

Monte Sant' Angelo Mercy College

Flora and Fauna Assessment

Bloompark Consulting Pty Ltd

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Final



Report No. 20007RP1

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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Table of Contents

Glossary	v
1. Introduction	1
1.1. Purpose	1
1.2. Background	2
1.3. Relevant Legislation	4
1.4. Biodiversity Offset Scheme Waiver	5
2. Methodology	6
2.1. Desktop Assessment	6
2.2. Site Surveys	6
3. Results	8
3.1. Introduction	8
3.2. Vegetation Communities	8
3.3. Flora Species	11
3.4. Fauna	12
4. Impact Assessment	16
4.1. Introduction	16
4.2. Direct Impacts	16
4.3. Indirect Impacts	17
4.4. Impacts to Threatened Ecological Communities	18
4.5. Impacts to Threatened Flora Species	18
4.6. Impacts to Threatened Fauna Species	18
5. Mitigation Measures	20
5.1. Introduction	20
5.2. Mitigation Measures	20
5.3. Environmental Risk Assessment and Mitigation Measures	21
6. Conclusion	23
7. References	24

Table of Tables

Table 1 List of relevant SEARs.....	1
Table 2 Monte Campus Allotments.....	2
Table 3 Vegetation communities found within the subject land.....	8
Table 4 Fauna species list.....	13

Table 5 Risk assessment and mitigation measures.....	21
Table 6 Flora species found within the subject land	2
Table 7 Flora likelihood of occurrence.....	8
Table 8 Fauna likelihood of occurrence.....	19

Table of Photographs

Photograph 1 Endemic canopy vegetation (Dwarf Apple in the background) found within the subject land
Photograph 2 Non-endemic vegetation found within the subject land
Photograph 3 Exotic vegetation (Camphor Laurel on the right) found within the subject land

Table of Appendices

APPENDIX A : Flora Species List
APPENDIX B : Threatened Species Likelihood of Occurrence Tables
APPENDIX C : Tests of Significance

Table of Figures

Figure 1 Subject land: Monte Sant' Angelo Mercy College landholdings
Figure 2 The site: location of proposed Sports and Science Building
Figure 3 Vegetation mapping and survey locations within the subject land
Figure 4 Impact area

Glossary

Term	Definition
The Applicant	Monte Sant Angelo Mercy College
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	NSW <i>Biosecurity Act 2015</i>
BOS	Biodiversity Offsets Scheme
DoEE	Commonwealth Department of the Environment and Energy
DPIE	Department of Planning, Industry and Environment
E	Endangered
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFA	Flora and Fauna Assessment
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	North Sydney Local Environmental Plan 2013
LGA	Local Government Area
Migr,	Migratory
Monte	Monte Sant Angelo Mercy College, North Sydney
Monte Campus	Monte Sant' Angelo Mercy College in its entirety
OEH	Office of Environment and Heritage
OWRC	Other Weed of Regional Concern
PCT	Plant Community Type
The Project	Demolition and construction of a new Sports and Science Building and associated landscape works
SEARs	Secretary's Environmental Assessment Requirements
The Site	Location of proposed works at 128 Miller Street: Lots 3, 4 and 5 in DP 262534
SSD	State Significant Development
Subject Land	Monte Campus
TEC	Threatened Ecological Community
V	Vulnerable
WONS	Weeds of National Significance

1. Introduction

Cumberland Ecology has been commissioned by Monte Sant Angelo Mercy College (the 'Applicant') to prepare this Flora and Fauna Assessment (FFA) report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSDA-10393 for the development of a new Sports and Science Building (the 'Project') at Monte Sant Angelo Mercy College, North Sydney (Monte).

1.1. Purpose

Secretary's Environmental Assessment Requirements (SEARs) for the Project were issued on 02 Dec 2019 and included assessment requirements for multiple areas, including ecology. Specifically, this report addresses the following SEARs, as shown in **Table 1** below :

Table 1 List of relevant SEARs

SEARs	Report Reference
18. Biodiversity Assessment	
Unless the Planning Secretary has issued a waiver, the biodiversity impacts related to the proposed development (SSD-10393) are to be addressed in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form of detailed in the <i>Biodiversity Conservation Act 2016</i> (s6.12), <i>Biodiversity Conservation Regulation 2017</i> (s6.8) and Biodiversity Assessment Method.	BDAR waiver request granted on 17 March 2020.
The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.	Not applicable to this report.
The BDAR must include details of the measures proposed to address the offset obligation as follows: the total number and classes of biodiversity credits required to be retired for the development/project; the number and classes of like-for-like biodiversity credits proposed to be retired; the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; any proposal to fund a biodiversity conservation action; and any proposal to make a payment to the Biodiversity Conservation Trust.	Not applicable to this report.
If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been undertaken to obtain requisite like-for-like biodiversity credits.	Not applicable to this report.
The BDAR must be submitted with all spatial data associated with the survey and assessment as per the BAM.	Not applicable to this report.
The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the <i>Biodiversity Assessment Method Order 2017</i> under s.6.10 of the <i>Biodiversity Conservation Act 2016</i> .	Not applicable to this report.
Where a Biodiversity Assessment Report is not required, engage a suitably qualified person to assess and document the flora and fauna impacts related to the proposal.	Flora and Fauna Assessment report has been prepared.

If a waiver has been issued, the application must demonstrate that the waiver relates to the scope of this development. BDAR waiver request approved on 17 March 2020.

1.2. Background

1.2.1. Description of Site

The Monte Campus is approximately 2.52 hectares comprising 18 allotments (hereafter referred to as the 'subject land'), which are described in **Table 2** below and shown in **Figure 1**. It is noted that the new Sports and Science Building and the proposed works are located on Lot 3, 4 and 5 in DP262534 (the 'site') (see **Figure 2**).

Table 2 Monte Campus Allotments

Address	Legal Description
128 Miller Street	Lot 8 in DP 262534
	Lots 1, 2, 3, 4, 5, 6 and 7 in DP 262534
	Lot 4 in DP 5030
	Lot 1 in DP 780403
5 McLaren Street	Lot 1 in DP 104072
9 McLaren Street	Lot A in DP 339358
11 McLaren Street	Lot 11 in DP 5030
21-23 McLaren Street	Lot 10 DP 5030
27 and 27A McLaren Street*	Lots 7 and 8 in DP 5030
29 McLaren Street*	Lot 6 in DP 5030
31 McLaren Street	Lot 5 in DP 5030

* *Sisters of Mercy land is not used by the College*

The key school elements within and surrounding the Site include:

- The main vehicle entry to the School, the 'Circular Driveway', is located to the north of the site;
- The 'Holy Grass' lawn is located to the north-west of the site and is surrounded by several original School buildings including the Chapel, Masalou Building, and Mercy Hall;
- Two existing sports courts centrally located within the site;
- The McQuoin Hall/Aquatic Centre is located to the south of the site;
- To the west of the site is the Treanor building, which comprises arts and textile teaching rooms; and

- To the north of the 'Holy Grass' is the School Chapel and the O'Reagan Arts and Cultural Common Building completed in 2014.

The subject land has been extensively modified and is largely comprised of a mixture of planted native and exotic vegetation.

1.2.2. Monte and the Surrounding Context

Monte is located in the North Sydney Council local government area (LGA). It is directly to the north of the North Sydney CBD, which is the major commercial centre of North Sydney.

Monte is located approximately 3.5 km north of the Sydney CBD, 500 metres north of North Sydney Railway Station. Victoria Cross Metro Station is currently under construction diagonally opposite the school at the south-eastern corner of Miller Street and Berry Street, as well as an entrance to the north-east on the corner of McLaren Street. Miller Street runs along the eastern boundary of the subject land which provides a major bus corridor to the North Shore and Northern Beaches.

The key land use characteristics surrounding the School Campus are:

- **South:** North Sydney CBD commercial core, primarily characterised by high-rise commercial buildings and support services including hotels, retail uses, and Shore Grammar School;
- **North:** mixed precinct including:
 - Low-density residential area with a heritage conservation area;
 - Community buildings including North Sydney Council Chambers;
 - Schools, including St Mary's Primary, Wenona School, Marist College and North Sydney Boys High School;
 - St Leonard's Park.
- **East:** The extension of the North Sydney CBD Commercial Core, generally characterised by high density residential and commercial buildings; and
- **West:** Medium density residential and high-rise buildings along the Pacific Highway. Further west is a low-density residential area which is identified as a heritage conservation area, and the Australian Catholic University.

Built form immediately surrounding the Monte campus comprises:

- **South** (Berry Street): Commercial buildings and the Victoria Cross Metro Station currently under construction;
- **North** (McLaren Street): McLaren Street is a heritage conservation area under the North Sydney LEP. Monte owns most of the buildings on the southern side of McLaren Street which are generally single and two storey buildings originally built for residential purposes. The site at the south-western corner of Miller

Street and McLaren Street is an Italian restaurant and a four-storey commercial building with basement parking. The northern side of McLaren Street is primarily used for community facilities including a preschool, , Council Chambers, community hall, and public plaza/park used for a weekend fresh produce market;

- **East** (Miller Street): Mix of commercial, residential and hotel towers, as well as the Rag and Famish Hotel at the corner of Miller Street and Berry Street. A northern pedestrian portal to the Victoria Cross Metro Station is proposed on the north-eastern corner of Miller Street and McLaren Street intersection;
- **West** (Angelo Lane): mix of commercial and high-density residential buildings up to 16-storeys with basement parking.

A.1.1. Project Description

The proposed works comprise the following:

- Demolition of two existing sports courts and associated undercroft staff carpark. The demolition works will include demolition of all structures between the main 'circular drive' driveway entry from Miller Street, and refurbishment of the connection to the McQuoin Hall/Aquatic Centre at the corner of Miller and Berry Streets;
- Construction of a new four-storey sports and science building with a basement staff carpark, partially underground dual sports court facility, three levels of new teaching spaces (innovation/science labs) and a rooftop sports court;
- Landscaping works surrounding the new sports and science building.

1.3. Relevant Legislation

1.3.1. Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), any action (which includes a development, project or activity) that is considered likely to have a significant impact on Matters of National Environmental Significance (MNES) (including nationally threatened ecological communities and species and listed migratory species) must be referred to the Commonwealth Minister for the Environment. The purpose of the referral is to allow a decision to be made about whether an action requires approval on a Commonwealth level. If an action is considered likely to have a significant impact on MNES, it is declared a "controlled action" and Commonwealth approval is required.

1.3.2. NSW *Environmental Planning and Assessment Act 1979*

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, populations and ecological communities, and their habitats, as listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and NSW *Fisheries Management Act 1994* (FM Act).

The proponent is seeking development consent under Part 4 – State Significant Development (SSD) of the EP&A Act.

1.3.3. NSW Biodiversity Conservation Act 2016

The BC Act is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act is supported by regulations, including the *Biodiversity Conservation Regulation 2017* (BC Regulation).

The BC Act requires consideration of whether a development or an activity is likely to significantly affect threatened species. For Part 4 SSD, projects automatically trigger the Biodiversity Offsets Scheme (BOS), unless a waiver is granted (see **Section 1.4**). The BOS is intended to simplify biodiversity assessment and improve biodiversity outcomes by creating consistent assessment requirements to measure the likely biodiversity loss of development proposals and gains in biodiversity value achieved at offset sites through active management. The BOS requires an assessment following the Biodiversity Assessment Methodology (BAM) by an accredited Biodiversity Assessment Method (BAM) assessor and the preparation of a Biodiversity Development Assessment Report (BDAR).

1.4. Biodiversity Offset Scheme Waiver

Typically, SSD projects require the preparation of a Biodiversity Development Assessment Report (BDAR) to accompany the development application (DA), however this requirement can be waived under certain circumstances when it can be demonstrated that there will not be a significant impact to biodiversity values. Cumberland Ecology prepared a BDAR waiver request for the project in early February 2020 (see 20007 Let2), which was subsequently accepted by the NSW Department of Planning Industry and Environment (DPIE) on 17 March 2020, confirming that a BDAR is not required to accompany the DA. Secretary's Environmental Assessment Requirements (SEARs) were received on the 12 December 2019 and outlined the ecological assessment requirements for the project (see **Table 1**), including assessment requirements if a waiver was granted. In order to address these requirements, Cumberland Ecology has prepared this FFA to assess the impacts of the proposed development.

2. Methodology

2.1. Desktop Assessment

Mapping layers from State Vegetation Type Map (VIS ID 4489), which covers the subject land were reviewed to determine the potential vegetation communities present, including those that align to Threatened Ecological Communities (TECs) listed under the BC Act and/or EPBC Act.

Database analysis was conducted for the locality using the NSW BioNet Atlas and the Commonwealth EPBC Act Protected Matters Search Tool. The locality is defined as the area within a 5 km radius of the subject land. The NSW BioNet Atlas and the Commonwealth Protected Matters Search Tool were examined for records of any threatened flora and fauna species listed under the BC Act and/or EPBC Act within the locality.

2.2. Site Surveys

2.2.1. Flora Surveys

A flora survey was conducted on 22 January 2020 by a botanist from Cumberland Ecology. The flora survey consisted of:

- Random meander surveys across the entire subject land to compile a species list and to map vegetation communities;
- Targeted searches for threatened flora species identified as being present within the locality and having the potential to be present; and
- Photographs taken of vegetation to provide a visual documentation of Plant Community Types (PCTs) present and their condition.

Identification of the PCTs occurring within the subject land was guided by the findings of the floristic survey. The data collected during surveys of the subject land was analysed in conjunction with a review of the PCTs held within the VIS Classification Database. Consideration was given to the following:

- Occurrence within the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and Pittwater IBRA Subregions.

The locations of flora surveys within the subject land are shown in **Figure 3**.

2.2.2. Fauna Survey

A fauna habitat assessment was conducted by an ecologist on 22 January 2020. The subject land was assessed for groundcover, shrub/understory cover, canopy cover, tree hollows as well as other habitat features such as bush rock, fallen trees, buildings and signs of fauna use such as scats, scratches and scrapings.

The nature and extent of fauna habitats in the subject land were assessed and areas where fauna species could reside or forage were identified. This included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, bush rock and wetland areas such as creeks and soaks.

An assessment of the structural complexity of vegetation, the age structure of the vegetation and the nature and extent of human disturbance throughout the subject land was also undertaken and considered. Tree hollows were used as a general indication of habitat quality for arboreal fauna and hollow-dwelling birds and bats. Any hollows observed during surveys were recorded and the general vegetation condition and tree maturity was used to predict whether trees on site were likely to contain hollows.

During this habitat assessment any fauna species seen or heard calling were recorded.

2.2.3. Microchiropteran Bat Survey

A diurnal threatened microchiropteran bat survey of the site was undertaken on the 4 March 2020 between 12:00 and 14:00 encompassing structures proposed to be demolished. A search was undertaken for microchiropteran bats in suitable roosting habitat in the undercoft carpark as well as the two artificial sportsfields and surrounding area. The search was conducted using a handheld Anabat unit to detect bats that may call, as well as a handheld torch to illuminate holes, crevices and cracks in which bats may be roosting. A more detailed assessment, including photographs, can be found in the BDAR waiver request for the Project (CE reference 20007 Let2).

2.2.4. Survey Limitations

The subject land was easily accessible and random meander transects were conducted within each patch of vegetation within the subject land. Despite this, it is unlikely that all flora species present within the subject land have been recorded. However, it is probable that the vast majority of species, and all of the endemic, native species present at the time of the survey were recorded, and that issues including conservation significance of the flora, and ecological constraints of native vegetation on development have been satisfactorily assessed. An assessment of the likelihood of occurrence of all threatened flora species recorded or likely to occur within a 5 km radius of the subject land was undertaken to supplement the flora survey.

Limited fauna surveys were undertaken for this assessment, which mainly relied on database analysis of species recorded within a 5 km radius, fauna habitat assessment and diurnal microchiropteran bat survey. The data produced by the database analysis and fauna habitat assessment is intended to be indicative of the types of species that could occur in the subject land. Apart from a diurnal microchiropteran bat survey of the site, additional targeted fauna surveys were considered unwarranted due to the degraded and highly modified nature of the subject land and limited fauna habitat that is proposed to be removed.

3. Results

3.1. Introduction

A review of historical imagery from 1943 confirmed presence of buildings and modified lands within the subject land in the early 1940s. The 1943 imagery also showed presence of retained trees between buildings, some of which remain today.

However, the existing vegetation has significantly been altered from its original state and the majority of the vegetation is either exotic or non-endemic and would therefore be of planted origins. Generally, the composition, structure and function of vegetation within the subject land and the surrounding landscape have been altered significantly and do not resemble any naturally occurring PCTs. The subject land is an artificial landscape with planted garden beds and planted trees situated throughout the campus. Subsequently, all of the woody vegetation within the subject land predominately forms a single mapping unit of 'Urban Exotic/Native vegetation' as described below. This unit has been further divided into 'Endemic', 'Non-Endemic' and 'Exotic', as shown in **Figure 3**.

3.2. Vegetation Communities

A description of the vegetation communities present in the subject land is provided below and their distribution within the subject land is shown in **Figure 3**. The area of each vegetation community found within the subject land is shown in **Table 3**.

Table 3 Vegetation communities found within the subject land

Vegetation Community	Subject Land (ha)
Endemic Vegetation	0.05
Non-endemic Vegetation	0.10
Exotic Vegetation	0.40
TOTAL	0.55

3.2.1. Endemic Vegetation

BC Act Status: Not listed

EPBC Act Status: Not listed

Approximately 0.05 ha of endemic vegetation is located in patches in the south-eastern portion of the subject land, including within the site. Small patches of endemic vegetation are also found in the north-western portion of the subject land (see **Figure 3**).

Canopy species found within this vegetation community include *Syncarpia glomulifera* (Turpentine) and *Angophora hispida* (Dwarf Apple), as well as small shrubs and trees such as *Pittosporum undulatum* (Sweet Pittosporum) and *Grevillea sericea* (Pink Spider Flower). Endemic ground cover includes *Lomandra longifolia* (Spiny-headed Mat-rush) and *Oplismenus aemulus*.

A representative photograph of this vegetation community is provided in **Photograph 1** below.

Photograph 1. Endemic canopy vegetation (Dwarf Apple in the background) found within the subject land



3.2.2. Non-endemic Vegetation

BC Act Status: Not listed

EPBC Act Status: Not listed

Approximately 0.10 ha of non-endemic vegetation is located within the subject land, mostly restricted to the south-eastern portion of the subject land, with the majority of this vegetation community occurring within the site. Additionally, a small patch is located in the north-western portion of the subject land, adjacent to the native garden (see **Figure 3**).

Canopy species found within this vegetation community include *Syzygium francisii* (Giant Water Gum) and *Brachychiton acerifolius* (Illawarra Flame Tree), with small shrubs and trees such as *Syzygium paniculatum* (Magenta Lilly Pilly) and *Howea forsteriana* (Kentia Palm). Non-endemic ground cover includes *Dicksonia antarctica* (Soft Treefern) and *Cyathea cooperi* (Straw Treefern).

A representative photograph of this vegetation community is provided in **Photograph 2** below.

Photograph 2. Non-endemic vegetation found within the subject land



3.2.3. Exotic Vegetation

BC Act Status: Not listed

EPBC Act Status: Not listed

The majority of the vegetation found within the subject land (~0.40 ha) consists of exotic species, including within the site. This vegetation community is found scattered throughout the subject land, as patches of exotic grassland or garden bed plantings (see **Figure 3**).

Canopy species found within this vegetation community include *Araucaria heterophylla* (Norfolk Island Pine), *Jacaranda mimosifolia* (Jacaranda), *Magnolia grandiflora* (Southern Magnolia) and *Cinnamomum camphora* (Camphor Laurel), as well as small shrubs and trees such as *Strelitzia* sp. (Bird of Paradise), *Gardenia jasminoides*, *Buxus microphylla*, and *Rosa* sp. (Roses). Exotic ground cover includes *Stenotaphrum secundatum* (Buffalo Grass) and *Axonopus fissifolius* (Narrow-leafed Carpet Grass),

A representative photograph of this vegetation community is provided in **Photograph 3** below.

Photograph 3. Exotic vegetation (Camphor Laurel on the right) found within the subject land



3.3. Flora Species

3.3.1. General Species

A total of 85 species were recorded within the subject land during field surveys, including 37 native species and 48 exotic species. Of the native species recorded in the subject land, the most frequently recorded plant family was the Myrtaceae (12 species), and Proteaceae (5 species) families. Of the exotic species recorded in the subject land, the most frequently recorded plant families include the Apocynaceae (2 species), Scrophulariaceae (2 species) and Strelitziaceae (2 species).

The floral assemblage across the subject land is a reflection of previous clearing for urban development and current land uses which have resulted in the subject land being dominated by planted exotic ground cover and understorey, combined with some native canopy species, including non-endemic plantings. A total species list for the subject land is provided in **Appendix A**.

3.3.1.1. Priority Weeds and Weeds of National Significance

No State Priority Weeds or Weeds of National Significance listed under the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2017) under the NSW *Biosecurity Act 2015* have been identified within the subject land.

Eight species are classified as High Threat Exotics under the BAM and five species are also classified as Other Weeds of Regional Concern. **Table 6** in **Appendix A** details the status of the weeds found within the subject land.

3.3.2. Threatened Ecological Communities

As the vegetation identified as Urban Exotic/Native within the subject land is comprised of a combination of exotic and native species of planted origin situated within a highly artificial context, it is not considered to conform to any Threatened Ecological Communities listed under either the BC Act or the Commonwealth EPBC Act.

3.3.3. Threatened Species

No existing records of naturally occurring threatened flora species are present on the subject land.

One threatened species, *Syzygium paniculatum* (Magenta Lilly Pilly), listed as Endangered under the BC Act and Vulnerable under the EPBC Act, was identified within the subject land. The subject land is outside of the natural range and habitat of this species and it is also regularly planted as ornamental species. Therefore, for the purposes of this assessment, this species is not considered to constitute threatened flora species as they comprise planted individuals within a landscaped gardenbed.

Although threatened flora species are known to occur within the locality (see **Appendix B**), due to the highly developed and artificial nature of the subject land as well as the lack of threatened species found during surveys, it is considered unlikely that any threatened flora species would occur naturally within the subject land.

3.4. Fauna

3.4.1. Fauna Habitat

The primary habitat for native fauna within the subject land is the native and exotic plantings throughout the campus. This vegetation may fall within the foraging range of a variety of native fauna species, including threatened species. The foraging resources of the subject land would be expected to be utilised occasionally and opportunistically by birds, bats and arboreal mammals. Nectivorous and frugivorous species may utilise the native and exotic vegetation within the subject land to feed on blooms and fruit, whilst insectivorous species such as Microchiropteran bats may forage for insects throughout the canopy layer. No hollow-bearing trees or nests were observed within the subject land, ruling out the possibility of breeding habitat for hollow nesting and roosting species. One small building located in the north-western corner of the subject land which contains a roof cavity and may provide potential roosting habitat for microchiropteran bats.

3.4.2. General Species

Seven vertebrate fauna species have been recorded from the subject land during surveys. A total species list for the subject land is provided in **Table 4**.

Table 4 Fauna species list

Family	Common Name	Scientific Name	BC Act Status	EPBC Act Status	Detection Method
Artamidae	Australian Magpie	<i>Cracticus tibicen</i>	-	-	W
Corvidae	Australian Raven	<i>Corvus coronoides</i>	-	-	W
Meliphagidae	Noisy Miner	<i>Manorina melanocephala</i>	-	-	O,W
Psittaculidae	Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	-	-	O,W
Scincidae	Elegant Snake-eyed Skink	<i>Cryptoblepharus pulcher</i>	-	-	O
Scincidae	Rainbow Skink	<i>Lampropholis delicata</i>	-	-	O
Sturnidae	Common Myna	<i>Acridotheres tristis</i>	-	-	O,W

O= Observed, W = Heard Calling

3.4.3. Threatened Species

No threatened fauna species were recorded within the subject land during surveys. A limited number of threatened fauna species are known to occur within the locality of the subject land (see **Appendix B**). A review of the BioNet Atlas records of threatened fauna species within 5 km of the subject land includes two Powerful Owl sightings previously recorded within the subject land. Threatened fauna that would be expected to utilise the foraging resources within the subject land and immediate surrounds include highly mobile, aerial species such as:

- Grey-headed Flying-fox (*Pteropus poliocephalus*),
- Powerful Owl (*Ninox strenua*), and
- Microchiropteran bats.

Of the 95 threatened and migratory fauna species known or predicted to occur within the locality, a total of six have been assessed as having potential to occur within the subject land. These are considered in more detail in the sections below.

3.4.3.1. Grey-headed Flying Fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable under the BC Act and the EPBC Act. The Grey-headed Flying-fox inhabits subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH 2019d). The primary food source is blossom from eucalypts (genera *Eucalyptus*, *Corymbia* and *Angophora*), melaleucas and banksias, and in some areas it also utilises a wide range of fruits of rainforest trees (DoE 2019). As none of the vegetation communities used by this species produces continuous foraging resources throughout the year, it has adopted complex migration traits in response to ephemeral and patchy food resources (DoE 2019). Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH 2019d). The Grey-headed Flying-fox is generally found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria (OEH 2019d).

The BioNet Atlas holds 868 records of Grey-headed Flying-fox within the locality. The Fairlight (Balgowlah) roosting camp is located approximately 17 km to the north-east and the Gladesville roosting camp is located approximately 15 km west of the subject land, both of which are within foraging range of the species (Department of the Environment and Energy 2015). The high number of records can also be attributed to the proximity of the subject land to the Royal Botanic Garden camp which was dispersed in 2012. Grey-headed Flying-fox individuals from these camps as well as other camps in Sydney are likely to fly over the subject land in search of foraging resources such as nectar and pollen (OEH 2019d). Whilst Grey-headed Flying-foxes are likely to opportunistically forage within the subject land, it does not contain a roosting camp.

3.4.3.2. Powerful Owl

The Powerful Owl (*Ninox strenua*) is listed as Vulnerable under the BC Act. The species inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest (OEH 2019g). Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials (DEC (NSW) 2006). The main prey items of this species are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider, with birds and flying foxes occasionally being consumed (OEH 2019g). Roosting occurs in groves of dense mid-canopy trees or tall shrubs in sheltered gullies, typically on wide creek flats and at the heads of minor drainage lines, but also adjacent to cliff faces and below dry waterfalls (DEC (NSW) 2006). This species nests in old hollow eucalypts in unlogged, unburnt gullies and lower slopes within 100 m of streams or minor drainage lines, with hollows greater than 45 cm diameter and greater than 100 cm deep; surrounded by canopy trees and sub-canopy or understorey trees or tall shrubs (DEC (NSW) 2006). In NSW, the Powerful Owl is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains (OEH 2019g).

The BioNet Atlas holds 274 records of the Powerful Owl within the locality, including two within the north-western portion of the subject land. The Powerful Owl occupies a territory of up to 4000 ha and may occasionally and opportunistically hunt for arboreal mammal prey species such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) within the subject land as part of a larger foraging range (OEH 2019g). However, the Urban Exotic/Native vegetation within the subject land would not be expected to support an abundance of prey species as no hollow-bearing trees are present. Nonetheless, the Powerful Owl may opportunistically utilise the limited foraging values within the subject land to hunt for prey such as Ring-tailed Possums (*Pseudocheirus peregrinus*), which may have the potential to occur.

3.4.3.3. Microchiropteran Bats

Species anticipated to frequent the subject land include but are not limited to the following, all of which are listed as Vulnerable under the BC Act:

- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Little Bent-winged Bat (*Miniopterus australis*);
- Southern Myotis (*Myotis macropus*); and
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*).

These species of microchiropteran bats (microbats) are found along the east coast of Australia. Although some primarily roost in caves (e.g. Large Bent-winged Bat and Little Bent-winged Bat) or tree hollows (e.g. Eastern Coastal Free-tailed Bat), all four species have been known to roost in buildings or other man-made structures (OEH 2019e, a, b, c). They prey on insects and other prey items above or just below tree canopy.

The BioNet Atlas holds 20 records across all four species. Microbats bats are also known to forage for insects in urban areas and would be expected to occasionally and opportunistically access the foraging resources within the subject land. The subject land contains very limited suitable breeding or refuge habitat for these species as the subject land lacks hollow-bearing trees considered suitable for roosting (OEH 2019e, a, b, c, f) . Man-made structures are present, but are well maintained and lack appropriate entry points, except for one small building located in the north-western corner of the subject land which contains a roof cavity (see **Figure 3**). This building is located well outside the site and will remain intact as potential habitat for resident microbats.

No microbats were observed on the site during the inspection of holes, cracks and crevices within the undercroft carpark, artificial sportsfields and immediate surrounding area. Furthermore, no calls were recorded by the Anabat unit during surveys. Therefore, the structures proposed to be removed are not considered to contain suitable roosting or breeding habitat for threatened microbat species.

4. Impact Assessment

4.1. Introduction

This chapter considers the ecological impacts of the Project on the biodiversity values within the subject land. The demolition, earthworks and construction of new building infrastructure will result in localised soil disturbance and the removal of a small area of vegetation within the impact area.

The ecological impacts of the Project are largely related to the direct disturbance of vegetation and associated habitat loss, represented by the removal of a small area of native and urban vegetation. Secondary impacts due to potential indirect impacts are also relevant to the Project and are discussed below.

4.2. Direct Impacts

The direct impacts of the Project include the clearing of some urban native/exotic vegetation to allow for the removal of required existing buildings, the construction of new structures, and removal of associated habitat. The extent of impacts from the proposed development on vegetation communities within the subject land is shown in **Table 4** and **Figure 4**. Direct impacts are discussed further in subsequent sections.

Table 4 Areas of vegetation and land to be impacted within the subject land

Vegetation Community	Subject Land (ha)	Site (ha)
Endemic Vegetation	0.05	0.02
Non-endemic Vegetation	0.10	0.05
Exotic Vegetation	0.40	0.04
TOTAL	0.55	0.11

4.2.1. Vegetation Removal in Impact Area

The site consists of 0.11 ha of urban native/exotic vegetation, including 0.02 ha of endemic vegetation, 0.05 ha of non-endemic vegetation and 0.04 ha of exotic (see **Figure 4**).

A total of 14 trees are proposed to be removed as part of the project and comprise seven native species and seven exotic species (Truth About Trees 2020). All of the other understorey vegetation proposed to be removed consists of planted natives and planted exotics.

The removal of endemic and non-endemic urban native/exotic vegetation is not expected to be significant as they do not constitute endemic plant communities and the only threatened species listed under the BC Act or the EPBC Act is the planted *Syzygium paniculatum* (Magenta Lilly Pilly). Large areas of similar vegetation occur in the locality, including the subject land, and will remain intact.

4.2.2. Habitat Feature Removal

The removal of vegetation in the subject land will result in a small reduction in the extent of potential foraging habitat for native species occurring in the locality including some threatened species. The foraging habitat to be removed is expected to only be utilised opportunistically by highly mobile and aerial species as part of a larger foraging range including the nearby St Leonards Park, Forsyth Park and Badangi Reserve, and no species

are expected to solely rely on the habitat within the subject land. Potential impacts to specific threatened fauna species are considered in more detail in **Section 4.6**.

4.3. Indirect Impacts

4.3.1. Edge Effects

Edge effects are impacts that occur at the interface between natural habitats, especially forests and disturbed or developed land (Yahner 1988). When an edge is created between woodland and a cleared area, changes to ecological processes within the vegetation can extend between 10 m and 100 m from the edge (Yahner 1988). These include microclimatic changes in light, temperature, humidity and wind, which can favour a suite of different species and therefore cause significant changes to the ecology of the patch (Lindenmayer and Fischer 2006). Edge effects can also result from the increase in noise and artificial light from a project.

4.3.2. Construction Impacts

A number of indirect impacts relevant to the construction phase of the Project have the potential to impact the remaining ecological values of the subject land, such as those relating to dust, noise, light and erosion.

4.3.2.1. Noise

Noise can affect animal physiology and behaviour, and if it becomes an ongoing stress, it can be injurious to an animal's energy budget, reproductive success and long-term survival. There are other potential impacts that include habitat loss through avoidance, reduced reproductive success and a retreat away from favourable habitats (AMEC 2005).

It is likely that most animal species will habituate to the periodic noise disturbance (AMEC 2005), and the construction phases of the project are likely to cause temporary disturbance only to fauna. In the long term, the levels of noise are not likely to be higher than existing levels in an urban environment and are not expected to have a significant, long-term, impact on any wildlife populations.

4.3.2.2. Light

The Project has the potential to increase the level of artificial light in the natural environment. Increased light levels may adversely impact wildlife by direct glare, chronic or periodic increased illumination and temporary unexpected fluctuations in light levels (Saleh 2007, Longcore and Rich 2010).

While the Project will have some effect on the surrounding environment, the impacts from light pollution are likely to be minimal. The subject land is located in an urban environment that is already subject to high levels of artificial light, and therefore light pollution from the Project is unlikely to have a significant or long-term impact on any fauna species.

4.3.2.3. Erosion

During the construction of the proposed project the retained vegetation can be impacted by sedimentation and erosion. Cutting and filling of the subject land for foundations is likely to increase potential erosion. Eroded sediment can smother retained vegetation if appropriate control measures are not implemented. Smothering can reduce regeneration of groundcover species and enter drainage lines. Sediment and eroded material can

also contain weed matter and nutrients, and movement of this material into the retained vegetation can facilitate the spread of weeds. Increased weed invasion can result in changes to community composition.

With the implementation of appropriate sediment control methods, the risk of sedimentation is considered to be minor and temporary.

4.4. Impacts to Threatened Ecological Communities

No Threatened Ecological Community (TECs) has been identified on either the subject land or Site and therefore the Project is not expected to have any impact on TECs.

4.5. Impacts to Threatened Flora Species

One threatened species, *Syzygium paniculatum* (Magental Lilly Pilly) was recorded in the subject land, including the Site, during field surveys. However, all individuals are cultivated plants which formed part of the landscaping of Monte Campus, and their conservation significance is therefore reduced. No threatened flora species are considered to have the potential to occur naturally within the subject land due to the subject land's highly modified nature. Therefore, the proposed development is unlikely to significantly impact on any threatened flora species listed under the BC Act or EPBC Act, or suitable habitat for threatened species.

4.6. Impacts to Threatened Fauna Species

No threatened fauna species were observed within the subject land during the time of field surveys. A total of six threatened fauna species listed under the BC Act, one of which are also listed under the EPBC Act, are considered to have the potential to occur within the subject land due to the presence of suitable habitat. These include the Grey-headed Flying-fox, Powerful Owl and microchiropteran bats.

Tests of Significance were undertaken for all species considered to have the potential to occur within the subject land (see **Appendix C**). Groups of species that share similar habitat requirements were assessed collectively and are summarised below.

4.6.1. Grey-headed Flying Fox

The Grey-headed Flying-fox is considered to have the potential to utilise the subject land for foraging purposes as part of a much broader foraging range. They roost/breed in camps which do not occur within the subject land.

A Test of Significance has been prepared for this species and is presented in **Appendix C**. This assessment indicates that the proposed development is unlikely to have a significant impact on this species.

4.6.2. Powerful Owl

The Powerful Owl is considered to have the potential to occur within the subject land as potential foraging habitat is present. However, this species is highly mobile and would likely only utilise the subject land on occasion as part of a much broader foraging range. This species is unlikely to utilise the subject land for roosting purposes as no suitably large hollows for roosting are present. It is more likely that the species roosts in the adjacent council reserve and may forage within the subject land.

A Test of Significance has been prepared for this species and is presented in **Appendix C**. This assessment indicates that the proposed development is unlikely to have a significant impact on this species.

4.6.3. Microchiropteran Bats

- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Little Bent-winged Bat (*Miniopterus australis*);
- Southern Myotis (*Myotis macropus*); and
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*).

The above listed five microchiropteran bat species are considered to have the potential to utilise the subject land for foraging purposes. These species are highly mobile and would likely only utilise the subject land as part of a much broader foraging range. No tree hollows were identified during surveys and 0.44 ha of urban native/exotic vegetation which may comprise potential roosting habitat for these species is being retained. Furthermore, no suitable roosting or breeding habitat was identified within the structures proposed to be demolished on the site during microchiropteran bat surveys. Therefore, only a small area of potential foraging habitat will be removed. This habitat is unlikely to be important to the long-term survival of any of these species in the locality and it is considered unlikely that the proposed development will have a significant impact on any of these species.

A Test of Significance has been prepared for these species and is presented in **Appendix C**. This assessment indicates that the proposed development is unlikely to have a significant impact on these species.

5. Mitigation Measures

5.1. Introduction

The purpose of this chapter is to outline the mitigation measures proposed to ameliorate the impacts of the Project on biodiversity values. As demonstrated in previous chapters, despite the Site being highly modified, it provides some habitat for threatened species. As a result, there is a need to implement measures to minimise impacts to these entities.

5.2. Mitigation Measures

5.2.1. Inductions

Site inductions are to be given by the civil contractor to ensure all site workers and visitors are aware of ecological issues associated with the subject land and the locations of any no access areas.

5.2.2. Access Restrictions

To avoid unnecessary removal or damage to vegetation to be retained adjacent to the subject land, the clearing area should be clearly demarcated and signed to ensure no vegetation beyond these boundaries is removed. Clearing works and equipment should be excluded from areas outside the clearing area.

5.2.3. Erosion, Sedimentation and Pollution Control

To reduce sedimentation on the construction site, erosion control measures should be implemented. This includes minimising the amount of exposed soils on the site at any given time. All soil stockpiles should be adequately covered when not in use to prevent erosion through heavy rainfall.

Sediment fences should be established around the perimeter of the development area to prevent the impacts of sedimentation on adjoining vegetation and the adjacent drainage line. During development, precautions should be taken to ensure that no pollution, such as petrochemical substances or water containing suspended solids, escapes the construction site. Pollution traps and efficient removal of pollution to an off-site location would help to minimise pollution impacts.

5.2.4. Pre-clearing and Clearing Surveys

Pre-clearing surveys are to be undertaken by a suitably qualified ecologist. Pre-clearing surveys will include the provision of a report following the completion of a pre-clearing survey, detailing the location and type of each habitat feature.

To minimise impacts to native fauna species, clearing is to be undertaken in the following two-stage process under the supervision of a suitably qualified ecologist:

- The initial phase of clearing will involve clearing around identified habitat features and leaving the features overnight; and
- The second stage will involve clearing of the habitat features left overnight followed by an inspection.

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

- All persons 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 should be assisted to move to the adjacent vegetation; and
- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal.

5.2.5. Landscaping

A total of 40 trees are proposed to be planted as a mitigation measure for the 14 trees being removed as part of the project (Spackman Mossop and Michaels Landscape Architects 2020). The proposed plantings incorporate a variety of urban native/exotic species, charactersitic of the exisiting vegetation found throughout the subject land. Proposed tree species to be planted include *Magnolia x soulangeana* 'Alba Superba', *Backhousia citriodora* (Lemon Myrtle), *Cornus Contraversa* 'June Snow', *Acmena smithii* (Dwarf Lilly Pilly) and *Tristanopsis laurina* (Water Gum). Shrubs proposed to be planted include *Leptospermum leavigatum* and *Acacia cognata*, and ground cover species such as *Myoporum parviflora* (Creeping Boobialla) and *Hibbertia scandens* (Snake Vine) are proposed to be included.

In time, these plantings will provide foraging and potentially roosting habitat for native fauna species found within the subject land and in the locality.

5.2.6. Weed Control Measures

High threat exotics occurring within the subject land should be managed in order to prevent further spread. As such, it is recommended that all vegetation removed from the subject land should be disposed of appropriately as identified in the Regional Strategic Weed Management Plan.

5.3. Environmental Risk Assessment and Mitigation Measures

The environmental risks and mitigation measures detailed in this FFA are summarised in **Table 5** below.

Table 5 Risk assessment and mitigation measures

Impact	Potential Impact	Approach	Residual Impact
Biodiversity	Potential impacts of the development on biodiversity value of the site, including the clearing of native vegetation to accommodate the Project.	A suite of measures are proposed to mitigate or minimise the impacts of the Project, including access restriction, erosion, sedimentation and pollution controls during construction, pre-clearance protocols during vegetation clearing, landscape replantings and weed control measures.	The tree plantings proposed in the landscape plan will take time to mature. However, they will provide foraging and potentially roosting habitat for native species found within the subject land and the locality, including threatened species.

6. Conclusion

The Project involves the demolition and construction of a new Sports and Science Building and associated landscape works. An assessment was undertaken to determine the potential impacts of the Project on the biodiversity values of the subject land. The Project does trigger the BOS under the BC Act as it is a SSD, however a waiver was granted by the consent authority and therefore this FFA has been prepared to document the findings of the ecological assessment undertaken within the subject land.

The project is considered highly unlikely to have significant impacts upon defined biodiversity values as impacts are limited to highly modified areas. The project is anticipated to impact ~0.11 ha of Urban Exotic /Native planted vegetation (0.02 ha endemic vegetation, 0.05 ha non-endemic vegetation and 0.04 ha of exotic vegetation) that does not conform to any recognised PCT. The management and maintenance arrangements proposed in this FFA, in combination with the plantings proposed in the Landscape Plan will mitigate the loss of habitat found on the subject land. The Project is only anticipated to impact a small area, with the majority of existing vegetation remaining throughout the subject land.

The vegetation on the subject land comprises potential foraging habitat for a number of highly mobile threatened fauna species including the Grey-headed Flying-fox, Powerful Owl and Microchiropteran bats. All of these species access resources from a wide area and are unlikely to be dependent on the resources present in the subject land. A Test of Significance has been prepared for all these species which indicates that a significant impact is unlikely to occur to threatened fauna species as a result of the project.

The ecological investigation undertaken for this assessment indicates that the anticipated impacts to threatened species habitat are manageable and will not result in significant impacts. Additionally, a referral to the Commonwealth under the EPBC Act is not warranted as the Project will only be impacting opportunistic foraging habitat for the GHFF. Notwithstanding this, a suite of mitigation measures are proposed to minimise the impacts on biodiversity values within the subject land.

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APPENDIX A :

Flora Species List

Table 6 Flora species found within the subject land

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	Weed Status	Site	Subject Land
Agavaceae	<i>Agave americana</i>	Century Plant	*				X	
Alliaceae	<i>Agapanthus praecox</i>		*			OWRC	X	X
Amaryllidaceae	<i>Clivia miniata</i>		*				X	X
Anthericaceae	<i>Chlorophytum comosum</i>	Spider Plant	*			HTW	X	
Apocynaceae	<i>Plumeria alba</i>	White Frangipani	*				X	X
Apocynaceae	<i>Trachelospermum jasminoides</i>		*				X	
Araceae	<i>Monstera deliciosa</i>	Fruit Salad Plant	*				X	X
Araceae	<i>Philodendron</i>		*					X
Araceae	<i>Spathiphyllum spp.</i>		*					X
Araliaceae	<i>Schefflera arboricola</i>		*				X	
Araucariaceae	<i>Araucaria heterophylla</i>	Norfolk Island Pine	*				X	
Arecaceae	<i>Archontophoenix cunninghamiana</i>	Bangalow Palm					X	
Arecaceae	<i>Livistona australis</i>	Cabbage Palm						X
Aspleniaceae	<i>Asplenium australasicum</i>	Bird's Nest Fern					X	X
Asteliaceae	<i>Cordyline australis</i>	Cabbage Tree	*				X	X
Asteraceae	<i>Senecio hispidulus</i>	Hill Fireweed						X
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	*					X

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	Weed Status	Site	Subject Land
Bignoniaceae	<i>Jacaranda mimosifolia</i>	Jacaranda	*				X	X
Brassicaceae	<i>Cardamine hirsuta</i>	Common Bittercress	*					X
Buxaceae	<i>Buxus microphylla</i>		*					X
Caprifoliaceae	<i>Lonicera japonica</i>	Japanese Honeysuckle	*			HTW, OWRC	X	X
Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew						X
Convallariaceae	<i>Ophiopogon japonicus</i>	Dwarf lilyturf	*				X	X
Crassulaceae	<i>Crassula spp.</i>	Stonecrop						X
Cunoniaceae	<i>Ceratopetalum gummiferum</i>	Christmas Bush						X
Cyatheaceae	<i>Cyathea cooperi</i>	Straw Treefern					X	X
Cyperaceae	<i>Cyperus eragrostis</i>	Umbrella Sedge	*			HTW		X
Dicksoniaceae	<i>Dicksonia antarctica</i>	Soft Treefern					X	X
Euphorbiaceae	<i>Euphorbia prostrata</i>	Red Caustic Weed	*					X
Fabaceae (Caesalpinioideae)	<i>Gleditsia triacanthos</i>	Honey Locust	*			HTW, OWRC		X
Geraniaceae	<i>Geranium spp.</i>							X
Hamamelidaceae	<i>Liquidambar spp.</i>		*					X
Hydrangeaceae	<i>Hydrangea macrophylla</i>		*					X
Lamiaceae	<i>Lavandula angustifolia</i>		*					X
Lamiaceae	<i>Westringia fruticosa</i>	Coastal Rosemary						X

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	Weed Status	Site	Subject Land
Lauraceae	<i>Cinnamomum camphora</i>	Camphor Laurel	*			HTW, OWRC	X	
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed rush						X
Lomandraceae	<i>Lomandra longifolia</i> 'Tanika'	Spiny-headed rush						X
Lythraceae	<i>Lagerstroemia indica</i>		*				X	X
Magnoliaceae	<i>Magnolia grandiflora</i>	Southern Magnolia	*					X
Malaceae	<i>Photinia serratifolia</i>	Chinese Photinia	*					X
Malvaceae	<i>Brachychiton acerifolius</i>	Illawarra Flame Tree					X	
Melastomataceae	<i>Tibouchina spp.</i>		*					X
Moraceae	<i>Ficus microcarpa</i>		*					X
Musaceae	<i>Musa spp.</i>	Banana	*				X	X
Myrtaceae	<i>Angophora hispida</i>	Dwarf Apple						X
Myrtaceae	<i>Backhousia citriodora</i>		*					X
Myrtaceae	<i>Callistemon citrinus</i>	Crimson Bottlebrush						X
Myrtaceae	<i>Callistemon viminalis</i>	Weeping Bottlebrush						X
Myrtaceae	<i>Lophostemon confertus</i>	Brush Box					X	
Myrtaceae	<i>Syncarpia glomulifera</i>	Turpentine					X	
Myrtaceae	<i>Syzygium 'cascade'</i>						X	
Myrtaceae	<i>Syzygium francisii</i>	Giant Water Gum					X	

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	Weed Status	Site	Subject Land
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly		E	V		X	X
Myrtaceae	<i>Syzygium spp.</i>							X
Myrtaceae	<i>Tristaniopsis laurina</i>	Kanooka					X	
Myrtaceae	<i>Waterhousea floribunda</i>	Weeping Lilly Pilly						X
Oxalidaceae	<i>Oxalis latifolia</i>		*					X
Passifloraceae	<i>Passiflora herbertiana</i>							X
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax-lily						X
Phyllanthaceae	<i>Glochidion ferdinandi</i>	Cheese Tree					X	
Pinaceae	<i>Cedrus deodara</i>	Deodar Cedar	*					X
Pinaceae	<i>Pinus spp.</i>		*					X
Pittosporaceae	<i>Pittosporum undulatum</i>	Sweet Pittosporum						X
Platanaceae	<i>Platanus x acerifolia</i>	Hybrid Plane	*					X
Poaceae	<i>Axonopus fissifolius</i>	Narrow-leafed Carpet Grass	*			HTW		X
Poaceae	<i>Oplismenus aemulus</i>							X
Poaceae	<i>Phragmites australis</i>	Common Reed						X
Poaceae	<i>Stenotaphrum secundatum</i>	Buffalo Grass	*			HTW	X	X
Polygonaceae	<i>Persicaria decipiens</i>	Slender Knotweed						X
Polypodiaceae	<i>Platynerium bifurcatum</i>	Elkhorn Fern					X	X
Proteaceae	<i>Banksia ericifolia</i>	Heath-leaved Banksia						X

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	Weed Status	Site	Subject Land
Proteaceae	<i>Banksia serrata</i>	Old-man Banksia						X
Proteaceae	<i>Grevillea robusta</i>	Silky Oak						X
Proteaceae	<i>Grevillea sericea</i>	Pink Spider Flower					X	
Rosaceae	<i>Rosa spp.</i>		*				X	X
Rubiaceae	<i>Gardenia jasminoides</i>		*				X	X
Rutaceae	<i>Murraya paniculata</i>		*			OWRC		X
Salicaceae	<i>Populus nigra</i>	Lombardy Poplar	*			HTW		X
Sapindaceae	<i>Acer palmatum</i>	Japanese Maple	*					X
Scrophulariaceae	<i>Antirrhinum spp.</i>		*					X
Scrophulariaceae	<i>Digitalis purpurea</i>	Foxglove	*					X
Strelitziaceae	<i>Strelitzia nicolai</i>		*				X	
Strelitziaceae	<i>Strelitzia reginae</i>		*				X	
Theaceae	<i>Camellia japonica</i>	Camellia	*				X	X

Key : HTW = High Threat Weed under the BAM, OWRC = Other Weed of Regional Concern

APPENDIX B :

Threatened Species Likelihood of Occurrence Tables



Table 7 Flora likelihood of occurrence

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Casuarinaceae	<i>Allocasuarina glareicola</i>	-	E	E	Species or species habitat may occur within area	Grows in Castlereagh woodland on lateritic soil with Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla and Melaleuca decora. Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.	Unlikely. Associated species not recorded within the subject land and outside of its known range. No previous sightings within the area and species not recorded during Cumberland Ecology surveys.
Casuarinaceae	<i>Allocasuarina portuensis</i>	Nielsen Park She-oak	E	E	6	No original plants left at original site, but plantings can be found at Neilson Park and other locations in the Woollahra LGA. Original habitat is tall closed woodland above a sandstone shelf with sandy, coarse soils.	Unlikely. Subject land is not a closed woodland. Additionally, species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>	-	V	-	5	Epacris purpurascens var. purpurascens occurs in sclerophyll forest, scrubs and swamps, from Gosford and Sydney districts in the Central Coast botanical subdivision. It is found in a large array of habitat types, though mostly in areas with a strong shale influence.	Unlikely. Subject land does not contain suitable habitat. Limited records within the locality and species not recorded during Cumberland Ecology surveys.
Fabaceae (Mimosoideae)	<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	Species or species habitat may occur within area	Found in heath and woodland on sandy soils. Prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside, spoil mounds and in recently burnt patches.	Unlikely. No suitable habitat found within the subject land. No records within the locality and species not recorded during Cumberland Ecology surveys.
Fabaceae (Mimosoideae)	<i>Acacia pubescens</i>	Downy Wattle	V	V	Species or species habitat may occur within area	Occurs on alluviums, shales and at the intergrade between shales and sandstones. Occur in open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	Unlikely. Subject land does not contain suitable habitat. No records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Fabaceae (Mimosoideae)	<i>Acacia terminalis</i> <i>subsp. terminalis</i>	Sunshine Wattle	E	E	60	Confined to the eastern suburbs of Sydney between Botany Bay and the northern foreshore of Port Jackson. Found in open coastal eucalypt woodland or forest, usually in sandy soil on creek banks, hill-slopes, or in shallow soil in rock crevices and sandstone platforms on cliffs.	Unlikely. Subject land consists primarily of landscaped garden beds. Species not recorded during Cumberland Ecology surveys.
Lamiaceae	<i>Prostanthera junonis</i>	Somersby Mintbush	E	E	Species or species habitat may occur within area	Known to occur in 9 populations on the Somersby Plateau, north-west of Gosford. It occurs in gently undulating landscapes over weathered Hawkesbury sandstone within open forest, low woodland, and open scrub.	Unlikely. Subject land located outside of species' known range. No records within the locality and not recorded during Cumberland Ecology surveys.
Malvaceae	<i>Lasiopetalum joyceae</i>	-	V	V	1	Occurs on the Hornsby Plateau south of the Hawkesbury River. Grows in heath on sandstone on lateritic and shale soils on ridgetops. Associated with Shale/Sandstone Transition Forest and Turpentine-Ironbark Forest.	Unlikely. Associated plant communities not found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Myrtaceae	<i>Darwinia biflora</i>	-	V	V	Species or species habitat may occur within area	Occurs within an area comprising Maroota to the north, North Ryde to the south, Cowan to the east, and Kellyville to the west. Prefers the edges of weathered shale-capped ridges where shale intergrades with Hawkesbury Sandstone.	Unlikely. Subject land outside of known range. No records within the locality and species not recorded during Cumberland Ecology surveys.
Myrtaceae	<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	Species or species habitat likely to occur within area	The species has been recorded as occurring in coastal areas from Raymond Terrace in the north to Waterfall in the south. It occurs mostly in small, scattered stands in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the edges of tall heath and low open woodland. It grows in shallow sandy soils overlying Hawkesbury Sandstone.	Unlikely. No records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	5	Has a natural range from east of Tamworth to north of Glen Innes. It occurs in grassy or sclerophyll woodland. The species has been cultivated since 1975 and is a popular street planting species throughout the east coast of Australia.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Myrtaceae	<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	Species or species habitat may occur within area	Occurs in damp areas, often near watercourses, on alluvium soils over shale. Vegetation communities associated with the species include 'Eucalypt open-forest' with Sydney Blue Gum (<i>Eucalyptus saligna</i>), Swamp Mahogany (<i>Eucalyptus robusta</i>) and Mountain Cedar Wattle (<i>Acacia elata</i>) and in 'Paperbark scrub' with Prickly-leaved Paperbark (<i>Melaleuca styphelioides</i>), Snow-in-summer (<i>Melaleuca linariifolia</i>), White Feather Honey myrtle (<i>Melaleuca decora</i>), Sieber's Paperbark (<i>Melaleuca sieberi</i>) and <i>Melaleuca nodosa</i> .	Unlikely. Associated vegetation communities not found within the subject land. No records within the locality and species not recorded during Cumberland Ecology surveys.
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	-	1	Occurs in coastal districts from Batemans Bay in NSW to Bundaberg in Qld. It is found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest, usually on volcanic and sedimentary soil.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	15	Species occurs naturally from Forster in the north to Jervis Bay in the south. It is found in rainforest on sandy soils or on sand dunes at low altitude in coastal areas. It is most commonly associated with littoral and gallery rainforest types. The species is extensively cultivated as an ornamental plant.	Present - Recorded within the subject land
Orchidaceae	<i>Caladenia tessellata</i>	Thick-lipped Spider-orchid	E	V	Species or species habitat likely to occur within area	Distributed along the eastern coast of Australia from the Central Coast to the Westernport region in Victoria. It favours low, dry sclerophyll vegetation with a heathy, or occasionally grassy understorey, or sedgy open forest. Soils it prefers are drained sand and clay loams.	Unlikely. No records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Orchidaceae	<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	Species or habitat likely to occur within area	Occur in a wide variety of habitats including heathlands, heathy woodlands, sedgeland, Xanthorrhoea spp. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests. Soils are generally considered to be moist and sandy, however, this species is also known to grow in dry or peaty soils. Is associated with the community Bloodwood / Scribbly Gum / Silver-top Ash Forest on the South Coast. Species is known to have occurrence associated with other <i>Cryptostylis</i> species. Flowering occurs generally from November to February.	Unlikely. Associated vegetation communities not found within the subject land. No records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Orchidaceae	<i>Genoplesium baueri</i>	Bauer's Orchid	E	E	Species or species habitat likely to occur within area	Grows in dry sclerophyll forest and in moss gardens over sandstone and flowers February to March.	Unlikely. No suitable habitat found within the subject land. No records within the locality and species not recorded during Cumberland Ecology surveys.
Polygonaceae	<i>Persicaria elatior</i>	Tall Knotweed	V	V	Species or species habitat may occur within area	Has been recorded in South-eastern and northern NSW. Usually grows in damp places, especially besides streams and lakes. Occasionally found in swamp forest or associated with disturbance.	Unlikely. No suitable habitat found within the subject land. No records within the locality and species not recorded during Cumberland Ecology surveys.
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Persoonia	E	E	Species or species habitat likely to occur within area	Has a scattered distribution along the east coast from Singleton in the north to Bargo in the south, and the Blue Mountains to the west. It is found in mostly small populations on sandy soils in dry sclerophyll forest, woodland, and heath.	Unlikely. No records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Rutaceae	<i>Asterolasia elegans</i>	-	E	E	Species or species habitat may occur within area	Occurs on Hawkesbury sandstone growing between sandstone boulders and rocky outcrops found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. It is currently only known from 7 populations occurring in the hills north of Maroota within a 22 km ² extent of occurrence.	Unlikely. Subject land located outside of species' known range. No records within the locality and not recorded during Cumberland Ecology surveys.
Santalaceae	<i>Thesium australe</i>	Austral Toadflax	V	V	Species or species habitat may occur within area	Found in very small populations scattered across eastern NSW. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (<i>Themeda australis</i>).	Unlikely. Subject land is located near the coast. No records within the locality and not recorded during Cumberland Ecology surveys.
Thymelaeaceae	<i>Pimelea curviflora</i> <i>var. curviflora</i>	-	V	V	Species or species habitat likely to occur within area	Occurs on ridge tops and upper slopes in open forest and woodland on sandy soils derived from sandstone, on shale/lateritic soils, and on shale/sandstone transition soils.	Unlikely. No records within the locality and species not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. of Records	Habitat Requirements	Likelihood of Occurrence
Thymelaeaceae	<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	Species or species habitat may occur within area	Found on well-structured clay soils in Cumberland Plain and Illawarra environments. In the inland Cumberland Plain sites it is associated with Grey Box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey.	Unlikely. Associated vegetation communities not found within the subject land. No records within the locality and species not recorded during Cumberland Ecology surveys.

Key: E = Endangered, V = Vulnerable

Table 8 Fauna likelihood of occurrence

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood of Occurrence
Amphibia									
Hylidae	Litoria aurea	Green and Golden Bell Frog	E	V		Species or species habitat known to occur within area	Marshes, dams, stream sides, particularly those containing bulrushes or spikerushes; unshaded water bodies free of Gambusia form optimum habitat; vegetation and/or rocks are needed for sheltering.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Myobatrachidae	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V		Species or species habitat may occur within area		Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat is generally soaks or pools within first or second order streams and are commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. Largely confined to sandstone in the Sydney Basin.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Myobatrachidae	<i>Mixophyes balbus</i>	Stuttering Frog	E	V		Species or species habitat likely to occur within area		Found in rainforest and wet, open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Occurs in deep leaf litter and thick understorey vegetation, and breeds in streams after heavy rain.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Myobatrachidae	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	-		56		Has a distribution restricted to the Sydney Basin, from Pokolbin in the north, Nowra to the south, and Mt Victoria in the Blue Mountains to the west. It inhabits ephemeral drainage lines below sandstone ridges that often have shale caps, in open forests on Hawkesbury and Narrabeen Sandstones. The species utilises dense vegetation and debris besides water in the breeding season. Outside of breeding season the species is found under rocks, logs, and leaf litter nearby to breeding areas.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Aves

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-		41		Found in coastal habitats and around terrestrial wetlands, including rivers, swamps, lakes and the sea.	Unlikely. No preferred foraging or breeding habitat found within the subject land and no nests found during Cumberland Ecology surveys.	
Accipitridae	<i>Hieraaetus morphnoides</i>	Little Eagle	V	-		1		Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Unlikely. No preferred foraging or breeding habitat found within the subject land. Limited records within the locality and no nests found during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite	V	-		1		Found in a variety of timbered habitats including dry woodlands and open forests. It is a specialist hunter preying on passerine birds, especially honeyeaters and targets predominately nestlings and insects occurring in the tree canopy. It nests in tree forks or on large horizontal tree limbs located mostly along or near watercourses.	Unlikely. No preferred foraging or breeding habitat found within the subject land. Limited records within the locality and not observed during Cumberland Ecology surveys.	
Anseranatidae	<i>Anseranas semipalmata</i>	Magpie Goose	V	-		1		Species mainly found in shallow wetlands with dense growth of rushes or sedges. Also found around dry ephemeral swamps, wet grassland and floodplains. Roosts in tall vegetation.	Unlikely. No preferred foraging or breeding habitat found within the subject land. Limited records within the locality and not observed during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift	P		Migr.	5		Species has been recorded throughout NSW, but mostly east of the Great Divide. The species is almost exclusively aerial in Australia and breeds overseas. It forages from a metre above the ground, up to hundreds of metres in altitude, and mostly occur over inland plains, though sometimes over foothills, and coastal areas.	Unlikely. Limited foraging habitat found within the subject land. Limited records within the locality and nor recorded during Cumberland Ecology surveys.	
Apodidae	<i>Hirundapus caudacutus</i>	White-throated Needletail	P		Migr.	16		Species is almost exclusively aerial, and is found commonly overhead of wooded areas and heathland. Is less commonly found overhead of grassland and swamps.	Unlikely. Limited records within the subject land and not sighted during Cumberland Ecology surveys conducted during relevant season.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Ardeidae	<i>Ardea ibis</i>	Cattle Egret	P		Migr.	2		Utilises temperate and tropical grasslands, wooded lands and terrestrial wetlands. Often forages away from water on low-lying grasslands.	Unlikely. Limited foraging habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E		E	1		Occurs in freshwater wetlands, and more rarely, estuarine wetlands. It favours wetlands with tall, dense vegetation, and forages in shallow water up to a depth of 0.3m. It nests in deep vegetative cover over shallow pools.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Ardeidae	<i>Egretta sacra</i>	Eastern Reef Egret	P		-	1		Species found along the Australian coast and islands, but is most common on the Queensland coast and the Great Barrier Reef area. Lives on beaches, rocky shores, tidal rivers and inlets, mangroves and exposed coral reefs.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood of Occurrence
Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	V	-		2		Inhabits terrestrial and estuarine wetlands, generally in areas containing permanent water and dense vegetation. The species can occur in flooded grassland, woodland, rainforest, and mangroves. It feeds on frogs, reptiles, fish, and invertebrates such as snails, dragonflies, shrimp and crayfish. It roosts during the day on the ground amongst dense reeds or within trees. It nests in branches overhanging water.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Artamidae	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		-	1		Occurs from Atherton Tableland in Queensland, down to Tasmania and west to the Eyre Peninsula in South Australia. In NSW it occurs from the coast to the western slopes of the Great Dividing Range and farther west. It breeds primarily on the western slopes of the Great Dividing Range in woodland and open dry forest. The species often occurs in eucalypt woodland and forest, though is also found in shrubland and heathland. It forages both above and below the canopy primarily for invertebrates, though will occasionally consume nectar, fruit and seed.	Unlikely. Limited foraging habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-		2		Lives in open forest and woodlands with a sparse, grassy ground layer, and fallen timber. It feeds on insects and small insects and vertebrates including frogs, lizards, and snakes. Nesting is undertaken in a scrape or small bare patch.	Unlikely. Limited habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Cacatuidae	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-		1		Occurs within a variety of forest and woodland types. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage, but appears to favour well timbered country through which it habitually flies as it moves about.	Unlikely. Subject land is not heavily timbered. Limited records found within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Cacatuidae	<i>Calyptrorhynchus lathamii</i>	Glossy Black-Cockatoo	V	-		2		Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m ASL in which stands of She-Oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur.	Unlikely. No <i>Allocasuarinas</i> present within the subject land. Limited records found within the locality and not sighted during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name		BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Charadriidae	<i>Charadrius leschenaultii</i>	Greater plover	Sand-	V		V, Migr.	Species or species habitat known to occur within area	Breeds in the northern hemisphere and annually migrates to the southern hemisphere to feeding grounds summer. During summer in Australia it is widespread through the continent, though predominately occurs in north-western Australia. Most records in NSW are from the Clarence and Richmond estuaries. It is restricted to coastal areas, occurring mainly on sheltered sandy, shelly, or muddy beaches or estuaries. It roosts during high tide on beaches and shores and forages at low tide away from the edge of the water on wet ground. It feeds on insects, crustaceans, worms and molluscs.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.		

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Charadriidae	<i>Charadrius mongolus</i>	Lesser Sand Plover	V		E, Migr.	Species or species habitat known to occur within area	Breeds in the Northern Hemisphere and migrates to Australia. Found in coastal areas, around beaches, mudflats, bays and estuaries, sand flats and dunes. Occasionally found in mangrove mudflats.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.		
Charadriidae	<i>Charadrius veredus</i>	Oriental Plover	P		Migr.	1	Species is most common in coastal areas and northern Australia. It is generally found inland in open grasslands in arid or semi-arid areas and occasionally in estuarine or littoral environments. Prefers flat inland plains, including claypans, playing fields and cattle camps.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.		

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Charadriidae	<i>Pluvialis squatarola</i>	Grey Plover	P	Migr.		2		Breeds in the Arctic and migrates to the southern hemisphere in summer. It is almost entirely coastal, found mainly on marine shores, inlets, estuaries and lagoons with large tidal mudflats, sandy beaches and rocky coasts.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Charadriidae	<i>Thinornis rubricollis rubricollis</i>	Hooded Plover	E	Migr.		Species or species habitat likely to occur within area		The species inhabits coastal areas, on or near high energy sandy beaches. They are generally found close to the shore but may visit coastal lakes.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Columbidae	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V	-		9		Inhabits rainforest and closed forests where it forages high in the canopy, preferring figs and palms. Occasionally occurs in eucalypt or acacia woodland where fruit-bearing trees are present.	Unlikely. Subject land is not a rainforest or closed forest. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Dasyornithidae	<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E		Species or species habitat likely to occur within area		Inhabits low dense vegetation in: sedgeland, heathland, swampland, shrubland, sclerophyll forest and woodland, and rainforest. Found near the coast, on tablelands and in ranges.	Unlikely. No dense vegetation found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedeidae	<i>Diomedea antipodensis</i>	Antipodean Albatross	V	V		Foraging, feeding or related behaviour likely to occur within the area		Marine and pelagic species. Nests in open patchy vegetation on ridges, slopes and plateaus.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Diomedidae	<i>Diomedea exulans</i>	Wandering Albatross	E	E		1		Marine and pelagic species that nests on islands near coastal or inland ridges, slopes, plateaux and plains, often on marshy ground.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedidae	<i>Diomedea antipodensis gibsoni</i>	Gibson's Albatross	V	V		Foraging, feeding or related behaviour likely to occur within the area		Marine and pelagic species that nests on islands near coastal or inland ridges, slopes, plateaux and plains, often on marshy ground.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedidae	<i>Diomedea epomophora epomophora</i>	Southern Royal Albatross	-	V		Foraging, feeding or related behaviour likely to occur within the area		Marine and pelagic species. Nests on large islands and islets.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Diomedidae	<i>Diomedea sanfordi</i>	Northern Royal Albatross	-	E		Foraging, feeding or related behaviour likely to occur within the area	Marine and pelagic species. Nests on large islands and islets.		Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedidae	<i>Thalassarche bulleri</i>	Pacific Albatross	-	V		Species or species habitat may occur within area	In Australia, Buller's Albatross are seen over inshore, offshore and pelagic waters. Breeds and nests in the New Zealand region.		Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedidae	<i>Thalassarche bulleri platei</i>	Northern Buller's Albatross	-	V, Migr.		Species or species habitat may occur within area	The Pacific Albatross is a marine, pelagic species. It occurs in subtropical and subantarctic waters of the South Pacific Ocean. The species occurs over inshore, offshore and pelagic waters and forages off the surface waters of the ocean.		Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Diomedidae	<i>Thalassarche cauta cauta</i>	Shy Albatross	V	V, Migr.		Foraging, feeding or related behaviour likely to occur within the area		Marine species that nests on level or gently sloping ledges, summits, slopes and caves of rocky islets and stacks, usually in broken terrain with little soil and vegetation.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedidae	<i>Thalassarche salvini</i>	Salvin's Albatross	-	V		Foraging, feeding or related behaviour likely to occur within the area		Marine species that nests on level or gently sloping ledges, summits, slopes and caves of rocky islets and stacks, usually in broken terrain with little soil and vegetation. It occurs both inshore and offshore, entering harbours and bays.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Diomedidae	<i>Thalassarche cauta steadi</i>	White-capped Albatross	-	V, Migr.		Foraging, feeding or related behaviour likely to occur within the area		Marine species that nests on slopes vegetated with tussock and succulents on Auckland Island.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedidae	<i>Thalassarche eremita</i>	Chatham Albatross	-	E		Foraging, feeding or related behaviour likely to occur within the area		Marine species that nests on level or gently sloping ledges, summits, slopes and caves of rocky islets and stacks, usually in broken terrain with little soil and vegetation.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Diomedidae	<i>Thalassarche impavida</i>	Campbell Albatross	-	V		Species or species habitat may occur within area		Marine species, in winter, they are commonly found in the coastal waters of continents, over up-wellings or boundaries of currents.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Diomedidae	<i>Thalassarche melanophris</i>	Black-browed Albatross	V	V		Species or species habitat may occur within area		Marine species that breeds on subantarctic and peri-Antarctic islands. Species is rarely sighted over land away from its breeding islands.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Laridae	<i>Hydroprogne caspia</i>	Caspian Tern	P	Migr.		1		Found throughout Australia, they forage on fish caught offshore or in freshwater lakes.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Laridae	<i>Sterna hirundo</i>	Common Tern	P	Migr.		5		Breeds in the Northern Hemisphere and migrates to Australia during the summer months. It is mainly coastal and found in offshore waters, ocean beaches, estuaries and large lakes.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Laridae	<i>Sternula albifrons</i>	Little Tern	E	Migr.		1		Migratory bird which spends part of the year in eastern Asia and breeds in the north, east, and south-east Australian coasts from Shark Bay in Western Australia to the gulf of St Vincent in South Australia. Within NSW it occurs mainly north of Sydney, although occurs in small numbers south to Victoria. It is an almost exclusively coastal species, preferring sheltered environments, though has been known to occur several kilometres from the sea in harbours, inlets, and rivers. It nests in small colonies in low dunes or on sandy beaches above the high tide mark.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Laridae	<i>Sternula nereis nereis</i>	Australian Fairy Tern	-	V		Species or species habitat known to occur within the area		Species nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. It has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline. It roosts on beaches at night.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood of Occurrence
Meliphagidae	<i>Anthochaera phrygia</i>	Regent Honeyeater	C E	CE		Species or species habitat known to occur within the area	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes.	Unlikely. No associated flora species or communities found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Meliphagidae	<i>Grantiella picta</i>	Painted Honeyeater	V	V		Species or species habitat may occur within area		Sparsely distributed from south-eastern Australia to north-western Queensland and eastern North Territory. Most records and all breeding records are from the inland slopes of the Great Dividing Range between the Grampians in Victoria, to Roma in Queensland. It moves north-south following the fruiting of mistletoe species. It feeds predominately on mistletoe fruits, but occasionally nectar of eucalypts, mistletoes, and potentially banksias, and arthropods. The species prefers woodlands with large numbers of mature trees which host mistletoes. The species nests in mistletoes.	Unlikely. No mistletoes present within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V -			1		Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Unlikely. Limited habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Oceanitidae	<i>Fregetta grallaria grallaria</i>	White-bellied Storm Petrel	V V			Species or species habitat likely to occur within area		Breed only on offshore islands in the Lord Howe Island group. Occurs in NSW coastal waters, particularly after storm events.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Phaethontidae	<i>Phaethon lepturus</i>	White-tailed Tropicbird	P Migr.			1		Coastal species that breeds on tropical islands. Feeds on fish and squid caught by surface plunging.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Procellariidae	<i>Ardenna grisea</i>	Sooty Shearwater	P	Migr.		4		Breeds on small islands in the south Pacific and south Atlantic Oceans. It forages on fish and squid, commonly caught on the surface by trailing whales and fishing boats.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Procellariidae	<i>Ardenna pacificus</i>	Wedge-tailed Shearwater	P	Migr.		3		Breeds in colonies on small islands off the coast of Australia, including Lord Howe Island, Montague Island and Lady Elliot Island. They feed pelagically on fish, squid and crustaceans.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Procellariidae	<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	P	Migr.		2		Breeds on small islands in Bass Strait and Tasmania before migrating to the Northern Hemisphere for the summer. It forages on food in the open ocean.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Procellariidae	<i>Macronectes giganteus</i>	Southern Giant-Petrel	E	E		Species or species habitat may occur within area		Pelagic species with a circumpolar range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Procellariidae	<i>Macronectes halli</i>	Northern Giant-Petrel	V	V		Species or species habitat may occur within area		Pelagic species with a circumpolar pelagic distribution, usually between 40-64°S in open oceans. Their range extends into subtropical waters (to 28°S) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Procellariidae	<i>Pachyptila turtur subantarctica</i>	Fairy Prion (southern)	-	V		Species or species habitat known to occur within area		Occupies Macquarie Island and other sub-antarctic islands outside of Australia. Dogs burrows among rocks and low vegetation for nesting. Forages along the surface waters of the ocean.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Procellariidae	<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel	V	E		1		Marine bird that nests on Cabbage Tree Island and Boondelbah Island, in rock crevices and hollows in fallen trees.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Procellariidae	<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel	V	V		Foraging, feeding or related behaviour likely to occur within the area		Marine species that breeds on Ball's Pyramid and Phillip Island, in crevices amongst rocks.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Psittacidae	<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-		8		Forages mostly in the canopy of open Eucalyptus forest and woodland, on Eucalypt species, and species of Angophora, Melaleuca, and other trees. Riparian habitats are ideal for the species due to higher productivity of flowering feed species. Isolated trees in paddocks and roadside remnants, along with urban trees can help sustain populations of the species. The species roosts in tree tops, often some distance from food trees, though prefers to nest in close proximity to feed areas. The species nests in hollows with a small entrance (3 cm) and at a height of between two and fifteen metres. Often nest trees are in riparian areas, and include trees of species like Allocasuarina spp.	Unlikely. Limited habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Psittacidae	<i>Lathamus discolor</i>	Swift Parrot	E	CE		6		Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	Unlikely. Limited habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	E	E		Species or species habitat likely to occur within area		Inhabits fringes of shallow inland wetlands, swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Unlikely. No habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	P	Migr.		2		Found along all coastlines of Australia, and many inland areas. It does not breed in Australia. It utilises coastal and inland wetlands, predominately occurring in estuaries and stream deltas, and upstream banks, though has been recorded around lakes, pools, billabongs, reservoirs, dams, and claypans. It forages in shallow water or on soft mud at the edges of wetlands, for molluscs, crustaceans, and insects.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Scolopacidae	<i>Calidris canutus</i>	Red Knot	P	E, Migr.		Species or species habitat known to occur within area		Summer migrant from the Northern Hemisphere where it breeds. In NSW it mainly occurs on intertidal mudflats, estuaries, bays, inlets, lagoons, harbours, sandflats, and sandy beaches, of sheltered coasts. It is occasionally found closer to the open ocean, and rarely in terrestrial saline and freshwater swamps. It forages near the water's edge on worms, bivalves, gastropods, crustaceans, and echinoderms. It roosts on sandy beaches, spits, islets, and mudflats close to feeding grounds in open areas.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Scolopacidae	<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE, Migr.		Species or species habitat known to occur within area		Occurs around coastal areas and is widespread inland. The species occupies mainly intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and around non-tidal swamps. They forage for invertebrates at the edges of shallow waters. The species generally roosts in dunes and sandy areas.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Scolopacidae	<i>Calidris tenuirostris</i>	Great Knot	V	CE, Migr.		Species or species habitat known to occur within area		Breeds in the Northern Hemisphere and migrates south from late Aug - Mar. Occurs within sheltered, coastal habitat with large intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Scolopacidae	<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	-	V, Migr.		Species or species habitat known to occur within area	Breeds in the Northern Hemisphere and migrates to Australia. Occurs mainly in coastal habitat such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoon and bays.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.		
Scolopacidae	<i>Limosa lapponica menzbieri</i>	Northern Siberian Bar-tailed Godwit	-	CE, Migr.		Species or species habitat known to occur within area	Breeds in the Northern Hemisphere and migrates to Australia. Occurs mainly in coastal habitat such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoon and bays.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.		

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Scolopacidae	<i>Numenius madagascariensis</i>	Eastern Curlew	P	CE, Migr.		Species or species habitat likely to occur within area		Breeds in the Northern Hemisphere and spends the non-breeding season in all states of Australia in coastal areas and rarely inland. In NSW it is distributed along all coastal areas but it mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River and Richmond River. It occupies lakes, inlets, bays and estuarine habitat. It is mainly found in intertidal mudflats and sometimes saltmarsh. It forages at the edge of shallow water and roosts on sandy spits and islets especially on dry beach sand.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Strigidae	<i>Ninox connivens</i>	Barking Owl	V	-		5		Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. Nests in hollows of large, old eucalypts. Hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations it becomes more reliant on birds, invertebrates and terrestrial mammals. Requires very large permanent territories in most habitats due to sparse prey densities.	Unlikely. No breeding habitat present due to lack of hollows and limited foraging habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Strigidae	<i>Ninox strenua</i>	Powerful Owl	V	-		274		The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. It breeds and hunts in open or closed sclerophyll forests or woodlands and occasionally hunts in open habitats. Roosting during the day time occurs in dense vegetation of Eucalypts and species such as Syncarpia glomulifera (Turpentine), Angophora floribunda (Rough-barked Apple), and other species. Prey species are medium-sized arboreal mammals. As most prey species require hollows and a shrub layer these are important habitat components also of the Powerful Owl. Nests are in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at	Potential - would utilise habitat periodically as part of a broader foraging range. No breeding habitat present.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act Status	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
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breast height of 80-240 cm)
that are at least 150 years
old.

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Tytonidae	<i>Tyto tenebricosa</i>	Sooty Owl	V	-		2		Occurs in coastal rainforest, including dry, subtropical, and temperate rainforests, and moist eucalypt forests. Utilises tall trees in heavily vegetated areas for day time resting. It hunts during the night for small ground or tree dwelling mammals such as the Common Ringtail Possum or Sugar Glider. The species requires very large tree hollows for nesting.	Unlikely. No breeding habitat present due to lack of hollows and limited foraging habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	
Mammalia										
Balaenidae	<i>Balaenoptera musculus</i>	Blue Whale	E	E		Species or species habitat may occur within area		Marine species that breeds in warm water, preferring open seas rather than coastal waters. Often feeds during spring and summer on krill close to the ice edge.	Unlikely. No suitable habitat present within the subject land.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Balaenidae	<i>Eubalaena australis</i>	Southern Right Whale	E	E		2		Marine species found in temperate and subpolar waters of the Southern Hemisphere. Migrate between summer feeding grounds in Antarctica and winter breeding grounds around the coast of southern Australia, New Zealand, South Africa and South America.	Unlikely. No suitable habitat present within the subject land.	
Balaenopteridae	<i>Megaptera novaeangliae</i>	Humpback Whale	V	V		6		Marine species found in oceans and coastal waters worldwide. Around Australia, migrates from summer cold water feeding grounds in subantarctic waters to warm water winter breeding grounds in the Great Barrier Reef.	Unlikely. No suitable habitat present within the subject land.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Burramyidae	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	-		1		Species is found in a broad range of habitats from rainforest to wet and dry sclerophyll forests through to woodland and heath. Woodland and heath habitats are preferred. The species feeds on pollen and nectar from banksias, eucalypts, and bottlebrushes, though will eat soft fruits when flowers are unavailable, and will also eat insects throughout the year. They shelter in tree hollows, rotten stumps, holes in the ground, abandoned birds nests and Ringtail Possum dreys, and thickets of vegetation. Tree hollows are preferred for nesting but the species will also nest under tree bark and shredded bark in tree forks.	Unlikely. Limited habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Dasyuridae	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E		Species or species habitat likely to occur within area		Occurs in wide variety of habitats; rainforest, open forest, woodland, coastal heath and riparian forest. Uses hollows in trees, logs and rock crevasses as den sites.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Macropodidae	<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V		Species or species habitat likely to occur within area		Occupies rock outcrops, escarpments and cliffs with features such as caves, fissures and ledges. Browses on adjacent vegetation. Has a home range of about 15 ha and shelters in caves.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Miniopteridae	<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-		4		Inhabits moist eucalypt forest, rainforest, wet and dry sclerophyll forest, melaleuca swamps, dense coastal forests and banksia scrub, preferring well timbered areas. Species roosts in caves, tunnels, tree hollows, stormwater drains, culverts, bridges and sometimes in buildings.	Potential - would utilise habitat periodically as part of a broader foraging range. May roost in small building with roof cavity in north-western corner of subject land. Not recorded on the site during Cumberland Ecology surveys.	
Miniopteridae	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-		68		Roosts mainly in caves but also in tunnels, mines or buildings. Non-breeding populations disperse within a 300 km range of maternity caves. Hunting for moths and other insects takes place in forested areas above the canopy.	Potential - would utilise habitat periodically as part of a broader foraging range. May roost in small building with roof cavity in north-western corner of subject land. Not recorded on the site during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Molossidae	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-		10		Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts in tree hollows but will also roost under bark or in man-made structures.	Potential - would utilise habitat periodically as part of a broader foraging range. May roost in small building with roof cavity in north-western corner of subject land. Not recorded on the site during Cumberland Ecology surveys.	
Muridae	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V		Species or species habitat may occur within area		Occurs in open habitats (heathland, woodland and forest) with a heath understorey and vegetated sand dunes. The species prefers deep soft top soils in order to burrow.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Otariidae	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V	-		5		Prefers rocky parts of islands with jumbled terrain and boulders.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Otariidae	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V	-		6		Prefers rocky parts of islands with flat, open terrain along the NSW coast.	Unlikely. No suitable habitat found within the subject land.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Peramelidae	<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot	E	E		Species or species habitat likely to occur within area	Within NSW, the species is rare and almost exclusively restricted to the coastal fringe of the state, from the southern side of the Hawkesbury River in the north to the Victorian border in the south. More specifically, the subspecies is considered to occur primarily in two areas: (i) Kuring-gai Chase and Garigal National Parks; and (ii) in the far south-east corner of the state. Occurs within their distribution in a variety of habitats including heathland, shrubland, sedgeland, heathy open forest and woodland.	Unlikely. Subject land is outside of known areas. Limited habitat found within subject land, no records within the locality and not recorded during Cumberland Ecology surveys.		

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood of Occurrence
Petauridae	<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-		1		Found throughout eastern Australia, from northern Queensland to western Victoria. Inhabits mature Box, Box-Ironbark woodlands and River Red Gum forests west of the Great Diving Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Requires abundant tree hollows for refuge and nest sites.	Unlikely. Associated community or hollows not present within the subject land. Limited records found within the locality and not recorded during Cumberland Ecology surveys.
Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	V	V		3		Inhabits eucalypt woodlands and forests, feeding on the leaves of Eucalyptus species. They feed on the foliage of more than 70 Eucalypt species and 30 non-eucalypt species.	Unlikely. No Eucalyptus species found within the subject land. Limited records within the area and not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Pseudocheiridae	<i>Petauroides volans</i>	Greater Glider	-	V		Species or species habitat likely to occur within area	Restricted to eastern Australia, and occurring from the Windsor Tableland in Queensland south to Wombat State Forest in central Victoria. Largely restricted to eucalypt forests and woodlands. The diet is predominately comprised of eucalypt leaves, and more rarely flowers. Highest abundances occur in tall montane forests with old trees and abundant hollows.	Unlikely. No Eucalyptus species found within the subject land. No records within the area and not recorded during Cumberland Ecology surveys.		
Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V		868	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Commonly found in gullies, close to water, in vegetation with a dense canopy.	Potential - would utilise habitat periodically as part of a broader foraging range. No breeding habitat present.		

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Vespertilionidae	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V		Species or species habitat likely to occur within area		Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin. Found in well-timbered areas containing gullies.	Unlikely. No suitable habitat found within the subject land due to lack of well-timbered areas and gullies as well as caves and cliffs. No records within the locality and not recorded during Cumberland Ecology surveys.	
Vespertilionidae	<i>Myotis macropus</i>	Southern Myotis	V	-		36		Roosts close to water in caves, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish. Known from a range of habitats close to water from lakes, small creeks to large lakes and mangrove lined estuaries	Potential. May utilise habitat periodically as part of a broader foraging range. May roost in small building with roof cavity in north-western corner of subject land. Not recorded on the site during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Vespertilionidae	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-		1		Found mainly in the gullies and river systems that drain the Great Dividing Range. Usually roosts in tree hollows and buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects. Species is not known to occur in areas of high urban density.	Unlikely. Subject land is located in a high density area with no tree hollows. Limited records within the locality.	
Reptilia										
Cheloniidae	<i>Caretta caretta</i>	Loggerhead Turtle	E	E		1		Occurs in the waters of coral and rocky reefs, seagrass beds and muddy bays throughout eastern, northern and western Australia.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Cheloniidae	<i>Chelonia mydas</i>	Green Turtle	V	V			Foraging, feeding or related behaviour known to occur within the area	Species nests, forages and migrate across tropical northern Australia. They usually occur between the 20°C isotherms, although individuals can stray into temperate waters.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Cheloniidae	<i>Natator depressus</i>	Flatback Turtle	-	V			Foraging, feeding or related behaviour known to occur within the area	Found only in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.	
Dermochelyidae	<i>Dermochelys coriacea</i>	Leatherback Turtle	E	E		1		Occurs in tropical, subtropical and temperate waters throughout the world, venturing close to shore mainly during the nesting season.	Unlikely. No suitable habitat found within the subject land. Limited records within the locality and not recorded during Cumberland Ecology surveys.	

Family	Scientific Name	Common Name	BC Status	Act	EPBC Act	No. of Records	Locality	Habitat Requirements	Likelihood Occurrence	of
Cheloniidae	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	-	V		Species or species habitat known to occur within area	Species occurs in the northern Great Barrier Reef and Torres Strait, but have been seen in temperate regions as far south as northern NSW.	Unlikely. No suitable habitat found within the subject land. No records within the locality.		
Elapidae	<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	-	V		Species or species habitat likely to occur within area	Found in rocky outcrops and adjacent sclerophyll forest and woodland. The most suitable sites occur on sandstone ridgetops. During autumn, winter, and spring the species shelters in rock crevices and under flat exposed sandstone rocks on cliff edges. In Summer it shelters in the hollows of large trees, within 200 m of escarpments.	Unlikely. No suitable habitat found within the subject land. No records within the locality and not recorded during Cumberland Ecology surveys.		

Key: E = Endangered, V = Vulnerable, Migr = Migratory

APPENDIX C :

Tests of Significance

C.1. Introduction

This appendix contains the formal Tests of Significance required under Section 7.3 of the BC Act that have been prepared in accordance with the Threatened Species Test of Significance Guidelines (NSW Government 2018). The Test of Significance is used for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats.

Tests of Significance have been provided for communities and species listed as vulnerable, endangered or critically endangered under the BC Act. Each Test of Significance is a series of factors (shown as italicised text below) for which a response has been supplied beneath in plain text.

C.2. Fauna

C.2.1. Powerful Owl

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

The Powerful Owl has been recorded in the locality, including to records within the north-western portion of the subject land. The local population is considered to extend beyond the subject land, particularly into nearby St Leonards Park, Forsyth Park and Oyster Cove Reserve. This species would be expected to utilise the foraging resources within the subject land occasionally or opportunistically as part of a broader habitat range.

The Powerful Owl will primarily be impacted by the Project through indirect impacts of removal of some opportunistic foraging habitat within the subject land. Due to the modified nature of the habitat within the subject land, and the lack of suitably large tree hollows, this species is not considered likely to breed within the subject land. The habitat to be impacted within the subject land is not considered important for the long-term survival of the species within the locality. Sufficient foraging habitat will be retained within the subject land. Accordingly, the Project is not considered to have an adverse effect on the life cycle of this species such that a viable local population is likely to be placed at risk of extinction.

in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

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

Not applicable.

In relation to the habitat of a threatened species or ecological community:

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

- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,*

Approximately 0.11 ha of vegetation will be removed from within the subject land, constituting marginal foraging habitat for the Powerful Owl. However, the majority of the trees are being retained and will continue to provide habitat for this species. Impacts associated with the Project are anticipated to be localised and overall are not considered to cause a substantial change in the extent of the habitat for these species.

The Project is not considered likely to increase fragmentation of habitat as the majority of native canopy trees within the subject land will be retained and only a small area of marginal foraging habitat will be removed.

Previous land uses have resulted in the modification of the habitat of the Powerful Owl within the subject land. Given the condition of the habitat and its modified nature, the small area of habitat directly and indirectly impacted by the Project is not considered important for the long-term survival of Powerful Owl in the locality.

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

No area of outstanding biodiversity value is located in the locality of the subject land. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

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

The project will result in the key threatening process 'Clearing of native vegetation' as 0.11 ha of urban exotic/native vegetation will be removed. The Project will only remove a small area of a highly modified native vegetation and is not considered likely to substantially increase the impact of this key threatening process.

Conclusion

The Urban Native/Exotic vegetation within the subject land constitutes foraging habitat for the Powerful Owl. Of this extent, only a small area is anticipated to be cleared with the majority of trees being retained within the wider subject land. Previous land use has resulted in the modification of the habitat for the Powerful Owl within the subject land, with its occurrence comprising of mostly planted canopy trees above an understorey of exotic and native species. Some reduction in native vegetation extent will take place as part of the project; however this is not expected to risk the survival of the remaining trees and no fragmentation of this vegetation will take place. Furthermore, large areas of similar habitat will remain in the nearby St Leonards Park and locality. The Project is not considered likely to result in a significant impact to the Powerful Owl.

C.2.2. Grey-headed Flying Fox

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

The Grey-headed Flying Fox has not been recorded within the subject land; however the species has been recorded extensively in the locality and it has potential to occur due to the presence of suitable foraging habitat. The subject land does not contain a roosting camp for the species and therefore it would not breed within the subject land. The local population of this species is considered to extend far beyond the subject land, with known breeding camps located approximately 17 km north-east in Fairlight (Balgowlah) and 15 km west in Gladesville Park. This species is aerial and highly mobile and would be expected to occasionally utilise the foraging resources within the subject land as part of a larger foraging range.

The Grey-headed Flying Fox will primarily be impacted by the Project through direct removal of a small area of modified foraging habitat within the subject land. The habitat to be impacted within the subject land is comprised of degraded native urban and exotic vegetation and is not considered important for the long-term survival of the species within the locality. The majority of native canopy trees within the wider subject land will be retained and will continue to provide habitat for this species. Accordingly, the Project is not considered to have an adverse effect on the life cycle of this species such that a viable local population is likely to be placed at risk of extinction.

in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

Not applicable.

In relation to the habitat of a threatened species or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,*

Approximately 0.11 ha of Urban Native/Exotic vegetation occurring within the subject land will be removed which constitutes foraging habitat for the Grey-headed Flying Fox. However, the majority of native canopy trees are being retained. Impacts associated with the Project are anticipated to be localised and overall are not considered to cause a substantial change in the extent of the habitat for the species.

The Project is not considered to significantly increase fragmentation of habitat as it involves the removal of a small area of modified marginal foraging habitat with the majority of canopy trees will remaining which will continue to provide connectivity in the landscape.

Previous land uses have resulted in the modification of the habitat of the Grey-headed Flying Fox within the subject land. Given the condition of the habitat to be removed and its highly degraded nature, the small area of habitat directly and indirectly impacted by the Project is not considered important for the long-term survival of the Grey-headed Flying Fox in the locality.

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

No area of outstanding biodiversity value is located in the locality of the subject land. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

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

The project will result in the key threatening process 'Clearing of native vegetation' as 0.11 ha of urban exotic/native vegetation will be removed, reducing the area of foraging habitat available for the Grey-headed Flying Fox. However, the Project will only remove a small number of canopy trees and a small area of a highly modified native vegetation.

Conclusion

The Urban Native/Exotic vegetation occurring within the subject land constitutes potential foraging habitat for the Grey-headed Flying Fox. The majority of canopy trees present are being retained and will continue to provide habitat for this species. Previous land use has resulted in the modification of the habitat for the Grey-headed Flying Fox within the subject land, and it comprises a mostly planted canopy trees above an understorey of exotic and native species. Some reduction in native vegetation extent will take place as part of the project; however, this is not expected to risk the survival of the remaining trees and no fragmentation of this vegetation will take place. Furthermore, large areas of similar habitat will remain in nearby St Leonards Park and locality. The direct and indirect impacts of the Project are not considered to result in a significant impact to the Grey-headed Flying Fox.

C.2.3. Microchiropteran Bats

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

Several threatened microchiropteran bats have been recorded in the locality and have potential to occur in the subject land due to the presence of suitable foraging habitat. The local populations of these potentially occurring species are considered to extend far beyond the subject land into nearby St Leonards Park, Forsyth Park and Oyster Cove Reserve. This group of species are aerial and highly mobile and would be expected to occasionally utilise the foraging resources within the subject land as part of a larger foraging range.

Microchiropteran bats will primarily be impacted by the Project through direct removal of foraging habitat within the subject land. No hollow-bearing trees or roosting habitat in the form of man-made structures, such as buildings or bridges, will be removed by the proposed development. The habitat to be impacted within the

subject land is not considered important for the long-term survival of the species within the locality. Accordingly, the Project is not considered to have an adverse effect on the life cycle of these species such that a viable local population is likely to be placed at risk of extinction.

in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

Not applicable.

In relation to the habitat of a threatened species or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,*

Approximately 0.11 ha of vegetation will be removed from within the subject land, constituting foraging habitat for microchiropteran bats. No man-made structures or tree species containing hollows suitable for roosting by microchiropteran bats are being removed. Impacts associated with the Project are anticipated to be localised and overall are not considered to cause a substantial change in the extent of the habitat for the species.

The Project is not considered to significantly increase fragmentation of habitat as it involves the removal of a small area of modified planted foraging habitat nearby higher quality habitat. Furthermore, the majority of trees will be retained in the subject land, thereby maintaining connectivity in the landscape.

Previous land uses have resulted in the modification of the habitat for microchiropteran bats within the subject land. Given the condition of the habitat and its highly degraded nature, the small area of habitat directly and indirectly impacted by the Project is not considered important for the long-term survival of the microchiropteran bats.

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

No area of outstanding biodiversity value is located in the locality of the subject land. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

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

The project will result in the key threatening process of 'Clearing of native vegetation'. This is relevant to these species as it reduces the area of foraging habitat available for microchiropteran bats. That notwithstanding, the Project will only remove a small number of trees and only a small area of highly modified urban native and exotic vegetation will be removed.

Conclusion

The project will result in the removal of a small area of Urban Native/Exotic vegetation occurring within the subject land that constitutes potential foraging habitat for microchiropteran bats. However, the majority of planted trees are being retained and will continue to provide habitat for these species. The urban native and exotic vegetation is not considered to provide high quality habitat for microchiropteran bats. Some reduction in native vegetation extent will take place as part of the project; however, no fragmentation of this vegetation will take place. Furthermore, large areas of similar habitat will remain in nearby St Leonards Park and locality. Accordingly, the direct and indirect impacts of the Project are not considered to result in a significant impact to microchiropteran bats.

FIGURES



Legend

Subject Land

Coordinate System: MGA Zone 56 (GDA 94)



Image Source:
Image © NearMap 2020
Dated: 22/10/2019

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
North Sydney LGA

cumberland
ecology

Figure 1. Subject land: Monte Sant' Angelo Mercy College landholdings

0 50 m



Legend

- Subject Land
- Site

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © NearMap 2020
Dated: 22/10/2019

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
North Sydney LGA

Hayball Architect 2020



Figure 2. The Site: Location of proposed Sports and Science Building





Legend

- Subject Land
- Site
- Survey Effort
- Small building-shed – potential Microchiropteran bat habitat

- Vegetation Community**
- Endemic Vegetation
 - Non-endemic Vegetation
 - Exotic Vegetation
 - Cleared

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © SIX Maps 2020
Dated: 22/10/2019

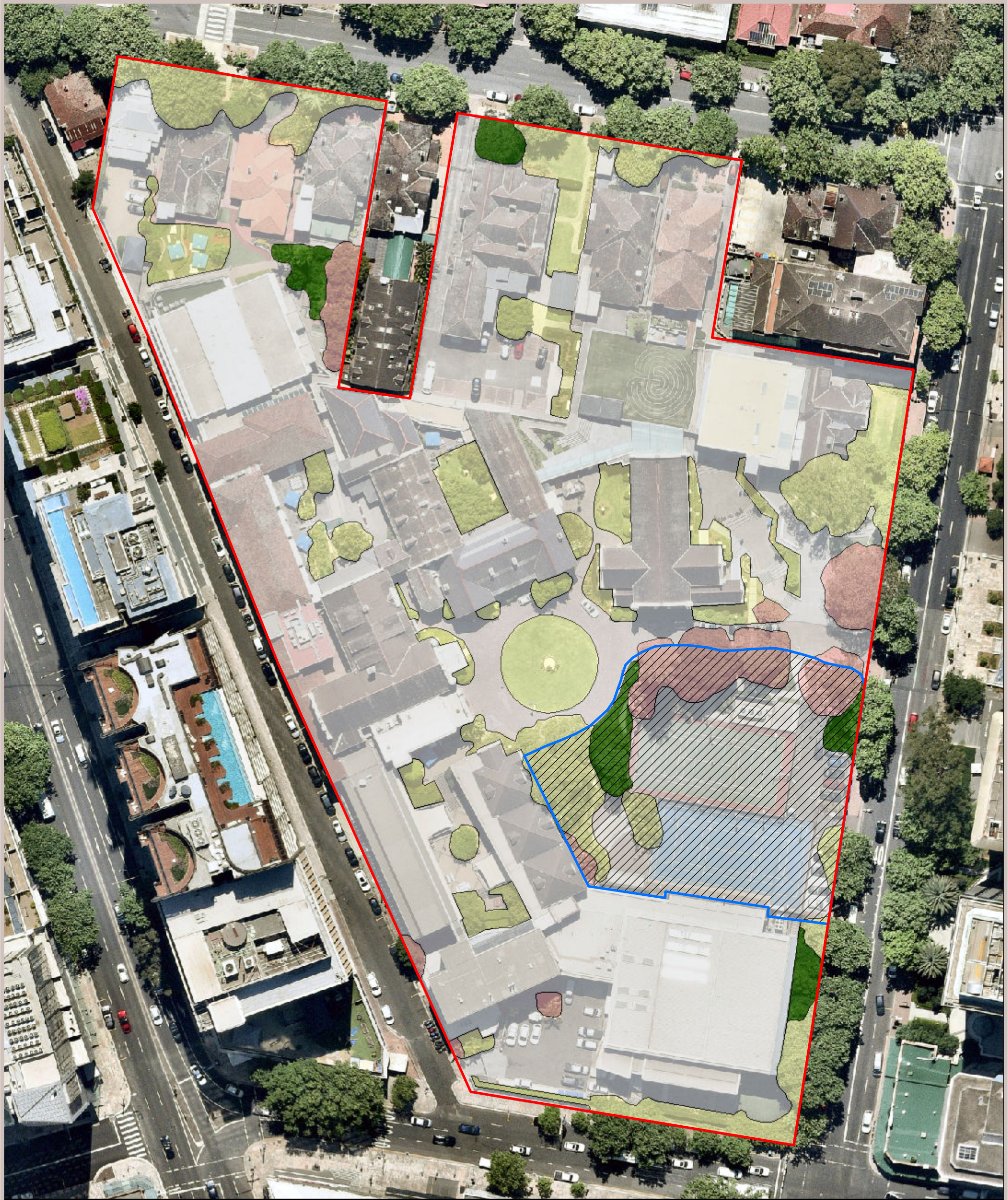
Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
North Sydney LGA



Figure 3. Vegetation mapping and survey locations within the subject land

0 30 m

I:\... \20007\Figures\RP1\20200221\Figure 3. Vegetation mapping and survey locations



Legend

Subject Land

Site

Impact Area

Vegetation Community

Endemic Vegetation

Non-endemic Vegetation

Exotic Vegetation

Cleared

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © SIX Maps 2020
Dated: 22/10/2019

Data Source:
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Figure 4. Impact area

0 30 m