N/A	N/A
(d) transport of weeds and pathogens from the	It is unlikely the proposed development will increase weeds and pathogens into adjacent vegetation, considering such	N/A	N/A

Indirect Impact	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.
site to adjacent vegetation	vegetation is heavily degraded and already exposed to such issues.		
(e) increased risk of starvation, exposure and loss of shade or shelter	It is unlikely that any threatened fauna relies on habitat within the Subject Land, such that the proposed impacts will lead to increased risks from starvation, exposure, shade and shelter. Canopy trees that provide habitat resources within the wider area will continue to be retained.	N/A	N/A
(f) loss of breeding habitats	The proposed development will not remove any important breeding habitats as the site is already highly disturbed and developed.	N/A	N/A
(g) trampling of threatened flora species	No threatened flora species were identified within the Subject Land. It is therefore not expected that the trampling of threatened flora species will occur.	N/A	N/A
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely that these issues affect the Subject Land.	N/A	N/A
(i) fertiliser drift	This issue is not likely to affect the vegetation on the Subject Land.	N/A	N/A
(j) rubbish dumping	This issue was not observed within the Subject Land and is not expected to be exacerbated as a result of the proposed development.	N/A	N/A
(k) wood collection	This issue is not likely to affect the vegetation on the Subject Land.	N/A	N/A
(l) bush rock removal and disturbance	This issue is not relevant to the Subject Land as there is no bush rock.	N/A	N/A

Indirect Impact	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.
(m) increase in predatory species populations	It is unlikely that the proposed works will influence or alter predatory species populations.	N/A	N/A
(n) increase in pest animal populations	It is unlikely that the proposed works will influence or alter predatory species populations.	N/A	N/A
(o) increased risk of fire	The proposed development is not situated in bushfire prone land and has been assessed as being low risk.	N/A	N/A
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	The proposed development will not result in the removal of any important breeding or foraging habitat for threatened species.	N/A	N/A

7.1.1 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 subdivision on the habitat of threatened species or ecological communities. This is discussed in **Table 9** below.

There is potential that human made structures within the Subject Land may support the habitat of threatened species, specifically threatened microbat species. A number of buildings will be demolished as part of the proposed development, and as such, may impact on threatened species. These buildings are identified in **Figure 12**. The following threatened microbat species have the potential to utilise such habitat within the Subject Land:

- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Little Bent-winged Bat (*Miniopterus australis*)
- Eastern Coastal Freetailed Bat (*Micronomusus norfolkensis*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*); and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

A targeted search was conducted within the Subject Land for these species on 15th April 2021, with a specific focus on buildings that will be demolished as part of the proposed development. The targeted survey involved daytime searches of potential roost sites within roof cavities. A torch was used to shine in holes, cracks and crevices within the roof space, and a handheld bat detector (Echometer) was used to locate any bats that may call. All recordings were sent to Pete Knock (Consultant Ecologist – Fauna Sonics) for echolocation call analysis. No individuals were located during the survey, and no signs of roosting (e.g. scats) were detected. In addition, echolocation call analysis indicated no microbats were present within the roof cavities. It was therefore concluded that the proposed development will have no prescribed impact on threatened microbat species.

Table 9. Prescribed and Uncertain Impacts.

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 situated on the Subject Land.
Habitat of threatened species or ecological communities associated with human made structures	No	Targeted surveys indicated that no threatened species (specifically microbat species) were utilising human made structures within the Subject Land. Therefore, there will be no impacts on threatened species associated with human made structures.
Habitat of threatened species or ecological communities associated with non-native vegetation	No	Ornamental gardens surrounding the Subject Land may provide intermittent, temporary foraging habitat for Grey-headed Flying-fox when trees flower or fruit, however, this habitat is not important for the survival of this mobile species.

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
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No	It is unlikely the removal of native vegetation on the Subject Land will interrupt connectivity for any threatened fauna or flora species. The Subject Land is situated in an already highly fragmented landscape. The vegetation proposed for removal is also low-quality habitat for threatened species.
Movement of threatened species that maintains their life cycle	No	It is unlikely that threatened species would utilise the Subject Land considering its location in a heavily urbanised and altered landscape. The vegetation proposed for removal is also low-quality habitat for threatened species.
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	There are no threatened species and ecological communities within the Subject Land that are sustained by water bodies and hydrological processes.
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	There is no potential habitat within the Subject Land that supports threatened species as outlined in this report, therefore it is unlikely that vehicle strikes will be an issue.

Figure 12. Potential prescribed impacts on threatened species associated with human made structures (buildings) within the Subject Land.

8. Other relevant Legislation or Planning Policies Requiring Address

8.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

No EPBC Act threatened species or ecological communities were located within the Subject Land.

8.2 Groundwater Dependent Ecosystems

The Commonwealth Groundwater Dependent Ecosystem (GDE) Policy defines GDEs as ecosystems, which have their species composition, and their natural ecological processes determined by groundwater (DLWC 2002). The Policy defines groundwater as the water beneath the earth's surface that has filtered down to the zone where the earth or rocks are fully saturated (DLWC 2002). Ecosystems vary dramatically in the degree of dependency of groundwater, from having no apparent dependence through to being entirely dependent on it (DLWC 2002). The Australian Government Atlas of Groundwater Dependent Ecosystems (BOM 2019) was used to identify any previously mapped GDEs that occur in or near the Subject Land. This atlas identifies GDEs reliant on surface groundwater (rivers, springs and wetlands) and subsurface groundwater (vegetation).

The Atlas was reviewed and it was identified that the Subject Land does not contain a GDE. During on-ground surveys no GDE were evident.

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

Clause 9 of SEPP 19 – Bushland in Urban Areas, applies to land which adjoins bushland zoned or reserved for public open space purposes. As the Subject Land is not situated adjacent to a council reserve, SEPP 19 does not apply.

9. Biodiversity Offset Credit Requirements

The assessor has determined that the vegetation integrity score of the proposed action is 4.8. In accordance with section 3.1.1.3 of the BAM, a vegetation zone that has a vegetation integrity score <17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, requires no further assessment of native vegetation beyond Section 5.4 of the BAM, and an assessment of threatened species habitat according to Section 6.2 and Paragraph 6.2.1.4 is not required.

The proposed impact will result in no ecosystem credits and no species credits are required to offset the biodiversity impacts of the proposed development.

Conclusion

As the proposed development is a State Significant Development (SSD), the Secretary's Environmental Assessment Requirements (SEARs) issued for the Environmental Impact Statement (EIS) by the NSW Department of Planning, Industry and Environment (DPIE) requires a Biodiversity Development Assessment Report (BDAR) to be undertaken by an accredited assessor to assess the impacts of the proposed development. This BDAR has been prepared by Narla Environmental Pty Ltd to identify the potential impacts of the proposed development on biodiversity values within the Subject Land. This has been completed in accordance with the BAM.

The proposed development is located in a highly urbanised area that contains minimal biodiversity. The removal of vegetation will not impact on habitat for threatened species in the wider area. The proposed development is expected to result in impacts to one (1) Plant Community Type (PCT), with the planned removal of 0.24ha of PCT 1776 – Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast. This vegetation was of considerably poor structure and composition, and contained minimal floristic diversity.

A biodiversity assessment and credit calculation has been performed in accordance with the BAM (OEH 2017a). No biodiversity offset credits will be required as a result of the proposed development.

A suite of mitigation and management measures have been proposed in order to avoid and minimise potential impacts of the proposed development on local biodiversity values, including assigning a Project Ecologist to be present during the clearing of all vegetation in relation to the proposed development.

Considering the location of the proposed development in a highly urbanised and degraded area, there are unlikely to be any notable indirect impacts on biodiversity values arising from the proposed development.

References

Atlas of Living Australia (ALA) (2019) Atlas of Living Australia. Spatial Portal http://spatial.ala.org.au/

Australian Government Bureau of Meteorology (BOM) (2019) Groundwater Dependent Ecosystems Atlas http://www.bom.gov.au/water/groundwater/gde/map.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

Chapman and Murphy (1989) Soil Landscapes of the Sydney 1:100 000 Sheet. Soil. Conservation Service of NSW, Sydney

Department for Land and Water Conservation (DLWC) (2002). The NSW State Groundwater Dependent Ecosystem policy: A component policy of the NSW State Groundwater Policy Framework Document. NSW Department for Land and Water Conservation.

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 Primary Industries (DPI) (2019) Priority Weeds for Greater Sydney, NSW Weeds Wise https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3

Department of the Environment and Energy (DEE) (2019) Protected Matters Search Tool http://www.environment.gov.au/epbc/protect/index.html

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

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)

NSW State Environmental Planning Policy (Coastal Management) (2018) https://www.legislation.nsw.gov.au/#/view/EPI/2018/106

NSW State Environmental Planning Policy No 19—Bushland in Urban Areas (2018) https://www.legislation.nsw.gov.au/#/view/EPI/1986/014

NSW State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44) (2016) https://www.legislation.nsw.gov.au/#/view/EPI/1995/5/full

Eco Logical (2016) NSW (Mitchell) Landscapes - version 3.1

Office of Environment and Heritage (OEH) (2016) The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0. NSW Office of Environment and Heritage, Sydney - Version 3.1 VIS_ID 4489

Office of Environment and Heritage (OEH) (2017a) Biodiversity Assessment Methodology http://www.environment.nsw.gov.au/resources/bcact/biodiversity-assessment-method-170206.pdf

Office of Environment and Heritage (OEH) (2017b) Biodiversity Assessment Method (BAM) Calculator

Office of Environment and Heritage (OEH) (2018) Biodiversity Assessment Method Operation Manual – Stage 1

Office of Environment and Heritage (OEH) (2019a) BioNet Vegetation Classification System https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx

Office of Environment and Heritage (OEH) (2019b) eSPADE v2.0 https://www.environment.nsw.gov.au/eSpade2Webapp#

Office of Environment and Heritage (OEH) (2019c) NSW BioNet. The website of the Atlas of NSW Wildlife http://www.bionet.nsw.gov.au/

Office of Environment and Heritage (OEH) (2019d) NSW BioNet. Threatened Biodiversity Data Collection

Six Maps (2019). Six Maps Spatial Viewer. https://maps.six.nsw.gov.au/

Appendices

Appendix A - Flora recorded within the Subject Land
Appendix B – Fauna recorded during survey of Subject Land
Appendix C – BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet)
Appendix D – Site Photos
Appendix E – BAMC Generated Biodiversity Credit Report

Appendix A. Flora recorded within the Subject Land.

Scientific Name	Exotic	Canopy	Midstory	Groundcover	Status
Archontophoenix cunninghamiana		X		X	
Cenchrus setaceus	X			X	
Clivia miniata	X			X	
Dimorphotheca ecklonis	X			X	
Ehrharta erecta	X			X	HTE
Lomandra longifolia				X	
Lyriope spp.	X			X	
Phoenix Canariensis	X	X			HTE
Plantanus x Acerifolia	X	X			
Strelizia spp.	X			X	
Syzygium spp.			X	X	
Trachelospermum asiaticum	X			X	
Waterhousea floribunda		X			

Appendix B. Fauna recorded during survey of Subject Land.

Class	Scientific Name	Common Name	Status
Aves	*Acridotheres tristis*	Common Myna	Introduced
	Columba livia	Rock Dove	Introduced
	Corvus coronoides	Australian Raven	Protected – BC Act
	Strepera graculina	Pied Currawong	Protected – BC Act
	Trichoglossus moluccanus	Rainbow Lorikeet	Protected – BC Act

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

BAM Site – Field Survey Form					
Date:	22nd November 2019	**Plot ID:**	Plot 1	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20 x 40m	**Easting:**	334124.3 E
Datum:	GDA94	**Middle bearing from 0m:**	280°	**Northing:**	6205766.7 S
PCT:	PCT 1776 – Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast				

Growth Form	Scientific Name	Cover	Abundance
Shrub SG)	*Syzygium* spp.	3	7
N/A	*Trachelospermum asiaticum*	6	
N/A	*Plantanus* x *acerifolia*	5	1
N/A	*Lyriope* spp	0.1	1
N/A	*Clivia miniata*	2	15
Other (GG)	*Archontophoenix cunninghamiana*	2	6
Tree (TG)	*Waterhousea floribunda*	5	6
N/A	*Dimorphotheca ecklonis*	0.1	2
N/A	*Osteospermum* spp	0.1	2

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	0
30-49cm	1	0
20-29cm	3	0
10-19cm	2	0
5-9cm	0	0
<5cm	16	0
Length of Logs (m)	0	

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	100
2 (15m)	0
3 (25m)	0
4 (35m)	0
5 (45m)	0

BAM Site – Field Survey Form		
Average	20	
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	1	5
Shrub	1	3
Grass	0	0
Forb	0	0
Fern	0	0
Other	1	2
Hight Threat Exotics	0	0

Appendix D. Site Photos.

Plate 1. Large *Waterhousea floribunda* that was historically planted in a garden bed.

Plate 2. Example of the vegetation within the Subject Land. Manicured shrubs and young palms over exotic ground cover.

Plate 3. A second garden bed with the same vegetation composition.

Plate 4. The majority of the Subject Land was paved surfaces surrounded by classrooms.

Appendix E. BAMC Generated Biodiversity Credit Report.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018621/BAAS21006/19/00018622	Marist College Redevelopment - North Shore Precinct	10/06/2021
Assessor Name	Assessor Number	BAM Data version *
Jack Tatler	BAAS21006	45
Proponent Names	Report Created	BAM Case Status
Brodie McHutchison	01/11/2021	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Major Projects	01/11/2021

* 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
Nil		

Species
Nil

Additional Information for Approval

PCTs With Customized Benchmarks

BAM Biodiversity Credit Report (Like for like)

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
1776-Coastal enriched sandstone dry forest	Not a TEC	0.2	0	0	0

1776-Coastal enriched sandstone dry forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1138, 1253, 1625, 1636, 1638, 1776, 1778, 1782, 1786	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	1776_1	No	0	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

NARLA

environmental

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NSW 2101

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