Moriah College

Biodiversity Development Assessment Report

Aver

21 February 2020

Final

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Report No. 19139RP1

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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v1	5 December 2019	JL, TM	Draft
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v3	21 February 2020	JL, VO	Final v3

Approved by:	Dr David Robertson
Position:	Director
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Date:	21 February, 2020

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Glossary

BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BVM	Biodiversity Values Map
CEEC	Critically Endangered Ecological Community
Development site	Area within the subject land subject to the BAM assessment
DoEE	Department of the Environment and Energy
DPIE	Department of Planning, Industry and Environment
EES	Environment, Energy and Science Group
EP&A Act	Environmental Planning and Assessment Act 1979
GIS	Geographic Information Systems
GPS	Global Positioning System
Ha	Hectares
LEP	Local Environment Plan
LGA	Local Government Area
PCT	Plant Community Type
PMST	Protected Matters Search Tool
SAII	Serious and Irreversible Impact
SSD	State Significant Development
Subject land	Lot 1 DP701512, Lot 23 DP879582, Lot 22 DP879582 and Lot 3 DP701512
TEC	Threatened Ecological Community
The proponent	Moriah War Memorial College Association

1. Introduction

Cumberland Ecology was commissioned by Aver to provide formal biodiversity assessments utilising the Biodiversity Assessment Method (BAM) to support the proposed infill State Significant Development (SSD) application for Moriah College Queens Park Campus (hereafter referred to as the 'project'). This assessment considers the entire land area covered by the campus (Lot 22 DP 879582, Lot 1 DP 701512, Lot 3 DP 701512), hereafter referred to as the 'subject land' with particular reference to the areas to be impacted by the project.

1.1. Requirement for BDAR

The project is classified as a Stage Significant Development under Clause 15 of Schedule 1 of State Environmental Planning Policy (State and Regional Development) 2011, as the Capital Investment Value (CIV) exceeds $20 million for the purpose of alterations or additions to an existing school.

Section 7.9 of the NSW *Biodiversity Conservation Act 2016* (BC Act), requires all development applications for State Significant Development (SSD) to be accompanied by a Biodiversity Development Assessment Report (BDAR) unless both the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values.

The main steps in the biodiversity assessment process for SSD are as follows:

1. The Planning Agency Head and the Environment Agency Head determines if the Biodiversity Offsets Scheme (BOS) applies to the SSD and specifies the environmental assessment requirements;
2. The proponent engages an accredited person to assess the development site using the BAM and a BDAR is prepared;
3. The approval authority considers any serious and irreversible impacts (SAII) and determines whether there are additional and appropriate measures required to minimise impacts;
4. The approval authority sets an offset obligation as part of the Conditions of Approval; and
5. The proponent meets their offset obligation and begins their development.

The Biodiversity Assessment Method (BAM) sets out clear and repeatable methods to conduct assessment of direct and indirect impacts. The BAM is supported by the BAM Calculator, which is a web-based tool that quantifies direct impacts using 'biodiversity credits'. Two types of credits are generated by the BAM Calculator, ecosystem credits and species credits. Ecosystem credits are calculated based on variables including landscape features, native vegetation and ecosystem credit species (species that are reliably predicted by habitat surrogates). Species credits are calculated based on the number of individuals (flora) or the area of habitat (fauna) of species credit species (species that are not reliably predicted by habitat surrogates).

The BAM includes a requirement to prepare a BDAR for the development site. The BDAR must be prepared by an accredited assessor. A proponent is required to submit the BDAR as part of an Environmental Impact Statement for a SSD.

On 15 July 2019, the Secretary's Environmental Assessment Requirements (SEARs) (SSD 10352) for the project were received from the NSW Department of Planning, Industry and Environment (DPIE).

The SEARs required the biodiversity impacts to be assessed in accordance with the Biodiversity Assessment Method ('BAM'; OEH 2017) and documented in a Biodiversity Development Assessment Report (BDAR). Biodiversity assessment required for an SSD is described in Section 7.9 of the BC Act. Clause 2 of Section 7.9 indicates that an application for development consent for an SSD:

"…is to be accompanied by a biodiversity development assessment report [BDAR] unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values".

This BDAR has been prepared to provide information for the Planning Agency Head and the Environment Agency Head to assist them in determining whether the development is likely to have any significant impact on biodiversity values.

1.2. Purpose

The purpose of this BDAR is to document the findings of an assessment undertaken for the Project in accordance with Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM. Specifically, the objectives of this BDAR are to:

- Identify the landscape features and site context (native vegetation cover) within the subject land and assessment area;
- Assess native vegetation extent, plant community types (PCTs), threatened ecological communities (TECs) and vegetation integrity (site condition) within the subject land;
- Assess habitat suitability for threatened species that can be predicted by habitat surrogates (ecosystem credits) and for threatened species that cannot be predicted by habitat surrogates (species credit species);
- Identify potential prescribed biodiversity impacts on threatened species;
- Describe measures to avoid and minimise impacts on biodiversity values and prescribed biodiversity impacts during project planning;
- Describe impacts to biodiversity values and prescribed biodiversity impacts and the measures to mitigate and manage such impacts;
- Identify the thresholds for the assessment and offsetting of impacts, including:
    - Impact assessment of potential entities of serious and irreversible impacts (SAII);
    - Impacts for which an offset is required;
    - Impacts for which no further assessment is required;
- Describe the application of the no net loss standard, including the calculation of the offset requirement.

1.3. Project Description

1.3.1. Location

The subject land is wholly located within the Waverley Local Government Area (LGA); approximately 5 km from the Sydney CBD. The subject land is located adjacent to Centennial Park which is across York Road to the west. and is bound to the west and south by York Road, to the north by Queens Park Road and east by Queens Park.

A site map is presented in **Figure 1** and a location map is presented in **Figure 2**.

1.3.2. Project Overview

Below is a description of the proposed development and is shown on **Figure 2**.

1.3.2.1. Stage 1

Stage 1 of the Project involves the construction of a new STEAM (Science, Technology, Engineering, Art and Maths) building and includes new teaching rooms for technology and applied sciences (TAS), food technology, science and art. The uses will be contained in a 4-storey building plus basement and will be facilitated by the demolition of Buildings and A and B and the reconfiguration of adjacent landscaping vegetation.

1.3.2.2. Stage 2

Stage 2 of the Project involves the construction of a new three storey building containing early learning centre, flexible teaching spaces and school administration offices. Buildings C and D and adjacent vegetation are to be demolished to enable the construction. Additional at grade and basement parking will be included in Stage 2.

1.3.3. Identification of the Development Site Footprint

The layout of the project is shown in **Figure 3**. The development site footprint comprises the area of land directly impacted by the project and is referred to within this BDAR as the subject land as shown in **Figure 1**. For the purposes of this assessment, the development site footprint comprises both the construction footprint and the operational footprint of the project.

1.3.4. General Description of the Development Site

Moriah College is an independent Jewish School established in 1943. The school has operated from the Queens Park campus since 1994 and currently accommodates students across Preschool, Primary and High School educational levels. The Moriah College campus is bound by Queens Park Road to the north, Baronga Avenue to the east, and York Road to the south and west. Moriah College Queens Park Campus includes the following addresses (See **Figure 1**):

- 101 York Road, Queens Park/Lot 22 DP 879582 - approximate area of 4,830m^2. The lot contains the ELC buildings and car parking.
- 1 Queens Park Road, Queens Park/Lot 1 DP 701512 - approximate area of 1.45 hectares. The lot comprises the junior school campus

- 3 Queens Park Road, Queens Park/Lot 3 DP 701512 - approximate area of 2.6 hectares. The lot comprises the senior school campus.

Additionally, a conservation area is located adjacent to the subject land. This area contains an intact stand of Eastern Suburbs Banksia Scrub that will not be directly impacted by the project.

1.4. Information Sources

1.4.1. Databases

Databases were searched during the preparation of this BDAR, including:

- Environment, Energy and Science (EES) BioNet Atlas;
- EES Threatened Biodiversity Data Collection;
- EES BioNet Vegetation Classification database;
- Commonwealth Department of the Environment and Energy (DoEE) Species Profile and Threat Database;
- DoEE Protected Matters Search Tool (PMST); and
- DoEE Directory of Important Wetlands in Australia.

1.4.2. Literature

This BDAR has utilised the results and/or spatial data from the following sources:

- The Native Vegetation of the Sydney Metropolitan Area (OEH 2016a);
- Waverley Local Environmental Plan 2012 (Waverley Council 2012b); and
- Waverley Development Control Plan 2012 (Waverley Council 2012a).

1.4.3. Aerial Photography

The aerial imagery utilised in this BDAR is sourced from NearMap and is dated 1 July 2019. Additional aerial images available on NearMap and SixMaps were also consulted.

1.5. Authorship and Personnel

This document has been prepared by Dr David Robertson (BAM Accredited Assessor No: 17027). This document, and associated field surveys and Geographic Information Systems (GIS) mapping, was prepared with the assistance of additional personnel as outlined in **Table 3**. Notwithstanding the assistance of the additional personnel, the assessment presented within this document is David's.

Table 1. Personnel

Name	Tasks	Relevant Qualifications / Training	BAM Accredited Assessor No.
Dr David Robertson	Document preparation, document review	Doctor of Philosophy. Ecology, University of Melbourne, 1986 Bachelor of Science (Honours) in Ecology, University of Melbourne, 1980 BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS17027
Jesse Luscombe	GIS mapping, credit calculations, field surveys, report preparation	Bachelor of Marine Science. Macquarie University, 2013 Certificate III in Conservation and Land Management. TAFE NSW, 2016 BAM Accredited Assessor Training. Muddy Boots, 2018	-
Bryan Furchert	Field surveys	Bachelor of Biodiversity and Conservation. Macquarie University, 2012 Diploma of Conservation and Land Management. TAFE NSW, 2008 BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS18095
Rohan Mellick	Field Surveys	CSIRO Postdoctoral Research Fellowship (2014 – 2017) Doctor of Philosophy, Evolutionary Ecology, University of Adelaide, 2013. Bachelor of Applied Science (Hons), Eucalypt Forestry, Southern Cross University, 2000 Bachelor of Applied Science Natural Resource Management, Southern Cross University, 1999.	BAAS18075
Dr Trevor Meers	Document Review	Doctor of Philosophy, Restoration Ecology. University of Melbourne, 2007 Bachelor of Applied Science (Honours) in Natural Resource Management. Deakin University, 2002 BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS18119
Michael Davis	GIS mapping	Bachelor of Biodiversity and Conservation. Macquarie University, 2016 BAM Accredited Assessor Training. Muddy Boots, 2017	-
Cecilia Erikkson Pinatacan	Field Surveys	Master of Science (Major in Marine Science and Management). University of Technology Sydney, 2013 Bachelor of Science (Honours) in Marine Biology, University of Technology Sydney, 2008	BAAS19052

2. Methodology

2.1. Literature Review

A review of relevant ecological literature was undertaken as part of this BDAR to evaluate the biodiversity values associated with the subject land and included online documentation publicly available as well as previous reports produced for the subject land. In recent years, the biodiversity of the subject land has been assessed for previous development applications and management plans.

2.2. Landscape Features

Landscape features requiring consideration were initially determined via desktop assessment. Field surveys undertaken on 25 July 2019 and 27 November 2019 sought to verify the following landscape features:

- Rivers, streams and estuaries;
- Important and local wetlands;
- Karsts, caves, crevices, cliffs and areas of geological significance; and
- NSW BioNet Landscapes.

No amendments were required to be made to mapping of any of these landscape features following field surveys.

2.3. Native Vegetation Survey

2.3.1. Vegetation Mapping

Previous broad-scale mapping of the Sydney Metropolitan Area by the Office of Environment and Heritage (OEH 2016a) was accessed prior to the survey in order to determine vegetation communities that could occur within the subject land. The vegetation within the subject land was ground-truthed by Cumberland Ecology on 25 July 2019 and 27 November 2019. Where vegetation community boundaries were found to differ from the existing mapping, records were made of new boundaries using a hand-held Global Positioning System (GPS) and mark-up of aerial photographs. The data collected was analysed and the resultant information was synthesised using Geographic Information Systems (GIS) to produce a vegetation map of the subject land.

2.3.2. Vegetation Integrity Assessment

Plot-based floristic surveys were undertaken within the subject land. The survey was conducted in accordance with the BAM and included establishment of flora plots using the BAM within which the following data was collected:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within the standard 20 x 20 m plot or a modified 10 x 40 m plot where the standard plot size could not be accommodated;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 x 20m plot or a modified 10 x 40 m plot where the standard plot size could not be accommodated;

- Cover of 'High Threat Exotic' weed species;
- Assessment of function attributes within a 20 x 50 m plot or a modified 10 x 100 m plot where the standard plot size could not be accommodated, including:
    - Count of number of large trees;
    - Tree stem size classes, measured as 'diameter at breast height over bark' (DBH);
    - Regeneration based on the presence of living trees with steams <5 cm DBH;
    - The total length in metres of fallen logs over 10 cm in diameter;
- Assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 x 50 m plot or a modified 10 x 40 m plot where the standard plot size could not be accommodated; and
- Number of trees with hollows that are visible from the ground within the 20 x 50 m plot or a modified 10 x 40 m plot where the standard plot size could not be accommodated.

All vascular plants recorded or collected were identified using keys and nomenclature provided in PlantNET (Botanic Gardens Trust 2018)

A total of three BAM plots were undertaken within the subject land, and their locations are shown in **Figure 4**. It should be noted that the second plot (Q2) was modified as the standard size plot (20 x 20 m and 20 x 50 m) could not be accommodated due to the small area of vegetation. BAM plots were undertaken within the subject land on 25 July 2019 and 27 November 2019 and included plots within vegetation that is outside of the development site and not requiring assessment or credit calculations for direct impacts. **Table 2** summarises the plot requirements based on the area and number of vegetation zones in the development site as well as the plot that falls outside of the development site. As shown in this table, the minimum number of plots has been completed for the vegetation zones. The location of plots sought to capture the environmental variation of the PCTs identified within the subject land (see ***Section 4.2*** for detail on how PCTs were determined). However, it is noted that due to the small area of the vegetation within the subject land, the options for the location of plots was limited.

Table 2. Required number of plots each vegetation zone within the development site

Vegetation Zone	PCT	Condition	Area (ha)	Minimum Number of Plots Required	Number of Plots Completed
1	1778	Planted	0.09	1	2
2	1061	Good	Outside development site	0	1

2.4. Threatened Flora Species Survey

2.4.1. Habitat Constraints

Desktop assessments and field surveys within the subject land included assessment of habitat constraints and microhabitats for predicted species credit flora species.

2.4.2. Targeted Species Survey

Targeted threatened flora surveys were undertaken for species credit species that have the potential to occur within the development site as determined by the BAM Calculator (BAMC). As part of this assessment, all species within the BAMC determined to contain potential habitat within the development site were surveyed. All targeted surveys were conducted using field traverses in accordance with the NSW Guide to Surveying Threatened Plants (OEH 2016b).

Table 3 provides a summary of the flora species credit species surveyed for within the subject land.

Table 3. Threatened flora survey dates and methods

Scientific Name	Common Name	Recommended Survey Period	Dates of Survey within Subject Land	Survey Method
Melaleuca biconvexa	Biconvex Paperbark	All year	25 July 2019 and 27 November 2019	Random meander

2.4.2.1. Random Meander

Random meander surveys and plot surveys were undertaken within the subject land on 25 July 2019 and 27 November 2019. Due to the small area of potential habitat within the subject land, a random meander was deemed appropriate for the survey, and was supplemented with the required plot survey. The random meander surveys and plot surveys were undertaken by a botanist and ecologist. The locations of the random meanders and plots within the subject land are shown in **Figure 4**.

2.5. Threatened Fauna Species Survey

2.5.1. Habitat Constraints

Desktop assessments and field surveys within the subject land included assessment of habitat constraints and microhabitats for predicted species credit fauna species. This included desktop assessment of proximity of the subject land to features such as caves and waterways and field inspection of microhabitats including leaf litter, stick nests, hollowing-bearing trees and human-made structures.

2.5.2. Threatened Fauna Species Survey

Following the assessment of habitat constraints within the subject land, it was determined that the habitat that is proposed for removal is sufficiently degraded such that it is not suitable habitat for candidate species credit species listed by the BAM calculator. Further discussion on the assessment of threatened species habitat is presented in **Chapter 5**.

2.5.3. Survey Weather Conditions

All weather condition data was sourced from the Bureau of Meteorology from the weather station located at Observatory Hill (Station No. 066062). The details of the weather for the survey dates are provided below:

Survey Detail	Date	Effort	Personnel	Weather Conditions
Vegetation Integrity Assessment	25 July 2019 27 November 2019	24 Person hours	Jesse Luscombe Rohan Mellick Bryan Furchert Cecilia Erikkson Pinatacan John Foster	8.0ºC – 20.3ºC, and 0.6 mm of rainfall, 14.8ºC - 28.5ºC and 0.0 mm of rainfall
Vegetation Mapping	25 July 2019 27 November 2019	24 Person hours	Jesse Luscombe Rohan Mellick Bryan Furchert Cecilia Erikkson Pinatacan John Foster	8.0ºC – 20.3ºC, and 0.6 mm of rainfall, 14.8ºC - 28.5ºC and 0.0 mm of rainfall
Threatened Flora Searches	25 July 2019 27 November 2019	24 Person hours	Jesse Luscombe Rohan Mellick Bryan Furchert Cecilia Erikkson Pinatacan John Foster	8.0ºC – 20.3ºC, and 0.6 mm of rainfall, 14.8ºC - 28.5ºC and 0.0 mm of rainfall
Habitat Assessment	25 July 2019 27 November 2019 11 February 2020	30 Person hours	Jesse Luscombe Rohan Mellick Bryan Furchert Cecilia Erikkson Pinatacan John Foster Mikael Peck	8.0ºC – 20.3ºC, and 0.6 mm of rainfall, 14.8ºC - 28.5ºC and 0.0 mm of rainfall, 21.1ºC - 30.6ºC and 0.1 mm of rainfall

3. Landscape Features

3.1. Assessment Area

As the project is being assessed as a non-linear project, the assessment area comprises the area of land within a 1,500 m buffer around the outer boundary of the development site. The location of the assessment area is shown in **Figure 2**.

3.2. Landscape Features

Landscape features identified within the development site and assessment area are outlined below. The extent of these features within the development site is shown in **Figure 1** and the extent within the assessment area is shown in **Figure 2**.

3.2.1. IBRA Bioregions and IBRA Subregions

The development site and assessment area are located within the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and within the Pittwater IBRA Subregion.

3.2.2. Rivers, Streams and Estuaries

The development site and assessment area are located within the Parramatta River catchment. No mapped watercourses are present within the development site and there are only two watercourses mapped within the assessment area. Due to the extensive development of the assessment area, the vast majority of natural watercourses are highly modified and possibly piped.

3.2.3. Important and Local Wetlands

No important wetlands listed in the Directory of Important Wetlands in Australia are present in the development site (DotE 2014). The closest important wetlands identified by the Directory of Important Wetlands in Australia are the Lachlan Swamps located approximately 4 km to the south of the development site, within the Botany Wetlands. The closest important wetland identified in the Coastal Management SEPP wetland forms part of Centennial Park and located approximately 350 m west of the development site. Local wetlands are scattered throughout the assessment area (**Figure 1**), including wetlands within Centennial Park to the west. These local wetlands are located within 150 m of the development site at the closest point.

3.2.4. Habitat Connectivity

The development site is located in a developed urban environment which is currently used for educational purposes with pre- to high-school on the campus. The vegetation within the development site is connected to the parklands of Centennial Park, however, does not connect to any National Parks or other large native vegetation patches. The vegetation within the development site exists in a matrix of remnant and planted native, and exotic species in an otherwise cleared and highly modified area.

Some connectivity is present in the form of riparian corridors to the west of the development site with local wetlands that extend throughout the assessment area.

3.2.5. Karsts, Caves, Crevices, Cliffs and Area of Geological Significance

No karsts, caves, crevices, cliffs or areas of geological significance have been identified within the assessment area based on searches of available aerial imagery from Near Maps.

3.2.6. Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value have been mapped within the assessment area.

3.2.7. BioNet NSW Landscapes

The development site is located in the "Sydney – Newcastle Barriers and Beaches" BioNet NSW Landscape.

3.2.8. Soil Hazard Features

No soil hazard features have been identified within the development site based on the hydrological landscape and soil capability mapping in OEH's eSPADE and Acid Sulfate Soils Risk Mapping, due to its occurrence on a disturbed terrain soil landscape (OEH 2019b).

3.2.9. Native Vegetation Cover

The native vegetation cover was determined through the use of GIS. To map native vegetation cover within the development site and assessment area, this assessment utilised the detailed vegetation mapping prepared by Cumberland Ecology in conjunction with broad scale mapping by the OEH Vegetation Mapping of the Sydney Metropolitan Area (OEH 2016b). The assessment area is approximately 804.98 ha, of which approximately 122.36 ha comprises native vegetation cover, which represents 15.2% of the assessment area. Therefore, the native vegetation cover value has been assigned to the cover class of 10-30%.

4. Native Vegetation

4.1. Native Vegetation Extent

The subject land and development site have been subject to detailed surveys by Cumberland Ecology for the purpose of this BDAR. The native vegetation extent within the subject land was determined through aerial photograph interpretation and field surveys. The native vegetation of the subject land occupies approximately 1.70 ha, which represents approximately 30% of the subject land. The majority of the native vegetation within the subject land is within the conservation area on the south west corner of the subject land. This area is not proposed to be directly impacted by the project. The remaining native vegetation is represented by the Urban Native/Exotic Vegetation. For the purposes of this BDAR, this vegetation was labelled as 'native' however, much was planted exotic species.

The native vegetation extent within the development site is comprised of Urban Native/Exotic Vegetation represented by one best-fit PCT in one broad condition state. This vegetation is planted and is not all proposed for removal. More detail on the extent of vegetation removal is provided in **Section 4.2.1** below.

4.2. Plant Community Types

4.2.1. Introduction

Identification of the PCTs occurring within the subject land was guided by the results of the Cumberland Ecology surveys. The data collected during surveys of the subject land was analysed in conjunction with a review of the PCTs held within the BioNet Vegetation Classification Database (OEH 2019a).

Aside from the conservation area in the south west corner, the native vegetation within the subject land is entirely of planted origin, often comprising monospecific stands of trees and a large portion of non-endemic species, and as a result is not considered to comprise a naturally occurring PCT. Nevertheless, recent advice provided from DPIE regarding how to assess native vegetation that is not generally considered to conform to a vegetation community, is to still nominate a PCT based on the native species present and surrounding naturally occurring PCTs. Therefore, for the purpose of this BDAR, the use of what is considered to be the best-fit PCT has been applied, as explained further in subsequent sections.

Consideration was given to the following:

- Occurrence within the Cumberland IBRA subregion;
- Vegetation formation;
- Alignment with TECs;
- Landscape position; and
- Upper, mid and ground strata species.

Table 4 provides a summary of the PCTs identified within the subject land. The distribution of these PCTs within the subject land is shown in **Figure 6**. Detailed descriptions of each PCTs and the justification for PCT selection is provided in the sections below.

Table 4. Plant Community Types within the subject land and development site

PCT	Common Name	Development Site (ha)	Subject land (ha)	Proposed Removal (ha)
1778	Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	0.33	0.51	0.09
1061	Old-man Banksia - she-oak - Red Bloodwood heathland on coastal sands, southern Sydney Basin Bioregion	0.00	1.19	0.00

4.2.2. Plant Community Types within the Subject Land

4.2.2.1. Urban Native/Exotic Vegetation – Degraded Condition;

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

BC Act Status: Not Listed

EPBC Act Status: Not Listed

The Urban Native/Exotic vegetation within the subject land is comprised of garden beds and rows of trees of primarily planted origin. Common native canopy tree species planted throughout the areas mapped as Urban Native/Exotic vegetation include *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus scoparia* (Wallangara White Gum), *Ficus rubiginosa* (Port Jackson Fig), *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Melia azedarach* (White Cedar), and *Tristaniopsis laurina* (Water Gum). Native shrubs and small trees present throughout this area of vegetation include *Acacia longifolia* (Golden Wattle), *Acacia suaveolens* (Sweet Wattle), *Banksia ericifolia* (Heath-leaved Banksia), *Pittosporum undulatum* (Sweet Pittosporum) and *Westringia fruticosa* (Coastal Rosemary). Native groundcover species present within this area of vegetation include *Cynodon dactylon* (Common Couch), *Lomandra hystrix* (Green Mat-rush) and *Lomandra longifolia* (Spiny-head Mat-rush).

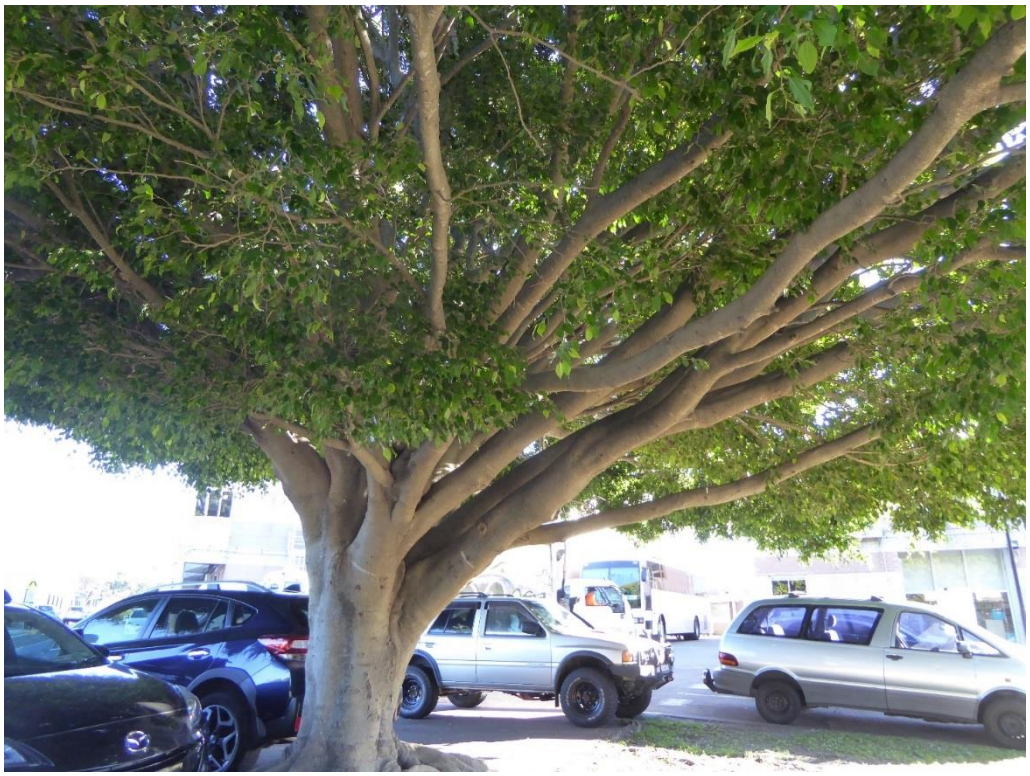
Planted exotics species feature heavily throughout these plantings with trees such as *Olea europaea* ssp. *europaea* (Common Olive), *Pinus radiata* (Monterey Pine), *Ficus benjamina* (Weeping Fig), *Fraxinus* spp. (Ash), *Jacaranda mimosifolia* (Jacaranda), *Platanus x acerifolia* (London Planetree) and *Schinus mole* var. *areira* (Pepper Tree). Common exotic shrubs and shrubby weeds throughout this area of vegetation include *Murraya paniculata* (False Orange) hedges, *Rododendron* spp. (Azaleas), *Lantana camara* (Lantana) and *Cestrum parqui* (Green Cestrum). Common ground layer planted exotic species and weeds include *Agapanthus praecox* subsp. o*rientalis* (Agapanthus), *Asparagus aethiopicus* (Asparagus Fern), *Bidens pilosa* (Cobbler's Pegs), *Buxus microphylla* (Japanese Boxwood), *Conyza sumatriensis* (Tall Fleabane), *Ehrharta erecta* (Panic Veldtgrass), *Lolium perenne* (Perennial Ryegrass), *Ophiopogon japonicus* (Dwarf Lilyturf), *Lysimachia arvensis* (Scarlet Pimpernel), *Poa annua* (Winter Grass), *Acetosa sagittata* (Turkey Rhubarb) and *Romulea rosea* (Onion Weed). Representative photographs of planted exotic species are provided as **Photograph 1** and **Photograph 2** below.

The vegetation is likely to originally have been Eastern Suburbs Banksia Scrub (ESBS) prior to clearing. The remnant *Leptospermum laevigatum* (Coast Teatree) individuals have been retained during the original construction of the retaining wall. Since then the area has become infested with exotics. The lack of fire and weed control accounts for the degraded condition of this patch of vegetation and it currently does not conform to the ESBS EEC.

Justification of PCT Selection

PCTs were initially filtered using BioNet Vegetation Classification System with search criteria including IBRA Region Sydney Basin, vegetation formation Dry Sclerophyll Forest (Shrubby Sub-formation), and locally occurring PCTs within the assessment area. The resulting list was narrowed down based on landform and geology. PCT 1778 was determined to be the best fit based on the presence of sandstone soils recorded during the flora surveys.

Photograph 1. Large *Ficus benjamina* (Weeping Fig) within the Urban Native/Exotic Vegetation



Photograph 2. *Pinus radiata* (Monterey Pine) within the Urban Native/Exotic Vegetation

4.2.3. Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion

NSW Plant Community Type: 1061 – Old-man Banksia, She-oak, Red Bloodwood Heathland on Coastal Sands

BC Act Status: Critically Endangered

EPBC Act Status: Endangered

Old-man Banksia, She-oak, Red Bloodwood Heathland on Coastal Sands is an open to dense shrubland community found on large, deep Pleistocene sand dunes along the New South Wales coast. This plant community type in the Botany and Woollahra area is included as a component of Eastern Suburbs Banksia Scrub (ESBS) and has been listed as an Endangered Ecological Community (EEC) under both the NSW *Biodiversity Conservation Act* 2016 (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A patch of moderate condition ESBS, covering approximately 1.19 ha, is found in the south west of the subject land. The area is entirely fenced and separated from the school land and is maintained in a natural state with no construction or infrastructure, and, with current bush regeneration and weed removal evident. The canopy is represented by small trees (3-4m) and the dominant species observed were *Leptospermum laevigatum* (Coast Teatree) and *Acacia longifolia* subsp. *sophorae* (Coastal Wattle). Common species within the shrub stratum (1-2m) include *Acacia suaveolens* (Sweet Wattle), *Acacia ulicifolia* (Prickly Moses), *Monotoca elliptica* (Tree Broom-heath), *Kunzea ambigua* (Tickbush) and *Bossiaea heterophylla* (Variable Bossiaea). Less frequent shrub species recorded include *Astroloma pinifolium* (Pine Heath), *Xanthosia pilosa* (Woolly Xanthosia) and *Persoonia*

lanceolata (Lance Leaf Geebung). The ground cover (<1m) was sparse but was dominated by grasses,mat-rushes and flax-lillies. The common species recorded included *Lomandra longifolia* (Spiny-headed mat-rush), *Dianella caerulea* subsp. *producta* (Blue Flax-Lilly), *D. revoluta* (Blue Flax-Lilly), *Dichelachne crinite* (Longhair Plumegrass) and *Austrostipa pubescens*.

The lack of fire and isolation from similar vegetation accounts for the limited diversity and moderate condition of this patch of vegetation. The main structural features of this community are shown in **Photograph 3.**

Justification of PCT Selection

PCTs were initially filtered using BioNet Vegetation Classification System with search criteria including IBRA Region Sydney Basin, vegetation formation Heathlands, and the key mid-story species *Acacia suaveolens*. The resulting list was narrowed down based on landform, geology and soil, and additional lower stratum species. PCT 1061 was determined to be the best fit based on the number of key indicator species present recorded within the BAM plot surveys. PCT 664 was considered but not selected as it is noted that this PCT occurs on coastal headlands rather than the relatively more inland location of the subject land.

Photograph 3. Structure of the Eastern Suburbs Banksia Scrub within the subject land

4.3. Threatened Ecological Communities

One PCT identified within the subject land has been assessed as being associated with a TEC. This has been determined using a number of key indicator species and geographic location compared with the final determination for threatened ecological communities (NSW Scientific Commitee 2017). **Table 5** summarises the TECs identified within the subject land and their distribution is shown in **Figure 7**.

Table 5. Threatened Ecological Communities within the subject land

TEC Name	BC Act Status	Associated PCT	Area Within Subject Land (ha)
Eastern Suburbs Banksia Scrub	CEEC	1061	1.19

4.4. Vegetation Integrity Assessment

The native vegetation identified within the subject land was assigned to a vegetation zone based on PCTs and broad condition state. Patch sizes were subsequently assigned for the vegetation zone. The extent of vegetation zone and patch size classes within the development site are shown in **Figure 8**.

The vegetation zone was assessed using survey plots/transects (see ***Section 2.3.2***) to determine the vegetation integrity score. Plot/transect utilised within the BAM Calculator (BAMC) to determine the vegetation integrity score is provided in **Appendix A**. Field data sheets are provided separately to this document.

The vegetation zone, patch size and vegetation integrity score for the development site are summarised in **Table 6**.

Table 6. Vegetation zones within the subject land

Vegetation Zone	PCT#	PCT Name	Condition Name	Area to be Removed (ha)	Patch Size Class	Vegetation Integrity Score
1	1778	Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	Planted	0.09	>101 ha	15.0

5. Threatened Species

5.1. Identifying Threatened Species for Assessment

The BAM Calculator generates a list of threatened species requiring assessment utilising a number of variables. The following criteria have been utilised to predict the threatened species requiring further assessment:

- IBRA subregion: Pittwater;
- Associated PCTs: 1778;
- Percent native vegetation cover in the assessment area: 15%;
- Patch size: >101 ha; and
- Credit type: Ecosystem and/or species.

Based on the above variables, the BAM Calculator generated a list of 20 ecosystem credit species and 35 species credit species. Ecosystem credit species and species credit species are assessed further in ***Section 5.2*** and ***Section 5.3***, respectively.

5.2. Ecosystem Credit Species

Table 7 lists the predicted ecosystem credit species for the vegetation zone within the development site, and whether they have been retained within the assessment following consideration of habitat constraints, geographic limitations, vagrancy and quality of microhabitats. No species were removed form the assessment.

Table 7. Ecosystem credit species requiring further assessment

Common Name	Scientific Name	Relevant PCT
Barking Owl	*Ninox connivens*	1778
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	1778
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	1778
Eastern Osprey	*Pandion cristatus*	1778
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	1778
Grey-headed Flying fox	*Pteropus poliocephalus*	1778
Koala	*Phascolarctos cinereus*	1778
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	1778
Little Bent-winged Bat	*Miniopterus australis*	1778
Little Eagle	*Hieraaetus morphnoides*	1778
Little Lorikeet	*Glossopsitta pusilla*	1778
Masked Owl	*Tyto novaehollandiae*	1778
Powerful Owl	*Ninox strenua*	1778
Regent Honeyeater	*Anthochaera phrygia*	1778
Rosenberg's Goanna	*Varanus rosenbergi*	1778
Spotted-tailed Quoll	*Dasyurus maculatus*	1778
Square-tailed Kite	*Lophoictinia isura*	1778
Swift Parrot	*Lathamus discolor*	1778
Varied Sittella	*Daphoenositta chrysoptera*	1778
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	1778

5.3. Species Credit Species

Table 8 lists the predicted species credit species for the vegetation zone within the development site, and whether they have been retained within the assessment following consideration of habitat constraints, geographic limitations, vagrancy and quality of microhabitats.

A total of two flora species and 18 fauna species have been predicted for the development. Of these, no species have been retained for further assessment due to the scarcity of habitat constraint.

5.3.1. Presence of Candidate Species Credit Species

No candidate species credit species were recorded within the subject land, and are not assessed as potentially occurring.

Table 8. Species credit species requiring further assessment

Scientific Name	Common Name	Relevant PCT	Justification for Removal
Flora			
Leptospermum deanei	*Leptospermum deanei*	1778	Subject land occurs in Waverley LGA, not in the LGAs listed by the threatened species profile.
Nielsen Park She-oak	*Allocasuarina portuensis*	1778	Only a very small number of individuals known to occur near South Head following rehabilitation efforts.
Fauna		1778	
Anthochaera phrygia	Regent Honeyeater	1778	Habitat constraint absent from the subject land – i.e. not located within mapped important habitat.
Calyptorhynchus lathami	Glossy Black-Cockatoo	1778	Habitat constraint absent from the subject land – i.e. living or dead tree with hollows greater than 15 cm diameter and greater than 5m above ground absent.
Cercartetus nanus	Eastern Pygmy-possum	1778	Microhabitats within the subject land are degraded, such that the species is unlikely to utilise the habitat. The subject land is outside of the known distribution of the species.
Chalinolobus dwyeri	Large-eared Pied Bat	1778	Habitat constraint absent from the subject land – i.e. not within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.
Haliaeetus leucogaster	White-bellied Sea-Eagle	1778	Microhabitats within the subject land are degraded, such that the species is unlikely to utilise the habitat. No nests found within the subject land during the survey period.
Hieraaetus morphnoides	Little Eagle	1778	Microhabitats within the subject land are degraded, such that the species is unlikely to utilise the habitat. No nests found within the subject land during the survey period.
Lathamus discolor	Swift Parrot	1778	Habitat constraint absent from the subject land – i.e. not located within mapped important habitat.
Lophoictinia isura	Square-tailed Kite	1778	Microhabitats within the subject land are degraded, such that the species is unlikely to utilise the habitat. The PCT in which this species is predicted comprises planted vegetation.

Miniopterus australis	Little Bent-winged Bat	1778	Habitat constraint absent from the subject land – i.e. caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding present.
Miniopterus orianae oceanensis	Large Bent-winged Bat	1778	Habitat constraint absent from the subject land – i.e. caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding present.
Myotis macropus	Southern Myotis	1778	Microhabitats within the subject land are degraded, such that the species is unlikely to utilise the habitat. The PCT in which this species is predicted comprises planted vegetation.
Ninox connivens	Barking Owl	1778	Habitat constraint absent from the subject land – i.e. living or dead trees with hollow greater than 20 cm diameter absent.
Ninox strenua	Powerful Owl	1778	Habitat constraint absent from the subject land – i.e. living or dead trees with hollow greater than 20 cm diameter absent.
Pandion cristatus	Eastern Osprey	1778	Microhabitats within the subject land are degraded, such that the species is unlikely to utilise the habitat. No nests found within the subject land during the survey period.
Phascolarctos cinereus	Koala	1778	Habitat constraint absent from the subject land – i.e. area not assessed as comprising important habitat due to absence of feed trees.
Phascolarctos cinereus	Endangered population Koala in the Pittwater Local Government Area	1778	Subject land is not within Pittwater LGA.
Pseudophryne australis	Red-crowned Toadlet	1778	Geographic limitation not relevant to the subject land – i.e. not located on the margin of the Cumberland Plain where sandstone outcrops intersect shale.
Pteropus poliocephalus	Grey-headed Flying-fox	1778	Habitat constraint absent from the subject land – i.e. breeding camps absent.
Tyto novaehollandiae	Masked Owl	1778	Habitat constraint absent from the subject land – i.e. living or dead trees with hollow greater than 20 cm diameter absent.

6. Prescribed Impacts

Prescribed impacts are identified in Clause 6.1 of the *Biodiversity Conservation Regulation 2017*. Prescribed impacts are those that are additional to the clearing of native vegetation and associated habitat. These include:

- Development on the habitat of threatened species or ecological communities associated with:
    - karst, caves, crevices, cliffs, rock outcrops and other geological features of significance;
    - human-made structures;
    - non-native vegetation;
- Development on areas connecting threatened species habitat, such as movement corridors
- Development on water quality, water bodies and hydrological processes that sustain threatened species and TECs (including from subsidence or upsidence from underground mining)
- Wind turbine strikes on protected animals
- Vehicle strikes on threatened species or on animals that are part of a TEC.

An assessment of the relevance of these prescribed impacts to the project is provided in **Table 9**.

Table 9. Relevance of prescribed impacts

Prescribed Impact	Relevance to the Project
Karst, caves, crevices, cliffs, rock outcrops and other geological features of significance	Not relevant. Features are not present within the development site.
Human-made structures	Buildings currently exist within the development site, including school classrooms and courtyard shelters that will be removed by the project. All buildings are actively used, and have been considered to comprise minimal potential habitat for threatened species. During the survey period, habitat was considered to be provided by small holes in roofline metal work and crevices created by joins in varying rooflines. These were found to be scarce within the subject land with only two examples found (shown in Appendix C - building B and C). Additionally, these marginal habitat items were found within metal rooflines; likely too hot for roosting Microchiropteran Bats during the day. These habitat items were considered as a precautionary measure due to the limited availability in the existing buildings for threatened species habitat.
Non-native vegetation	As the development design have been focused on avoiding areas of native vegetation and locating the development within areas cleared or existing of non-native/ exotic vegetation, the majority of areas of non-native vegetation will be cleared as a result of the Project. Although considered as areas of low ecological integrity, the clearing of non-native vegetation has the potential to reduce foraging habitat for some fauna species. Although the areas consisting of non-native vegetation may be utilised occasionally as foraging habitat, they are unlikely to be favoured over the adjoining reserve and wetland habitats. Hence, no significant impacts on threatened fauna species are expected from the removal of non-native vegetation within the development site.
Habitat connectivity	The development site is located on the edge of Centennial Park, which contains remnant native vegetation that largely exists as canopy trees above a highly modified (mown) understorey. The vegetation within the development site forms part of a patch of predominantly native vegetation that is greater than 101 ha in area. The development site and adjoining vegetation within the subject land somewhat forms connectivity between the vegetation Centennial Park which appears to be the largest and most intact habitat within the assessment area. The habitat provided by the subject land may provide connectivity for ecosystem credit species, such as the Grey-headed Flying-fox and microchiropteran bats.
Waterbodies, water quality and hydrological processes	Waterbodies exist nearby to the development site in the form of the ponds of Centennial Park. The ponds are largely artificial waterbodies and are not fed by naturally occurring overland or groundwater flows and are highly unlikely to be impacted by the hydrological conditions of the subject land. The construction activities associated with the project have the potential to cause impacts to water quality arising from sedimentation, potentially impacting the ponds. The creation of additional impervious surfaces in addition to the removal of vegetation may result in altered hydrological conditions continuing through to the operational phase of the project, potentially contributing to erosion, sedimentation and nutrient transport into adjacent habitat and waterbodies. These potential impacts can be managed with the implementation of an approved sedimentation and erosion control plan.

Wind turbine strikes	Not relevant. Project does not comprise a wind farm development.
Vehicle strikes	Not relevant. Although the project includes the construction and maintenance of an existing driveway, no impacts to threatened species are predicted.

7. Avoid and Minimise Impacts

7.1. Avoid and Minimise Direct and Indirect Impacts on Native Vegetation and Habitat

Due to the nature of the project and requirement to be situated within the existing extent of the current school layout, there is limited scope to readily avoid impacts on native vegetation and habitat. However, avoidance can be achieved to varying degrees by the modification of the design and location of a project. Furthermore, mitigation measures can further assist in minimising impacts to biodiversity values. The development of avoidance and mitigation measures for the Project has considered the current condition of the vegetation and habitat within the subject property. Avoidance and mitigation measures relevant to the project are detailed below.

7.1.1. Project Location

The development site has been situated within the subject land to allow for the operational requirements of the project while minimising impacts to areas containing biodiversity values. The development site has been positioned within a south-eastern portion of the subject land to avoid impacts to native vegetation where possible, including retaining the majority of trees that exist within the subject land. Direct impacts have been completely avoided throughout the 1.19 ha area of Eastern Suburbs Banksia Scrub, and the majority of the Urban Native/Exotic Vegetation within the development site.

The development is positioned over an area within the subject land containing the lowest biodiversity values, consisting predominantly of cleared land, exotic trees and some scattered native trees, including some non-endemic native species. In doing so, the project has considered the biodiversity values of the vegetation within the subject land and has demonstrated reasonable steps to avoid and minimise impacts based upon the project location within the subject land.

The Project will avoid and minimise direct impacts on clearing of native vegetation and habitat by:

- Locating the development predominantly in areas where there are lower biodiversity values such as previously cleared areas;
- Situating the development to avoid clearing of native vegetation where possible;
- Locating the development in the south-eastern section of the subject land to reduce impacts to local wetlands and adjacent native vegetation' and
- Built form designed to avoid shading to the adjacent lot comprising the Eastern Suburbs Banksia Scrub.

7.1.2. Consideration of Project Design

Measures to avoid and minimise impacts to native vegetation and habitats have been incorporated into the design of the project. This has included:

- Locating the construction facilities within the operational footprint;
- Utilising existing access roads;

- Retaining existing planted trees within areas proposed for landscaping; and
- Area of landscaping to incorporate locally indigenous species, including those conforming with the TEC of Eastern Suburbs Banksia Scrub.

7.2. Avoid and Minimise Prescribed Impacts

Measures to avoid and minimise prescribed impacts identified in **Chapter 6** are outlined below.

7.2.1. Non-native Vegetation

The location of the project and the development design have been focused on avoiding areas of native vegetation, with a specific focus on avoiding areas of TECs. As a result, most of the development site contains non-native vegetation, in the form of planted exotic vegetation which will be cleared as part of the development. Hence, impacts to the areas of non-native vegetation are not able to be avoided as part of the project

The non-native vegetation is found in different forms throughout the subject land, from garden plantings to sporadic plantings amongst the native plantings. Due to the nature of the subject land as a highly modified school which has historically been cleared, the non-native vegetation offers very limited habitat for threatened species.

Although the areas consisting of non-native vegetation may be utilised occasionally as foraging habitat, they are unlikely to be favoured over the adjoining reserve and wetland habitats.

7.2.2. Habitat Connectivity

Habitat connectivity has been identified as a prescribed impact for the project. In determining the location and design of the development, the project has sought to avoid and minimise direct impacts to habitat connectivity by:

- Retaining areas of native vegetation, including mature canopy trees;
- Maintaining connectivity with the adjoining Centennial Park, in particular to adjoining areas of Eastern Suburbs Banksia Scrub TEC;
- Maintaining existing hydrological characteristics to retained vegetation on the site and adjoining parkland; and
- Maintaining connectivity in an urban landscape through retention of trees across the subject land.

7.2.3. Water Quality, Water Bodies and Hydrological Processes

The project has demonstrated reasonable steps to avoid impacts to water quality, water bodies and hydrological processes that sustain the habitat of threatened species. The development site has been situated in the south-east portion of the subject land to avoid impacts to the adjacent ponds located adjacent to the western edge of the subject land.

8. Assessment of Impacts

8.1. Impacts on Native Vegetation and Habitat

8.1.1. Direct Impacts

The direct impact resulting from the project is the loss of vegetation and associated habitat within development site. **Table 10** identifies the proposed impacts to vegetation within the development site.

Table 10. Extent of vegetation impacts within the development site

Vegetation Zone	PCT#	PCT Name	BC Act Status	Area (ha)
1	1778	Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	Not listed	0.09

8.1.2. Change in Vegetation Integrity Score

Table 11 details the change in vegetation integrity score for the vegetation zone. The direct impacts of the project only involve one management zone, being the total clearing of vegetation within the development site.

Table 11. Change in vegetation integrity score

Vegetation Zone	PCT#	PCT Name	Current VI Score	Future VI Score	Change in VI Score
1	1778	Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	15.0	0	-15.0

8.1.3. Indirect Impacts

Table 12 outlines the indirect impacts to native vegetation and habitat. Due to the existing highly modified nature of the vegetation within the development site and the mitigation measures proposed for avoiding impacts to the Eastern Suburbs Banksia Scrub TEC within the subject land, the indirect impacts of the project are not considered to be significant.

8.1.4. Prescribed Impacts

Additionally, the project has been assessed as resulting in three prescribed impacts; non-native vegetation, habitat connectivity and hydrological processes (see **Chapter 6**). An assessment of these prescribed impacts is provided in **Table 13**.

Table 12. Indirect impacts of the project

Indirect Impact	Nature	Extent	Duration	Threatened Entities Likely Affected	Consequences
Inadvertent impacts on adjacent habitat or vegetation	Construction activities may result in inadvertent impacts on retained vegetation, such as increase sedimentation.	Retained vegetation within subject land and Centennial Park	Short term (during construction)	Eastern Suburbs Banksia Scrub	Reduced condition of the adjoining TEC.
Reduced viability of adjacent habitat due to edge effects	Modification of vegetation extent within the subject land may increase edge effects.	Retained vegetation within subject land and Centennial Park	Potential long-term	Eastern Suburbs Banksia Scrub	Reduced condition of the adjoining TEC.
Reduced viability of adjacent habitat due to noise, dust, litter or light spill	The construction activities associated with the project are likely to increase the noise, dust and light above current levels within the subject land.	Retained vegetation within subject land and Centennial Park	Short term (during construction)	Ecosystem credit species	Short term disruption of fauna habitat usage during construction.
Transport of weeds and pathogens from the site to adjacent vegetation	High threat exotic weeds are known from within the subject land and may be inadvertently spread to retained vegetation.	Retained vegetation within subject land and Centennial Park	Potential long-term	Eastern Suburbs Banksia Scrub	Reduced condition of the adjoining TEC.

Table 13. Prescribed impacts of the project

Prescribed Impact	Nature	Extent	Duration	Threatened Entities Likely Affected	Consequences
Human made structures	The Project will involve the demolition of several existing buildings that will be replaced by new structures. Microchiropteran bats can utilise man-made structures for roosting habitat that could therefore be removed as part of the Project. Human-made structures assessed for potential habitat for Microchiropteran bat species is being assessed here as a precautionary measure. Habitat within buildings proposed for demolition was found to be minimal during the survey period due to the lack of cavities and access to roofs present. Photographs of building rooflines are provided in **Appendix C**.	Minimal potential roosting habitat for Microchiropteran bats to be removed when demolishing existing buildings.	Long term	Ecosystem credit component of Little Bent-winged Bat, Large Bent-winged Bat, Southern Myotis	Minimal reduction in potential roosting habitat for ecosystem credit species listed above
Non-native vegetation	Development has largely avoided native vegetation within the subject land. Consequently, non-native vegetation could not be avoided as part of the project.	Scattered exotic trees to be removed across development site	Short term	Ecosystem credit species	Minimal reduction in potential foraging habitat for ecosystem credit species
Habitat connectivity	Vegetation within the development site forms part of a patch of predominantly native vegetation within the assessment area. Connectivity is formed with the adjacent vegetation within Centennial Park.	Scattered trees to be removed across development site	Short term	Ecosystem credit species	Minimal reduction in connectivity with Centennial Park vegetation
Waterbodies, water quality and hydrological processes	Subject land is adjacent to largely man-made ponds in Centennial Park. There is potential for increased dust pollution as a result of the construction phase of the project.	Demolition of existing buildings and some minor excavation works	Short term	None	Potential for increased dust pollution in ponds adjacent to subject land

8.2. Additional Assessment of Impacts to Eastern Suburbs Banksia Scrub

Section 9.1.4 of the BAM lists several indirect impacts to be assessed in relation to the construction and operational activities of the Project; these have been addressed in **Table 12** above. The following section has been prepared to assess indirect impacts to the Eastern Suburbs Banksia Scrub adjacent to the subject land above those that are listed under the BAM.

8.2.1. Shading

As part of the Project, built form is proposed in lots adjacent to the patch of Eastern Suburbs Banksia Scrub within the study area. As a result, shadow diagrams have been prepared by fjmt studio (2020) to determine whether the project will have any effect on the Eastern Suburbs Banksia Scrub. These diagrams display no additional shading to occur as a result of the Project.

8.2.2. Altered Drainage/Runoff

Altered drainage/runoff has the potential to result from the Project. The Project involves the demolition of a number of existing buildings and structures within the subject land for the construction of new buildings and hard-stand areas. There is potential for altered runoff of sediment and pollutants during the operational phase if areas of hardstand are to increase as a result of the Project. In the case of the Project however, areas proposed for construction currently largely exist as hard-stand and coupled with mitigation measures outlined in Section 8.3 below, the Project will not cause a significant alteration in drainage/runoff.

8.2.3. Hybridisation with native species not of local provenance or weed invasion by species used in landscaping

Cumberland Ecology has informed the planting list of the landscape plan to only include flora species indicative of Eastern Suburbs Banksia Scrub. No native species not of local provenance or exotic species will be planted within the subject land as part of the Project.

8.3. Mitigation of Impacts to Native Vegetation and Habitat

8.3.1. Mitigation measures have been developed for the project to mitigate the impacts to native vegetation and habitat that are unable to be avoided. These include a range of measures to be undertaken before and during construction to limit the impact of the project. Each mitigation measure is discussed in detail below, and a summary is provided in** Table 14**.Weed Management**

In order to minimise the spread of weeds throughout the subject land and adjoining areas, appropriate weed control activities will be undertaken prior to vegetation clearing in accordance with the Greater Sydney Local Land Services Area and is subject to the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2019) under the NSW *Biosecurity Act 2015*.

The *Biosecurity Act 2015* and regulations provide specific legal requirements for state level priority weeds and high risk activities, as provided in the Appendices of the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2019). In order to comply with the objectives of the Greater Sydney

Regional Strategic Weed Management Plan, it is recommended the following measures be implemented as part of weed management for the subject land.

i. Prevention

Appropriate construction site hygiene measures will be implemented to prevent entry of new weeds to the area such as the cleaning of equipment prior to entering the subject land.

ii. Eradication

Initial weed management will be carried out within the subject land according to best-practice methods under the direction of a suitably qualified bush regenerator. The targeted species will be those listed under Appendices 1 and 2 of the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2019). Initial weed treatment will include eliminating woody species and targeting large dominant infestations of exotic herbs. This may be achieved via a combination of manual weed removal and herbicide use.

Best-practice bush regeneration should undertake measures to avoid adverse impacts to retained vegetation within the subject land, including not over clearing (remove only targeted species), employment of minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter.

iii. Containment

Follow-up monitoring and maintenance should be undertaken in the subject land following vegetation clearing activities, to contain any re-emergence of weed species.

8.3.2. Delineation of Clearing Limits

The current limits of clearing will be marked either by high visibility tape on trees or metal/wooden pickets, fencing or an equivalent boundary marker that will be installed prior to clearing. To avoid unnecessary or inadvertent vegetation and habitat removal or impacts on fauna, disturbance must be restricted to the delineated area and no equipment, machinery, soil or vegetation is stockpiled beyond this boundary.

8.3.3. Tree Protection Measures

Trees retained within the subject land will be subject to tree protection measures detailed within the Aboricultural Impact Assessment (Advanced Treescape Consulting 2019). This includes:

- Inductions to communicate tree protection measures;
- Installation of fences around specified tree protection zones; and
- All tree work is to be carried out by a suitably qualified and insured Arborist.

8.3.4. Pre-clearance Surveys

In order to minimise impacts to fauna species during construction, pre-clearance surveys will be conducted in all areas of vegetation that are required to be cleared. Pre-clearing surveys will be undertaken within one week of clearing activities by a qualified ecologist.

Habitat features to be identified include:

- Hollow-bearing trees;
- Hollow-bearing logs; and
- Nests within tree canopy or shrubs.

Such features have the potential to contain native species. All habitat features will be identified, recorded and flagged with fluorescent marking tape and trees will have an "H" spray painted with marking paint on two sides of the tree.

8.3.5. Staging of Clearing

It is noted that no habitat features were found within the subject land during the survey period. The following procedure for removal of habitat features has been added to the mitigation measures as a precautionary approach. The clearing will be conducted using a two-stage clearing process as follows:

Stage 1: Clearing will commence following the identification of potential habitat features by a qualified ecologist. Hollow-bearing trees marked during pre-clearing will not be cleared during the first stage; however all vegetation around these trees will be cleared to enable isolation of the feature. Other habitat features, such as hollow-bearing logs, can be removed during Stage 1 only if done under supervision by a qualified ecologist. Identified hollow-bearing trees will be left at a minimum overnight after Stage 1 clearing to allow resident fauna to voluntarily move from the area.

Stage 2: After hollow-bearing trees have been left overnight, the trees will be cleared using the following protocols:

- Trees marked as containing hollows will be shaken by machinery prior to clearing to encourage any animals remaining to leave the hollows and move on;
- Use a bulldozer or excavator to start pushing the tree over. Move the bulldozer over the roots and continue gently pushing the tree over;
- Remove branches with hollows and sections of trunk and set aside for immediate transfer to a storage area for placement within retained vegetation; and
- All hollows will be investigated by an ecologist for the presence of fauna following felling of the tree.

The felled habitat tree will be left overnight to allow any remaining fauna time to leave the hollows and move on.

The two-stage clearing process enables fauna to feel secure whilst clearing occurs around their tree, and allows them a chance to self-relocate upon nightfall, when foraging typically occurs. Fauna are not likely to re-inhabit trees, as they are not likely to feel secure in their tree with all trees around it cleared.

Provisions will be made to protect any native fauna during clearing activities by the following means:

- All staff working on the vegetation clearing will be briefed about the possible fauna present and should avoid injuring any present;
- Animals disturbed or dislodged during the clearance but not injured will be assisted to move to adjacent bushland or other specified locations; and
- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal (either taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanised).

Provision of a report following the completion of clearing works will be provided detailing the total number and species of individuals recorded and details of their release/health.

8.3.6. Sedimentation Control Measures

The project may result in erosion and transport of sediments as a result of soil disturbance during construction. In order to prevent this impact, construction activities will be undertaken in accordance with Managing Urban Stormwater - Soils and Construction Volume 1 known as "The Blue Book" (Landcom 2004). These include implementation of the following measures:

- Installation of sediment control fences;
- Covering soil stockpiles; and
- Avoiding soil disturbance prior to heavy rainfall.

8.3.7. Current Consent Conditions

In undertaking previous DAs, Moriah College has been subjected to a number of consent conditions in relation the ongoing protection of the ESBS in the south west of the subject land. These conditions require the restoration of the ESBS within the subject land in perpetuity and protection from direct and indirect impacts of development. Specific measures include the establishment of a zone within Lot 22 to buffer the ESBS on Lot 23, subject to the provisions of an approved vegetation management plan; prohibition of overshadowing of the ESBS areas, and their protection from other impacts such as storm and surface water and invasion by non-indigenous plant species.

Cumberland Ecology understands that the Vegetation Management Plan prepared as part of a previous DA includes provisions to establish a 1 metre buffer on Lot 22 to prevent development occurring in close proximity to the ESBS in the south west of the subject land. Additionally, shading diagrams provided by fjmt studio (2020) show no further shading to the ESBS will occur as part of the Project. These provisions coupled with the mitigation measures that are described throughout **Section 8.3** above, the current DA from an ecological perspective complies with the consent conditions set by previous DAs.

Mitigation Measure	Proposed Techniques	Timing	Frequency	Responsibility	Risk of Failure	Risk and Consequences of Residual Impacts
Weed management	Appropriate weed control activities will be undertaken in accordance with the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2019).	Construction	Prior to construction, following vegetation clearing	Contractor	High	Spread of weeds throughout the study area and surrounding land.
Delineation of clearing limits	Clearing limits marked either by high visibility tape on trees of metal/wooden pickets, fencing or an equivalent boundary marker. Disturbance, including stockpiling, restricted to clearing limits.	Construction	Once	Contractor	High	Unnecessary damage to trees to be retained.
Tree protection measures	Inductions to communication tree protection measures. Installation of fences around specified tree protection zones. All tree work is to be carried out by a suitably qualified and insured Arborist.	Construction	Throughout construction period	Contractor	High	Unnecessary damage to trees to be retained.
Pre-clearance survey	Pre-clearance surveys will be conducted in all areas of vegetation that are required to be cleared. Pre-clearing surveys will be undertaken within one week of clearing.	Construction	Once	Contractor	Moderate	Increased and unnecessary mortality of native fauna.
Staging of clearing	Vegetation clearing will be conducted using a two-stage clearing process. Animals disturbed or dislodged during the clearance but not injured will be assisted to move to adjacent bushland or other specified locations. If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal (either taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanized).	Construction	Once	Contractor	High	Increased and unnecessary mortality of native fauna.

Sedimentation control	Construction activities will be undertaken in accordance with "The Blue Book" (Landcom 2004). These include implementation of the following measures: Installation of sediment control fences; Covering soil stockpiles; and Avoiding soil disturbance prior to heavy rainfall	Construction	Throughout construction period	Contractor	High	Sedimentation into retained and adjoining vegetation.
Consent conditions	1 metre buffer surrounding the ESBS will be retained. Development to include plans that incur no further shading to the ESBS within the subject land. Storm and surface water impacts mitigated using the sedimentation control measures. Invasion of non-indigenous plant species mitigated using the weed management measures.	Construction	Throughout construction period, following vegetation removal	Contractor	High	Indirect impacts to ESBS within the subject land

8.4. Mitigation of Prescribed Impacts

The following mitigation measures, described in ***Section 8.3***, are relevant to the prescribed impact of habitat connectivity:

- Delineation of clearing limits;
- Pre-clearance survey;
- Staging of clearing; and
- No additional mitigation measures are proposed for prescribed impacts.

8.5. Adaptive Management for Uncertain Impacts

The project is considered unlikely to result in any uncertain impacts that require adaptive management.

8.6. Use of Biodiversity Credits to Mitigate or Offset Indirect or Prescribed Impacts

Due to the small scale of indirect and prescribed impacts, the project does not propose to use additional biodiversity credits to mitigate or offset these impacts.

9. Thresholds of Assessment

9.1. Introduction

The assessment thresholds that must be considered include the following:

- Impacts on an entity that is at risk of a serious and irreversible impact;
- Impacts for which the assessor is required to determine an offset requirement;
- Impacts for which the assessor is not required to determine an offset requirement; and
- Impacts that do not require further assessment by the assessor.

The following sections outline these assessment thresholds and their relevance to the project.

9.2. Impacts on Serious and Irreversible Impact Entities

One SAII entity, Eastern Suburbs Banksia Scrub, has the potential to be impacted by the project. The location of the Eastern Suburbs Banksia Scrub in relation to the development site is shown in **Figure 7**. None of this community is proposed to be directly impacted as part of the project. Section 10.2.2 of the BAM requires the provision of additional information regarding SAII entities that are TECs. The additional information is required to assist the consent authority to evaluate the nature of an impact on a potential entity at risk of a serious and irreversible impact. The additional information requirements are shown as italicised text below, with responses supplied beneath in plain text. The information presented below indicates that the project is unlikely to result in a significant and irreversible impact to the TEC.

a. *the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII*

The actions and measures taken to avoid impacts to Eastern Suburbs Banksia Scrub include amendments to the location of building footprints to wholly contain the disturbance to cleared land and Urban Native/Exotic Vegetation. Mitigation measures proposed to be undertaken during construction have also been designed to minimise indirect impacts to the retained area of Eastern Suburbs Banksia Scrub within the subject land.

b. *the area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone*

None of the Eastern Suburbs Banksia Scrub within the subject land is proposed to be directly impacted by the project. The extent of Eastern Suburbs Banksia Scrub is wholly contained outside of the development site. There is potential for the TEC to be indirectly impacted by the project. Within the subject land, the Eastern Suburbs Banksia Scrub has a current vegetation integrity score of 50.8. It was determined that the area of Eastern Suburbs Banksia Scrub within the subject land conformed to one condition state. Therefore, it is assumed that all of the TEC within the subject land is consistent with the vegetation integrity score of 50.8.

c. *a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact*

There is currently no defined threshold for this SAII entity. No thresholds are currently defined for TECs within the Sydney Basin IBRA bioregion and Cumberland Ecology understands that the EES does not intend to determine any of these thresholds at the current time.

d. *the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint*

Within an area of 1,000 ha surrounding the subject land, approximately 7.95 ha of Eastern Suburbs Banksia Scrub is mapped. This was derived using the broad scale vegetation mapping for the Sydney Metropolitan Area mapped by OEH (2016a) in conjunction with the mapping of Eastern Suburbs Banksia Scrub for the extent of the TEC (OEH 2015a, b). The condition of Eastern Suburbs Banksia Scrub within an area of 1,000 ha surrounding the subject land is expected to be in a similar condition to that within the subject land. Approximately 3 ha of this area is within the adjoining Queens Park playing fields, where it occurs as a patch in the north of the park. The remaining patches of Eastern Suburbs Banksia Scrub within an area of 1,000 ha surrounding the subject land is also located within an urban environment and expected to be in a similar condition to that within the subject land.

Within an area of 10,000 ha surrounding the subject land, approximately 37.8 ha of Eastern Suburbs Banksia Scrub has been mapped. This was derived using several mapping projects for the Sydney Metropolitan Area mapped by OEH (2016a) in conjunction with the mapping of Eastern Suburbs Banksia Scrub for the extent of the TEC (OEH 2015a, b) clipped to include a 10,000 ha area surrounding the subject land. These mapping units included those used to obtain the area within the 10,000 ha area as well as the remaining extent within the 10,000 ha area. The condition of Eastern Suburbs Banksia Scrub within an area of 10,000 ha surrounding the subject land is variable.

e. *an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration*

Approximately 463 ha of Eastern Suburbs Banksia Scrub is mapped as occurring within the Pittwater IBRA subregion. This value is derived from broad scale vegetation mapping for the Sydney Metropolitan Area mapped by OEH (2016a) in conjunction with the mapping of Eastern Suburbs Banksia Scrub for the extent of the TEC (OEH 2015a, b). The project will not result in the removal of any extent of the TEC within the subject land, although the patch within the subject land has potential to be indirectly impacted by activities during the construction phase of the project. Mitigation measures have been proposed to avoid indirect impacts to the TEC within and surrounding the subject land.

The current distribution of Eastern Suburbs Banksia Scrub comprises a series of small remnant patches, the largest of which are contained within the Botany, Manly, Waverley and Randwick LGAs (OEH 2018). According to the Environmental Impact Assessment Guidelines for Eastern Suburbs Banksia Scrub, remnant patches tend to be small (0.06 to 1 ha), isolated and degraded to some extent (NPWS 2004). The overall condition of Eastern Suburbs Banksia Scrub across the Sydney Basin bioregion is unlikely to change as a result of the project, as the

condition present within the subject land is somewhat modified and reflects the dominant condition of the community through its current extent.

f. an estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion

A total of approximately 463 ha of Eastern Suburbs Banksia Scrub occurs within the Pittwater IBRA subregion, of which approximately 249 ha is in the reserve system.

A total of approximately 630 ha of Eastern Suburbs Banksia Scrub occurs within the Sydney Basin IBRA bioregion, of which approximately 414 ha occurs in the reserve system.

g. the development, clearing or biodiversity certification proposal's impact on:

i. abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns

The project will not involve changes to groundwater levels, surface water patterns and soil disturbance that would impact the Eastern Suburbs Banksia Scrub that will be retained within the subject land. The project is unlikely to have any impact on abiotic factors critical to the long-term survival of the TEC within the subject land.

ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants

The project will not result in the removal of any extent of the TEC. Within the subject land, there is potential for the Eastern Suburbs Banksia Scrub to be indirectly impacted by activities during the constructional phase of the project. Mitigation measures have been proposed to avoid and minimise the indirect impacts to the TEC. Therefore, there will not be any significant change to the composition of the community as a result of the project.

iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC

The Eastern Suburbs Banksia Scrub within the subject land has previously been modified as a result of previous clearing and ongoing residential and commercial activities. A suite of invasive flora species, including high threat exotics, are known to occur within this community within the subject land, and there is the potential for an increase of such species in areas of retained Eastern Suburbs Banksia Scrub if left unmitigated due to changing land uses and management. It should be noted that during the survey period, there was evidence of bushland management practises within this patch of Eastern Suburbs Banksia Scrub. The project is considered unlikely to result in the regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in areas of retained Eastern Suburbs Banksia Scrub. The quality

and integrity of the remaining areas of the TEC surrounding the subject land, including within Queens Park is unlikely to be significantly impacted, due to the modified nature of the surrounding vegetation.

h. direct or indirect fragmentation and isolation of an important area of the potential TEC

Eastern Suburbs Banksia Scrub is considered to be severely fragmented, with all remnants of the community surrounded by urban development (NPWS 2004). The project does not propose to remove any extent of the Eastern Suburbs Banksia Scrub within the subject land and so will not increase fragmentation or isolation of an important area of the TEC.

i. the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.

Mitigation measures to be implemented for the project will assist in minimising potential impacts to retained Eastern Suburbs Banksia Scrub within the subject land are detailed in **Section 8.2**.

9.3. Impacts that Require an Offset

9.3.1. Native Vegetation

In accordance with the BAM, an impact to biodiversity requires offsets for the clearing of native vegetation when the following criteria are met:

- A vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an EEC or CEEC;
- A vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or is representative of a vulnerable ecological community; or
- a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

As the vegetation proposed for removal within the development site has a vegetation integrity score of ≥20 (15.0), offsets are not required for to facilitate the project. This is summarised in **Table 15** and are mapped in **Figure 9**.

It is noted that the Department of Planning, Industry and Environment published a revised version of the BAM that was on public exhibition until 16 October 2019, which included a module to assess planted native vegetation. Application of this module to the planted vegetation within the subject land would result in the vegetation being assessed for species credits only (i.e. no calculation of ecosystem credits). As the revised version of the BAM is not finalised, this BDAR has been based on the current advice for planted vegetation, which is to assign to a best-fit PCT.

Table 14. Summary of impacts to native vegetation

Vegetation Zone	PCT#	PCT Name	Condition Name	Area to be Removed (ha)	Patch Size Class	Vegetation Integrity Score
1	1778	Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	Planted	0.09	>101 ha	15.0

9.3.2. Threatened Species

No species credit species have been identified as requiring an offset.

9.4. Impacts that do not Require Further Assessment

All areas identified as cleared that occur within the development do not require an offset. These areas comprise approximately 3.93 ha, as shown on **Figure 9**.

9.5. Application of the No Net Loss Standard

The BAM sets a standard that will result in no net loss of biodiversity values where the impacts on biodiversity values are avoided, minimised and mitigation, and all residual impacts are offset by retirement of the required number of biodiversity credits. As the vegetation integrity score for the project equals 15.0, no offsets are required for the removal of vegetation within the development site. Nevertheless, A credit summary report from the BAMC has been included in **Appendix B**.

10. References

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APPENDIX A :
BAM Plot Data

Table 15. BAMC data

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to19	funTreeStem20to29	funTreeStem30to49	funTreeStem50to79	funTreeRegen	funHighThreatExotic
1	1778	0.09	101	Planted	56	337625	6247470	45	1	0	1	0	0	0	1.0	0.0	20.0	0.0	0.0	0.0	1	0	12.4	0.0	0	0	1	0	1	0	5.1
2	1778	0.09	101	Planted	56	337672	6247504	45	3	6	4	1	0	0	5.3	31.5	16.3	0.1	0.0	0.0	0	0	38.0	0.0	1	1	1	1	0	1	14.2
3	1061	1.19	101	Good	56	337507	6247533	315	0	10	4	5	0	0	0.0	48.5	4.5	2.4	0.0	0.0	5	0	30.0	11.0	1	1	1	1	0	1	0.0

Table 16. Flora survey data

Scientific Name	Exotic	Common Name	Family	Establishment Means	NSW Status	Comm. Status	Native	Exotic	High Threat Weed	Plot Number	1	1	2	2	3	3	RMS			
										BAM Growth Form Group	C	A	C	A	C	A	1	2	3	4
Acacia falcata			Fabaceae (Mimosoideae)	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)			0.2	2				X		
Acacia longifolia			Fabaceae (Mimosoideae)	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)								X		
Acacia longifolia var. sophorae		Coastal Wattle	Fabaceae (Mimosoideae)	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)			20	20	3	12			X	
Acacia suaveolens		Sweet Wattle	Fabaceae (Mimosoideae)	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)			0.2	2	0.5	5				X
Acacia ulicifolia		Prickly Moses	Fabaceae (Mimosoideae)	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)					0.4	5				
Acetosa sagittata	*	Rambling Dock	Polygonaceae	Introduced	Not Listed	Not Listed		YES	YES		0.1	10	0.5	30						
Agapanthus praecox subsp. orientalis	*		Alliaceae	Introduced	Not Listed	Not Listed		YES										X		
Apium graveolens	*	Celery	Apiaceae	Introduced	Not Listed	Not Listed		YES									X			
Asparagus aethiopicus	*	Asparagus Fern	Asparagaceae	Introduced	Not Listed	Not Listed		YES	YES				0.2	20				X		
Astroloma pinifolium		Pine Heath	Ericaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)					0.1	2				
Austrostipa pubescens			Poaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)					1	35				
Banksia aemula		Wallum Banksia	Proteaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)									X	
Austrostipa pubescens			Poaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)								X		
Banksia integrifolia		Coast Banksia	Proteaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)								X	X	
Bidens pilosa	*	Cobbler's Pegs	Asteraceae	Introduced	Not Listed	Not Listed		YES	YES				0.1	20				X		X
Bossiaea heterophylla		Variable Bossiaea	Fabaceae (Faboideae)	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)					1	5				
Bromus catharticus	*	Praire Grass	Poaceae	Introduced	Not Listed	Not Listed		YES			1	100	0.5	50						
Bromus catharticus	*	Praire Grass	Poaceae	Introduced	Not Listed	Not Listed		YES												
Buxus microphylla	*		Buxaceae	Introduced	Not Listed	Not Listed		YES										X		
Cardamine hirsuta	*	Common Bittercress	Brassicaceae	Introduced	Not Listed	Not Listed		YES										X		
Casuarina glauca		Swamp Oak	Casuarinaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)			0.2	1						
Celtis sinensis	*	Japanese Hackberry	Ulmaceae	Introduced	Not Listed	Not Listed		YES					0.2	15						
Cenchrus clandestinus	*	Kikuyu Grass	Poaceae	Introduced	Not Listed	Not Listed		YES	YES											X

Scientific Name	Exotic	Common Name	Family	Establishment Means	NSW Status	Comm. Status	Native	Exotic	High Threat Weed	Plot Number	1	1	2	2	3	3	RMS			
										BAM Growth Form Group	C	A	C	A	C	A	1	2	3	4
Cenchrus setaceus	*	Fountain Grass	Poaceae	Introduced	Not Listed	Not Listed		YES					0.2	10							
Cerastium glomeratum	*	Mouse-ear Chickweed	Caryophyllaceae	Introduced	Not Listed	Not Listed		YES			0.1	50								
Cestrum parqui	*	Green Cestrum	Solanaceae	Introduced	Not Listed	Not Listed		YES	YES				0.1	1						X
Cinnamomum camphora	*	Camphor Laurel	Lauraceae	Introduced	Not Listed	Not Listed		YES	YES											X
Conyza bonariensis	*	Flaxleaf Fleabane	Asteraceae	Introduced	Not Listed	Not Listed		YES					0.1	5	0.2	25				
Conyza sumatrensis	*	Tall fleabane	Asteraceae	Introduced	Not Listed	Not Listed		YES					0.1	10			X			
Cupaniopsis anacardioides		Tuckeroo	Sapindaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)			0.1	5						X
Cuphea hyssopifolia	*		Lythraceae	Introduced	Not Listed	Not Listed		YES										X		
Cyclospermum leptophyllum	*	Slender Celery	Apiaceae	Introduced	Not Listed	Not Listed		YES			0.1	20	0.1	10						
Cynodon dactylon		Common Couch	Poaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)	20	1000	1	100						
Cyperus gracilis		Slender Flat-sedge	Cyperaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)			0.1	10						
Dianella caerulea		Blue Flax-lily	Phormiaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Forb (FG)					0.2	5				
Dianella caerulea var. producta			Phormiaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Forb (FG)									X	
Dianella revoluta		Blueberry Lily	Phormiaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Forb (FG)					1	10			X	
Dichelachne crinita		Longhair Plumegrass	Poaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)					0.5	20				
Ehrharta erecta	*	Panic Veldtgrass	Poaceae	Introduced	Not Listed	Not Listed		YES	YES		5	500	3	500			X			
Eragrostis tenuifolia	*	Elastic Grass	Poaceae	Introduced	Not Listed	Not Listed		YES									X			
Erythrina x sykesii	*	Coral tree	Fabaceae (Faboideae)	Introduced	Not Listed	Not Listed		YES												X
Eucalyptus robusta		Swamp Mahogany	Myrtaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)	1	4					X			X
Eucalyptus scoparia		Wallangarra White Gum	Myrtaceae	Alive in NSW, Native	Endangered	Vulnerable	YES			Tree (TG)								X		X
Euchiton sphaericus		Star Cudweed	Asteraceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Forb (FG)					0.1	5				
Festuca spp.			Poaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)			0.2	25						

Scientific Name	Exotic	Common Name	Family	Establishment Means	NSW Status	Comm. Status	Native	Exotic	High Threat Weed	Plot Number	1	1	2	2	3	3	RMS			
										BAM Growth Form Group	C	A	C	A	C	A	1	2	3	4
Ficinia nodosa		Knobby Club-rush	Cyperaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)									X	
Ficus benjamina	*	Weeping Fig	Moraceae	Introduced	Not Listed	Not Listed		YES			1	20					X			
Ficus rubiginosa		Port Jackson Fig	Moraceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)			5	1						X
Fraxinus spp.	*		Oleaceae	Introduced	Not Listed	Not Listed		YES										X		
Gamochaeta americana	*	Purple Cudweed	Asteraceae	Introduced	Not Listed	Not Listed		YES			0.1	20								
Gamochaeta pensylvanica	*	Cudweed	Asteraceae	Introduced	Not Listed	Not Listed		YES							0.1	10		X		
Grevillea spp.			Proteaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)			0.1	1						
Hypochoeris radicata	*	Catsear	Asteraceae	Introduced	Not Listed	Not Listed		YES			0.1	50	0.2	10						X
Jacaranda mimosifolia	*	Jacaranda	Bignoniaceae	Introduced	Not Listed	Not Listed		YES										X		
Kunzea ambigua		Tick Bush	Myrtaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)					1	10			X	
Lantana camara	*	Lantana	Verbenaceae	Introduced	Not Listed	Not Listed		YES	YES				0.3	5						
Leptospermum laevigatum		Coast Teatree	Myrtaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)			10	7	40	5			X	X
Leucopogon juniperinus		Prickly Beard-heath	Ericaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)					0.5	3				
Lolium perenne	*	Perennial Ryegrass	Poaceae	Introduced	Not Listed	Not Listed		YES												X
Lomandra hystrix			Lomandraceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)								X		X
Lomandra longifolia		Spiny-headed Mat-rush	Lomandraceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)			15	50	2	10	X		X	X
Lysimachia arvensis	*	Scarlet Pimpernel	Primulaceae	Introduced	Not Listed	Not Listed		YES									X			
Medicago polymorpha	*	Burr Medic	Fabaceae (Faboideae)	Introduced	Not Listed	Not Listed		YES									X			
Melaleuca quinquenervia		Broad-leaved Paperbark	Myrtaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)								X		
Melaleuca styphelioides		Prickly-leaved Tea Tree	Myrtaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)								X		
Melia azedarach		White Cedar	Meliaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)										X
Microlaena stipoides		Weeping Grass	Poaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Grass & grasslike (GG)					1	100				
Monotoca elliptica		Tree Broom-heath	Ericaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)					1	2			X	
Monotoca elliptica		Tree Broom-heath	Ericaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)										

Scientific Name	Exotic	Common Name	Family	Establishment Means	NSW Status	Comm. Status	Native	Exotic	High Threat Weed	Plot Number	1	1	2	2	3	3	RMS			
										BAM Growth Form Group	C	A	C	A	C	A	1	2	3	4
Olea europaea	*	Common Olive	Oleaceae	Introduced	Not Listed	Not Listed		YES	YES				10	25			X			X
Ophiopogon japonicus	*	Dwarf lilyturf	Convallariaceae	Introduced	Not Listed	Not Listed		YES										X		
Oxalis corniculata	*	Creeping Oxalis	Oxalidaceae	Introduced	Not Listed	Not Listed		YES					0.1	10			X			
Parietaria judaica	*	Pellitory	Urticaceae	Introduced	Not Listed	Not Listed		YES					0.1	20						
Paronychia brasiliana	*	Chilean Whitlow Wort, Brazilian Whitlow	Caryophyllaceae	Introduced	Not Listed	Not Listed		YES			0.1	100								
Passiflora edulis	*	Common Passionfruit	Passifloraceae	Introduced	Not Listed	Not Listed		YES									X			
Persoonia lanceolata		Lance Leaf Geebung	Proteaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)					1	1				
Phoenix canariensis	*	Canary Island Date Palm	Arecaceae	Introduced	Not Listed	Not Listed		YES	YES									X		
Pinus radiata	*	Radiata Pine	Pinaceae	Introduced	Not Listed	Not Listed		YES	YES								X			
Pittosporum undulatum		Sweet Pittosporum	Pittosporaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)			1	1						X
Plantago lanceolata	*	Lamb's Tongues	Plantaginaceae	Introduced	Not Listed	Not Listed		YES					0.1	10						
Plumbago auriculata	*	Cape leadwot	Plumbaginaceae	Introduced	Not Listed	Not Listed		YES					0.5	1				X		
Poa annua	*	Winter Grass	Poaceae	Introduced	Not Listed	Not Listed		YES			10	2000					X			X
Polycarpon tetraphyllum	*	Four-leaved Allseed	Caryophyllaceae	Introduced	Not Listed	Not Listed		YES					0.1	10						
Prunus spp.	*		Amygdalaceae	Introduced	Not Listed	Not Listed		YES					0.1	1						
Soliva sessilis	*	Bindyi	Asteraceae	Introduced	Not Listed	Not Listed		YES			0.25	500								
Sonchus asper	*	Prickly Sowthistle	Asteraceae	Introduced	Not Listed	Not Listed		YES										X		
Sonchus oleraceus	*	Common Sowthistle	Asteraceae	Introduced	Not Listed	Not Listed		YES					0.1	10						
Sonchus spp.		Sowthistle	Asteraceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Forb (FG)							X			
Sporobolus africanus	*	Parramatta Grass	Poaceae	Introduced	Not Listed	Not Listed		YES									X			
Stellaria media	*	Common Chickweed	Caryophyllaceae	Introduced	Not Listed	Not Listed		YES			0.2	200	0.1	5						
Stenotaphrum secundatum	*	Buffalo Grass	Poaceae	Introduced	Not Listed	Not Listed		YES	YES								X			
Taraxacum officinale	*	Dandelion	Asteraceae	Introduced	Not Listed	Not Listed		YES					0.1	10	0.2	35	X			
Trifolium repens	*	White Clover	Fabaceae (Faboideae)	Introduced	Not Listed	Not Listed		YES					0.1	10			X			
Tristaniopsis laurina		Kanooka	Myrtaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Tree (TG)							X			
Wahlenbergia gracilis		Sprawling Bluebell	Campanulaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Forb (FG)			0.1	2	0.1	10				

Scientific Name	Exotic	Common Name	Family	Establishment Means	NSW Status	Comm. Status	Native	Exotic	High Threat Weed	Plot Number	1	1	2	2	3	3	RMS			
										BAM Growth Form Group	C	A	C	A	C	A	1	2	3	4
Westringia fruticosa		Coastal Rosemary	Lamiaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Shrub (SG)								X		
Xanthosia pilosa		Woolly Xanthosia	Apiaceae	Alive in NSW, Native	Not Listed	Not Listed	YES			Forb (FG)					1	10				
Yucca aloifolia	*	Spanish Bayonet	Agavaceae	Introduced	Not Listed	Not Listed		YES										X		

APPENDIX B :

BAMC Summary Credit Report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018490/BAAS17027/19/00018491	19139 - Moriah College	26/11/2019
Assessor Name	Report Created	BAM Data version *
	29/11/2019	22
Assessor Number	BAM Case Status	Date Finalised
	Finalised	29/11/2019
Assessment Revision	Assessment Type	
0	Major Projects	

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

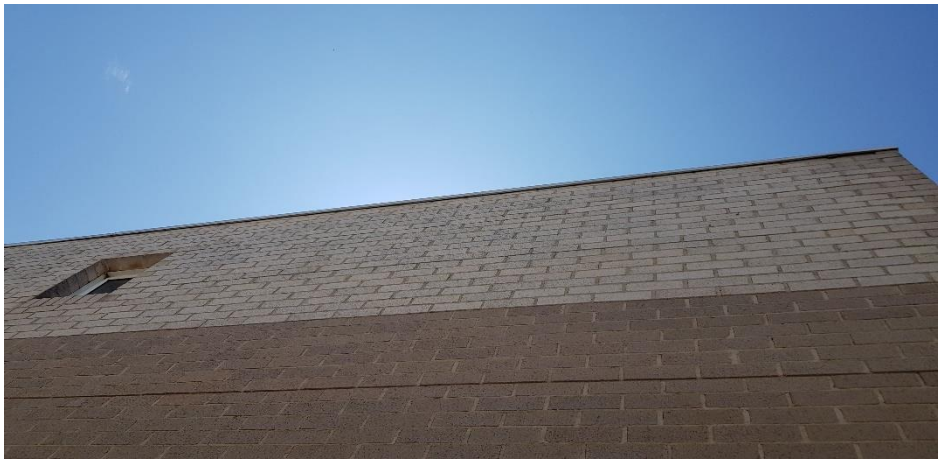
Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney								
1	1778_Planted	15.0	0.1	0.25	High Sensitivity to Potential Gain	2.50		0
							Subtotal	**0**
							Total	**0**

APPENDIX C :
Building Rooflines

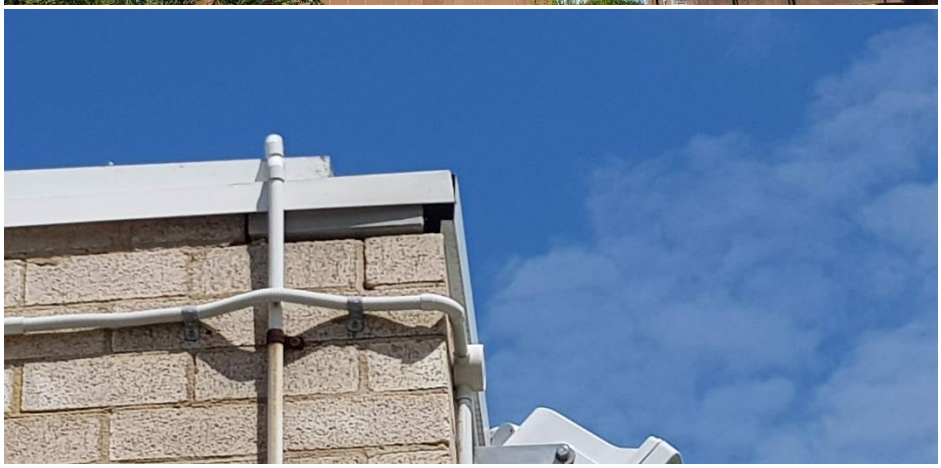
The following section includes photographs of the rooflines of buildings to be demolished as part of the project and is intended to provide context to the habitat assessment conducted within the subject land for Microchiropteran Bat species. **Figure 10** has been included to outline the buildings assessed as part of the habitat assessment. The building labels only apply to this appendix and are not necessarily consistent with other pieces of information related to the Project.

C.1. Building A

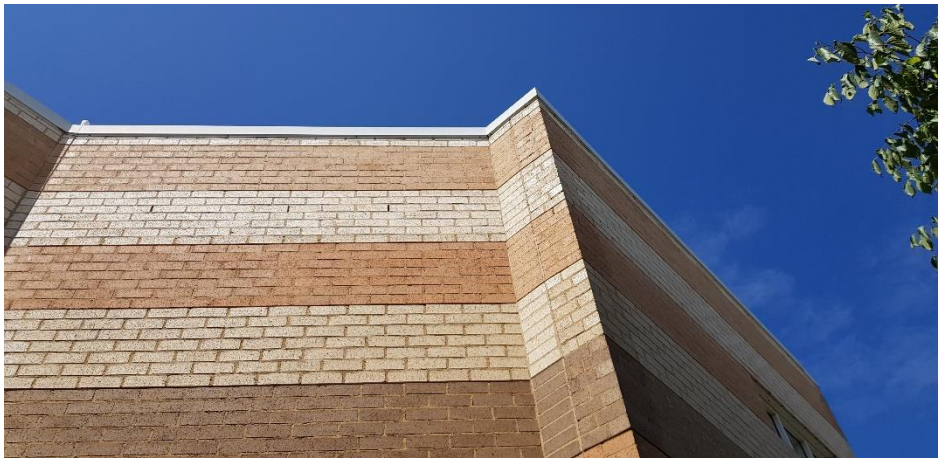


C.2. Building B

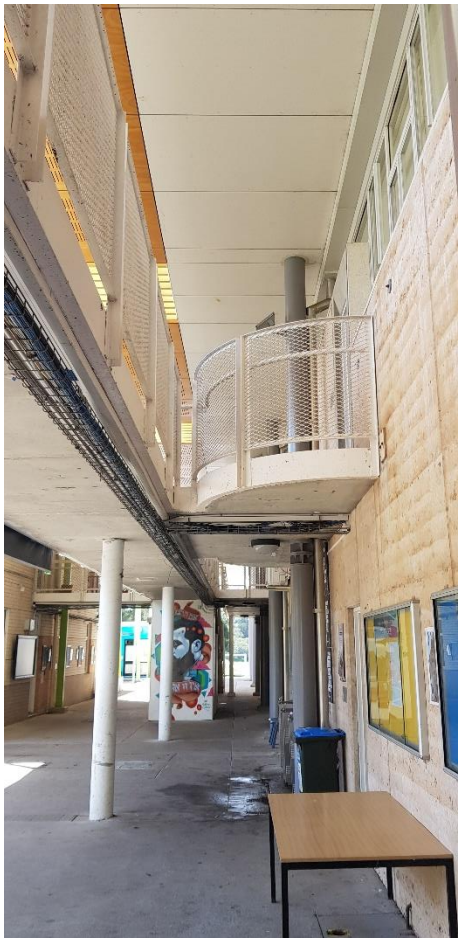
C.3. Building C



C.4. Building D



C.5. Building E



C.6. Building F

C.7. Building G

C.8. Building H

C.9. Building I

FIGURES

Legend

- Development Site
- Subject Land
- Assessment Area
- Cadastre
- Native Vegetation Cover
- Riparian Corridor

Wetlands

- Coastal Wetland (Important Wetlands)
- Coastal Wetland Proximity
- Local Wetland

Watercourses

- 1st Order Stream

IBRA Region

- Sydney Basin

IBRA Subregion

- Pittwater

Mitchell Landscape

- Sydney - Newcastle Barriers and Beaches

Image Source:
Image © NearMap 2019
Dated: 01/07/2019

Data Source:
State Environmental Planning Policy (Coastal Management) 2018
© Department of Finances,

Sercives and Innovation 2017
DECCW (2008). Landscapes (Mitchell) of NSW - Version 3.
DSEWPaC (2012). Interim

Biogeographic Regionalisation for Australia (IBRA) - Version 7.

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 50 m

I:\...\19139\Figures\RP1\20191202\Figure 1. Site map

Figure 1. Site map

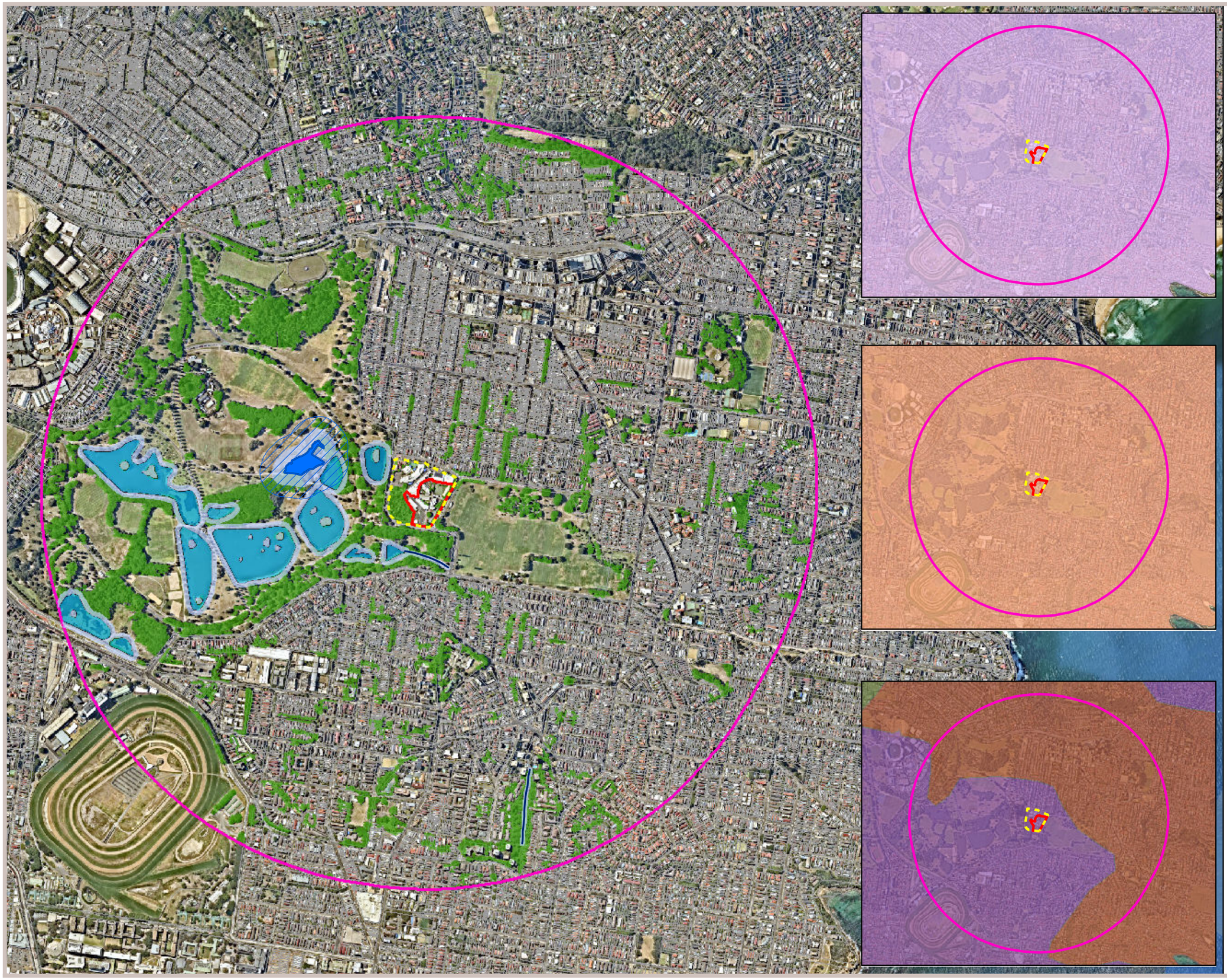


Figure 2. Location map

Legend

- Development Site
- Subject Land
- Impact Area

Image Source:
Image © Nearmap (2019)
Dated: 01/07/2019

Data Source:
Spatial Services
NSW Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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0 10 20 30 40 m

I:\...\19139\Figures\RP1\20200217\Figure 3. Project layout

Figure 3. Project layout

Legend

- Development Site
- Subject Land
- BAM Plot Locations
- Survey Tracks

Image Source:
Image © Nearmap (2019)
Dated: 01/07/2019

Data Source:
Spatial Services
NSW Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\19139\Figures\RP1\20200217\Figure 4. Survey locations

Figure 4. Survey locations

Legend

- Development Site
- Subject Land
- Native Vegetation Extent

Image Source:
Image © Nearmap (2019)
Dated: 01/07/2019

Data Source:
Spatial Services
NSW Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\19139\Figures\RP1\20191202\Figure 5. Native Vegetation Extent

Figure 5. Native Vegetation Extent

Legend

Development Site

Subject Land

Plant Community Type

1061: Old-man Banksia - she-oak - Red Bloodwood heathland on coastal sands, southern Sydney Basin Bioregion

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

Image Source:
Image © Nearmap (2019)
Dated: 01/07/2019

Data Source:
Spatial Services
NSW Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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0 10 20 30 40 m

I:\...\19139\Figures\RP1\20191202\Figure 6. Plant Community Types

Figure 6. Plant Community Types

Legend

- Development Site
- Subject Land

Threatened Ecological Community

- Eastern Suburbs Banksia Scrub

Image Source:
Image © Nearmap (2019)
Dated: 01/07/2019

Data Source:
Spatial Services
NSW Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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0 10 20 30 40 m

I:\...\19139\Figures\RP1\20191202\Figure 7. Threatened Ecological Communities

Figure 7. Threatened Ecological Communities

Figure 8. Vegetation zones

Legend

- Development Site
- Subject Land

Areas Requiring an Offset

- Zone 1: 1778_Planted

Areas Not Requiring Further Assessment

- Zone 1: 1778_Planted
- Cleared Land

Image Source:
Image © Nearmap (2019)
Dated: 01/07/2019

Data Source:
Spatial Services
NSW Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\19139\Figures\RP1\20191202\Figure 9. Thresholds of Assessment

Figure 9. Thresholds of Assessment

Legend

- Development Site
- Subject Land
- Impact Area

Image Source:
Image © Nearmap (2019)
Dated: 01/07/2019

Data Source:
Spatial Services
NSW Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 10 20 30 40 m

I:\...\19139\Figures\RP1\20200217\Figure 10. Building layout

Figure 10. Building layout