Westmead Catholic Community Education Project

Flora and Fauna Assessment

WINIM Developments Pty Ltd

25 January 2020

Final

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Report No. 19208RP1

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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Approved by:	**David Roberston**
Position:	Director
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Date:	25 February, 2020

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Glossary

Term	Definition
BAM	Biodiversity Assessment Method
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	NSW *Biosecurity Act 2015*
BOS	Biodiversity Offsets Scheme
CEDP	Catholic Education Diocese of Parramatta
DoEE	Commonwealth Department of the Environment and Energy
DoP	Diocese of Parramatta
EEC	Endangered Ecological Community
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FFA	Flora and Fauna Assessment
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Parramatta Local Environment Plan 2011
LGA	Local Government Area
OEH	Office of Environment and Heritage
OWRC	Other Weed of Regional Concern
PCT	Plant Community Type
The Project	Stage 1 of the Westmead Catholic Community Project
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
The Site	Lands located at 2 Darcy Road, Westmead (Lot 1 DP 1095407 and Lot 1 DP 1211982)
SOFF	Swamp Oak Floodplain Forest
TEC	Threatened Ecological Community
VMP	Vegetation Management Plan
WM Act	NSW *Water Management Act 2000*
WONS	Weeds of National Significance

1. Introduction

This Flora and Fauna Assessment (FFA) supports a State Significant Development Application for the Westmead Catholic Community (WCC) at 2 Darcy Road, Westmead (the 'site').

The WCC Project (the 'Project') seeks to meet the needs of the growing population within the region by providing upgraded school facilities for Mother Teresa and Sacred Heart Primary Schools, as well as a new Parish church. WCC is a collaboration between Catholic Education Diocese of Parramatta (CEDP), the Diocese of Parramatta (DoP), the Sisters of Mercy and the Marist Brothers Province of Australia.

As the proposal is for the purposes of alterations and additions to an existing school and has a capital investment value in excess of $20 million, it is State Significant Development (SSD) for the purposes of the *Environmental Planning and Assessment Act 1979* (the EP&A Act). The Parish church is also SSD under clause 8(2)(a) of *State Environmental Planning Policy (State and Regional Development) 2011* as it forms part of the proposal which comprises a single, integrated development with significant functional links between the education and church uses.

1.1. Purpose

This FFA addresses the assessment requirements for the Project set out in the Secretary's Environmental Assessment Requirements (SEARs). Of these, SEARs 18 and 19 are relevant to this FFA and are reproduced below:

18. Flora and Fauna

Engage a suitably qualified person to assess and document the flora and fauna impacts related to the proposal.

19. Landscaping and revegetation

Provide details in relation to the riparian corridor along the site's western boundary including:

- *the top of the highest bank, width, native vegetation community and condition;*
- *proposed management and maintenance arrangements; and*
- *proposed rehabilitation incorporating planting.*

Include a detailed landscaping strategy that:

- *identifies trees and other vegetation to be removed or retained on site;*
- *includes details on the native vegetation community (or communities) and native plant species that once occurred in this location;*
- *identifies the species to be used in landscaping of the site which focus on a diversity of local provenance native species (trees, shrubs and groundcovers) that once occurred on the site to improve biodiversity.*
- *Details how the proposed landscaping would improve the urban canopy cover and mitigate the urban heat island effect.*

1.2. Background

1.2.1. Description of Proposed Development

The Project will seek approval for:

- A primary school with capacity for approximately 1,680 students, to provide expanded facilities for the existing Mother Teresa Primary School on the site and to replace the existing Sacred Heart Primary School at Ralph Street;
- A new Parish church;
- A Catholic early learning centre (fit-out within an existing building); and
- New landscaping.

The layout of the proposed development is shown in **Figure 1**. Note that the construction of the multideck car park located in the north-eastern corner of the site is subject to separate approval and is therefore not included in this FFA.

1.2.2. The Site

The site is located at 2 Darcy Road, Westmead, approximately 2km to the north-west of the Parramatta CBD and approximately 300m to the west of Westmead Train Station. The site is located within the Parramatta Local Government Area (LGA).

The site has an area of approximately 12ha and a frontage of approximately 430m to Darcy Road. The site consists of two lots, which are legally described as Lot 1 in DP1095407, which is owned by the Trustees of the Roman Catholic Church of Parramatta, and Lot 1 in DP1211982, which is under the ownership of the Trustees of the Marist Brothers.

The site is bound by Darcy Road (to the north), the T1 North Shore & Western / T5 Cumberland train lines (to the south), the Western Sydney University Westmead Campus (to the east) and residential uses (to the west).

To the north of the site, across Darcy Road is the Westmead Health and Education Precinct comprising the Westmead Hospital, Westmead Private Hospital and the Western Sydney University Medical Research Institutes. The locational context of the site is shown at **Figure 2**.

The Westmead Health and Education Precinct, the WCC site and the surrounding residential land collectively form part of the recently nominated Westmead Priority Precinct Area.

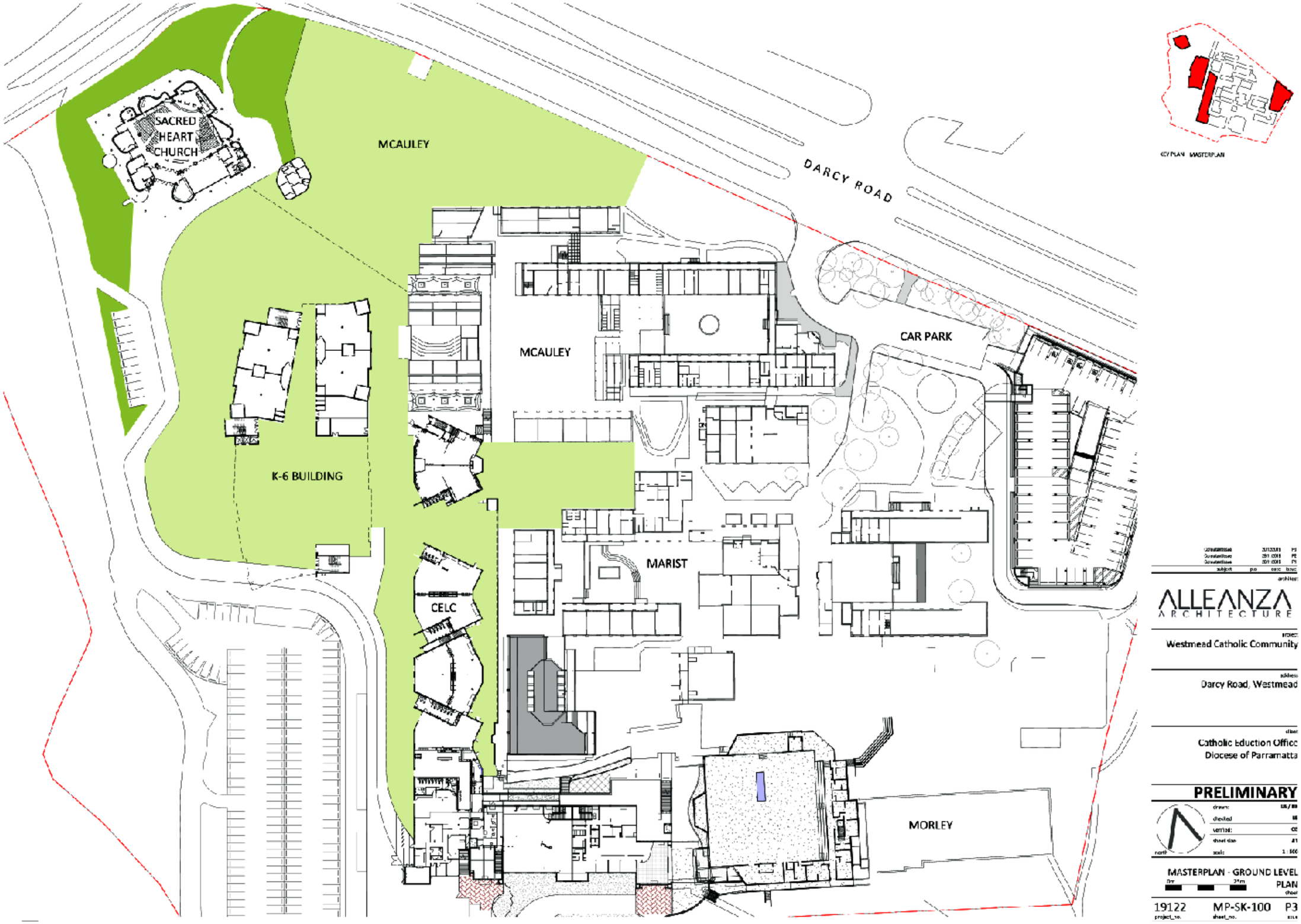


Figure 1. Layout of proposed development

Image Source: Alleanza Architecture (2020)

I:\...\19208\Figures\RP1\20200221\Figure 1. Layout of proposed development

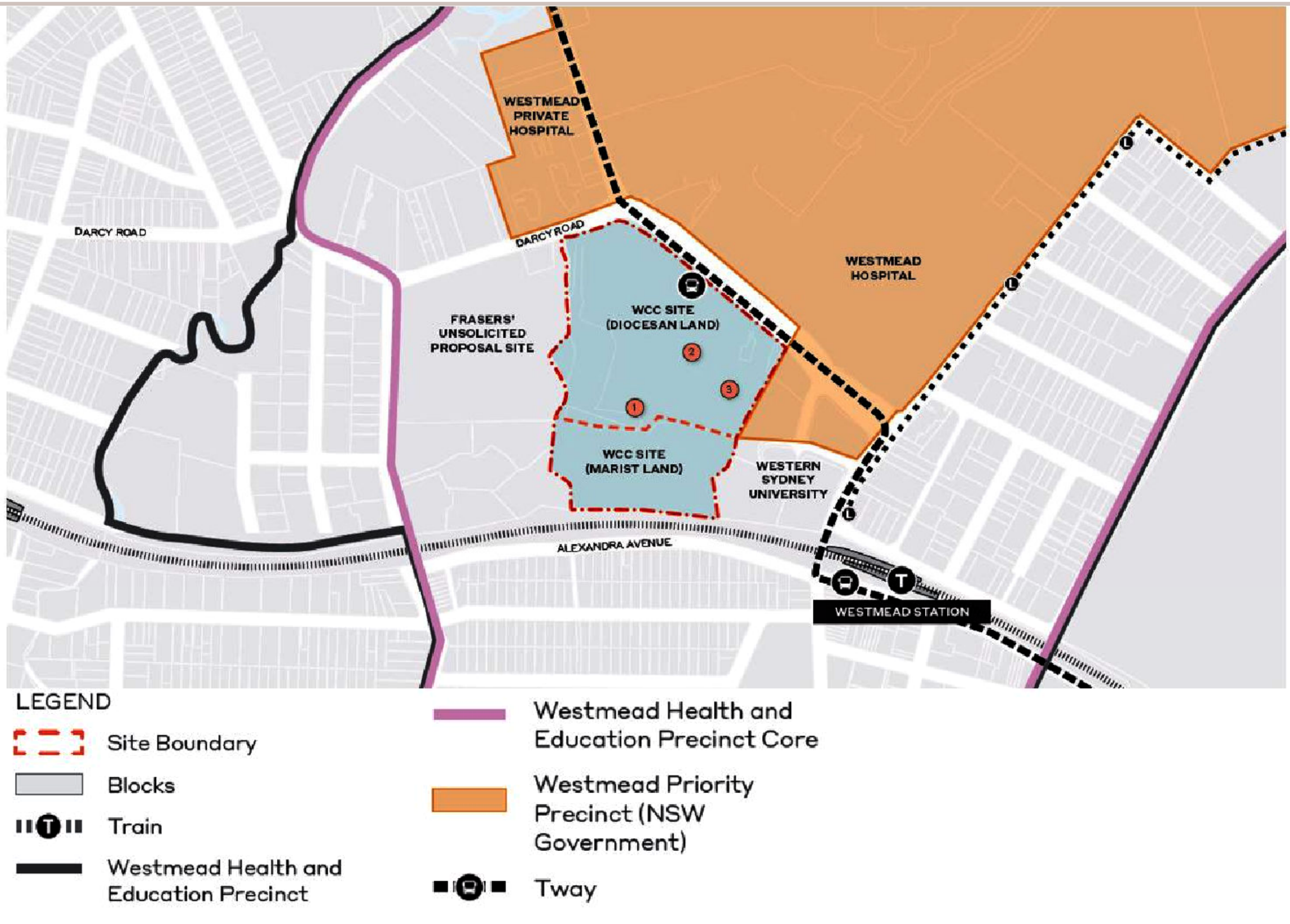


Figure 2. Location Plan

Image Source: Alleanza Architecture (2020)

I:\...\19208\Figures\RP1\20200221\Figure 2. Location Plan

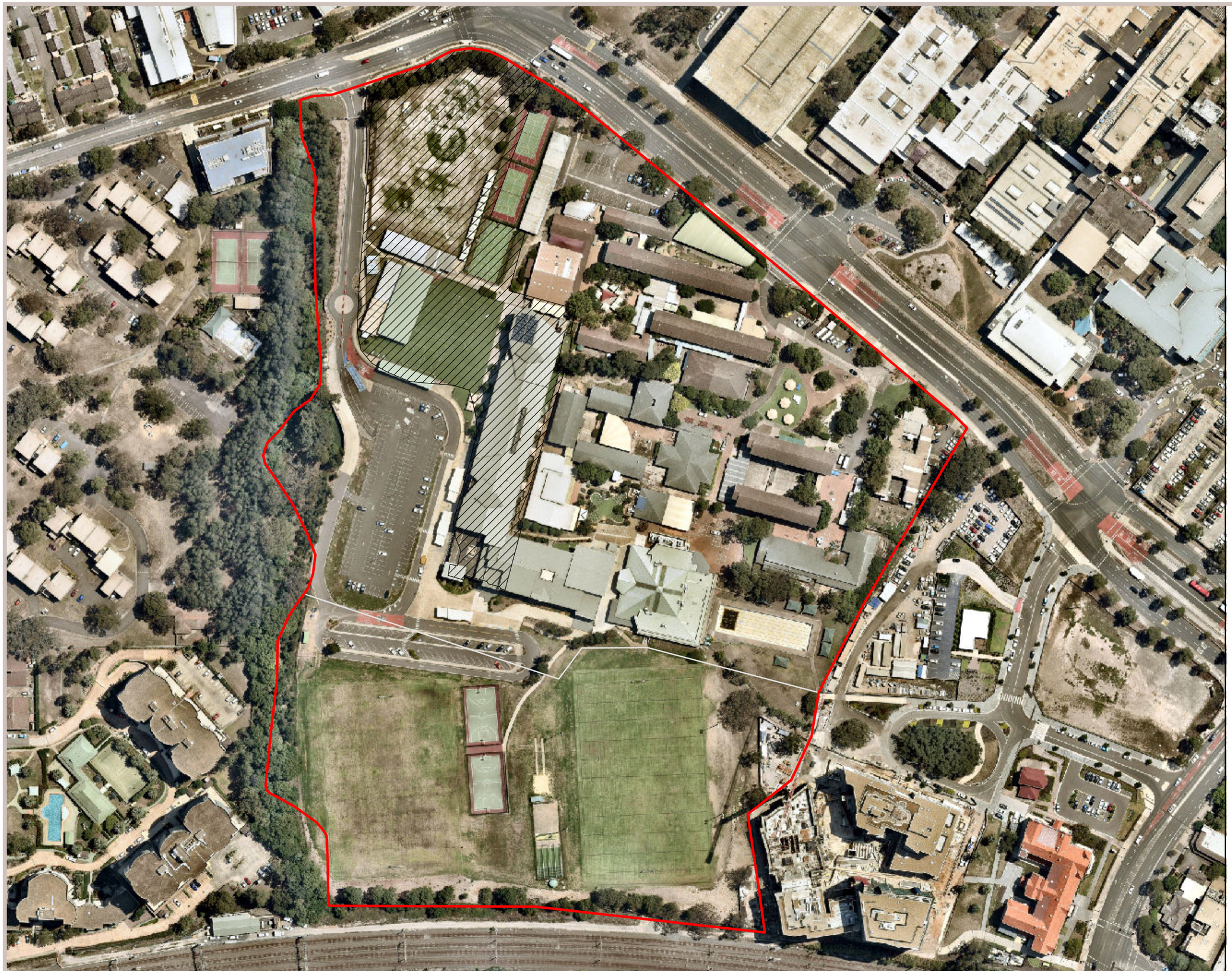
1.2.2.1. Existing Development

The site currently contains three separate schools being the Catherine McAuley Westmead (girls high school) which predominantly occupies the northern part of the site, and the Parramatta Marist High School (boys school) which occupies the eastern part of the site. The Mother Teresa Primary School occupies part of the Catherine McAuley school building in the centre of the site. The southern portion of the site contains open sports fields associated with the Parramatta Marist High School.

The existing Brother's residence is located in the north-eastern corner of the site, and an at grade car park occupies the western part of the site, to the north of the sports fields. Collectively, the three schools currently accommodate approximately 2,637 students and 190 staff.

1.2.3. Impact Area and Development Footprint

For the purpose of this report, the biodiversity of the entire site was assessed. However, the area of impact is limited to the development footprint located in the north-eastern portion of the site (see **Figure 3**).



Legend

- Site
- Lot Boundary
- Development Footprint

Image Source:
Image © Nearmap (2020)
Dated: 22/01/2020

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship';

Areas outside of subject land:
OEH (2016). The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage NSW.

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 20 40 60 80 m

I:\...\19208\Figures\RP1\20200221\Figure 3. Development footprint

Figure 3. Development footprint

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 Significance 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). 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).

1.3.4. NSW *Water Management Act 2000*

The objective of the NSW *Water Management Act 2000* (WM Act) is the sustainable and integrated management of the State's water for the benefit of both present and future generations. The WM Act provides clear arrangements for controlling land-based activities that affect the quality and quantity of the State's water resources.

Water sharing plans establish rules for sharing water between the environmental needs of the river or aquifer and water users, and between different types of water use such as town supply, rural domestic supply, stock watering, industry and irrigation.

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 October 2019 (see 19028 Let2), which was subsequently accepted by the NSW Department of Planning Industry and Environment (DPIE) on 19 November 2019, confirming that a BDAR is not required to accompany the DA. Subsequently, Secretary's Environmental Assessment Requirements (SEARs) were received on the 22 November 2019, presenting the assessment requirements for the Project. 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 The Native Vegetation of the Sydney Metropolitan Area (OEH 2016), which covers the study area 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 site (the 'locality'). 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 Survey

A flora survey was conducted on 15 October 2019 and 16 January 2020 by a botanist from Cumberland Ecology. The flora survey consisted of:

- Random meander survey across the entire site 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 site was guided by the findings of the floristic survey. The data collected during surveys of the study area was analysed in conjunction with a review of the PCTs held within the VIS Classification Database. Consideration was given to the occurrence within the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and Cumberland IBRA Sub-regions;

The locations of flora surveys within the site are shown in **Figure 4**.

2.2.2. Fauna Survey

A fauna habitat assessment was conducted by an ecologist on 15 October 2019. The study area was assessed for groundcover, shrub/understory cover, canopy cover, tree hollows as well as other habitat features such as bush rock, fallen trees and signs of fauna use such as scats, scratches and scrapings.

The nature and extent of fauna habitats in the site 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 study area 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. Riparian Corridor Survey

A survey of the riparian corridor located along the western boundary of the site was conducted by a botanist and ecologist on 16 January 2020. The survey consisted of:

- Random meander flora survey along both banks of the drainage line and surrounding riparian vegetation; and
- Mapping the location of the drainage line using a hand-held Global Positioning System (GPS), including the width and top of banks.

The survey included a detailed assessment of the riparian vegetation community, including species and conditions which can be incorporated into future works. Significant weed infestations were also noted.

The survey effort of the riparian corridor is shown in **Figure 4**.

2.2.4. Survey Limitations

The site was easily accessible and random meander transects were conducted within each patch of vegetation within the site. Despite this, it is unlikely that all flora species present within the study area 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 site 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, and fauna habitat assessment. 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 site. Additional targeted fauna surveys were considered unwarranted due to the degraded nature of the site and limited fauna habitat that is proposed to be removed.

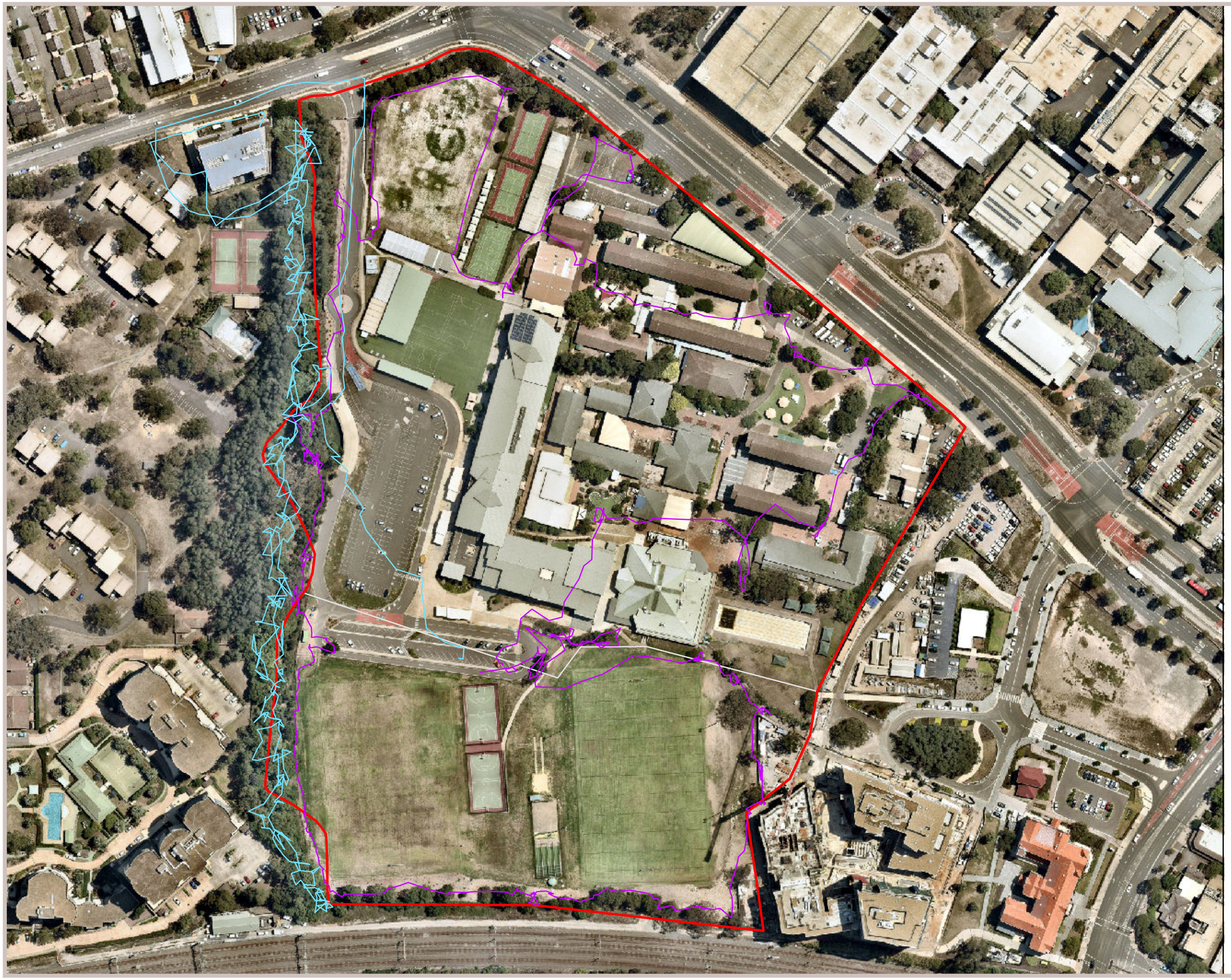


Figure 4. Survey effort

3. Results

3.1. Introduction

The vegetation within the site is likely to have been planted after 1943 as determined from review of historical imagery, (see **Figure 5**), which shows the majority of the site as cleared land**.** Generally, the composition, structure and function of vegetation within the site and the surrounding landscape have been altered significantly and do not resemble any naturally occurring PCTs. The site is predominantly an artificial landscape with planted garden beds and planted trees situated throughout the campus. Subsequently, most of the woody vegetation within the site predominately forms a single mapping unit of 'Urban Exotic/Native vegetation' as described below and as shown in **Figure 6**.

Areas along the western boundary of the site contain the BC Act listed Endangered Ecological Community (EEC) Swamp Oak Floodplain Forest, situated along a modified unnamed drainage line that extends beyond the site to the south-west. The Swamp Oak Floodplain Forest within and adjacent to the site is considered to align to PCT 1234 Swamp Oak Swamp Forest fringing estuaries of the Sydney Basin and South East Corner Bioregion. Swamp Oak Floodplain Forest is also listed as an Endangered Ecological Community under the EPBC Act, however it is not considered to conform to the EPBC Act listing due to the small patch size (less than 2 ha) and containing an exotic dominated understorey (DOEE 2018).

3.2. Vegetation Communities

A description of the vegetation communities present in the site is provided below and their distribution within the site is shown in **Figure 6**. The area of each vegetation community found within the site is shown in **Table 1**.

Table 1 Area of each community found within the site

Vegetation Community	Site (ha)
Swamp Oak Floodplain Forest	0.27
Urban Exotic/ Native	1.64
Exotic Grassland	3.19
Cleared	0.19
Total	**5.30**

3.2.1. Swamp Oak Floodplain Forest

BC Act status: EEC

EPBC Act Status: Does not meet criteria for EEC

PCT: 1234 - Swamp oak floodplain forest fringing estuaries of the Sydney Basin and South East Corner Bioregion

Swamp Oak Floodplain Forest (SOFF) is found within the riparian corridor surrounding a modified drainage line located along the western boundary of the site. The majority of this community extends outside of the site with

only a narrow linear strip (0.27 ha) present with the site that is almost entirely outside of existing campus fencing. One small section is present within campus fencing to the west of the campus entrance road (see **Figure 6** and **Photograph 1**). **Photograph 2** identifies an area characteristic of this community located outside of campus fencing. **Photograph 3** details an area of SOFF located in the riparian corridor, outside of the site.

The canopy of this community is dominated by *Casuarina glauca* (Swamp Oak) with scattered occurrences of *Casuarina cunninghamiana subsp. cunninghamiana* (River Oak), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus elata* (River Peppermint), *Angophora floribunda* (Rough-barked Apple) and the exotic *Cinnamomum camphora* (Camphor Laurel). Small trees and shrubs present within this patch of vegetation include *Melaleuca decora*, *Melaleuca styphelioides* (Prickly-leaved Tea Tree), *Pittosporum undulatum* (Sweet Pittosporum), the exotic weed *Ligustrum lucidum* (Large-leaved Privet) and regrowth of canopy species. The ground layer of this patch of vegetation is dominated by exotic species including *Cenchrus clandestinus* (Kikuyu Grass), *Bromus catharticus* (Prairie Grass), *Nassella neesiana* (Chilean Needle Grass) and *Conyza bonariensis* (Flaxleaf Fleabane) and the native *Dianella caerulea* (Blue Flax-lily).

Photograph 1 Swamp Oak Floodplain Forest within the site

Photograph 2 Swamp Oak Floodplain Forest outside of campus fencing of the site

Photograph 3 Swamp Oak Floodplain Forest in the riparian corridor to the west of the site

3.2.2. Planted Native/Exotic Vegetation

BC Act Status: Not listed

EPBC Act Status: Not listed

The Urban Exotic/Native vegetation within the site is comprised of garden beds and rows of trees of planted origin including non-local native species and exotic species. Common canopy tree species planted throughout the areas mapped as Urban Exotic/Native vegetation include *Eucalyptus microcorys* (Tallowood), *Corymbia citriodora* (Lemon-scented Gum), *Corymbia maculata* (Spotted Gum), *Pinus radiata* (Radiata Pine), *Cinnamomum camphora* (Camphor Laurel) and *Platanus x acerifolia* (London Plane). Small trees and shrubs present throughout this area of vegetation include *Melaleuca bracteata* (Black Tea-tree), *Acacia fimbriata* (Fringed Wattle), *Callistemon viminalis* (Weeping Bottlebrush) and *Grevillea* 'Robyn Gordon'. Groundcover species present within this area of vegetation include *Cynodon dactylon* (Common Couch), *Dianella caerulea* (Blue Flax-lily), *Ehrharta erecta* (Panic Veldtgrass) and *Lomandra longifolia* (Spiny-headed Mat-rush). Representative photographs of this community are provided in **Photograph 5** below.

Photograph 4 Planted Native/Exotic Garden Vegetation within the site

3.2.3. Exotic Grassland

BC Act Status: Not listed

EPBC Act Status: Not listed

Exotic Grassland is common throughout the site in the form of maintained lawns and sport-fields. Groundcover within this community is predominantly exotic and consists of non-endemic species such as *Cynodon dactylon* (Common Couch) and the exotic grasses *Cenchrus clandestinus* (Kikuyu), *Paspalum dilatatum* (Paspalum), and *Bromus catharticus* (Prairie Grass) and the cultivated native species. An example of this community within the site is shown in **Photograph 4**.

Overhanging canopy vegetation is present above this community along the western boundary of the site (refer to ***Section 3.2.1***).

Photograph 5 Exotic Grassland within the site (foreground)

3.3. Flora

3.3.1. General Species

A total of 111 species were recorded within the site during field surveys, including 44 native species and 67 exotic species. Of the native species recorded in the site, the most frequently recorded plant family was the Myrtaceae (19 species) and Fabaceae (Mimosoideae) (4 species) families. Of the exotic species recorded in the site, the most frequently recorded plant families include the Asteraceae (9 species), Poaceae (7 species), and Malvaceae (4 species).

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

3.3.1.1. Priority Weeds and Weeds of National Significance

Five exotic species recorded within the site are listed as State Priority Weeds under the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2017) under the NSW *Biosecurity Act 2015*. These species are also classed as a Weed of National Significance and include:

- *Anredera cordifolia* (Madeira Vine);
- *Asparagus aethiopicus* (Asparagus Fern);
- *Lantana camara* (Lantana);
- *Nassella neesiana* (Chilean Needle Grass); and
- *Senecio madagascarensis* (Fireweed).

Twenty-six species are classified as High Threat Exotics under the BAM and 24 species are also classified as Other Weeds of Regional Concern.

3.3.2. Threatened Species

No existing records of threatened flora species are present on the site; however two *Eucalyptus scoparia* (Wallangarra White Gum) and one *Eucalyptus nicholii* (Narrow-leaved Black Peppermint), all of planted origin were recorded (see **Figure 5**). Neither of these species are endemic to the Sydney region and are occasionally planted as landscaping trees. *Eucalyptus scoparia* (Wallangarra White Gum) is endemic to the Tenterfield region in northern NSW and is listed as Endangered under the BC Act and as Vulnerable under the EPBC Act. *Eucalyptus nicholii* (Narrow-leaved Black Peppermint) is endemic to the New England Tablelands and is listed as Vulnerable under the BC Act and EPBC Act.

Threatened flora species are known to occur within the locality (see **Table 6** in **Appendix B**). However, due to the lack of nearby records and the highly developed and artificial nature of the site, it is considered unlikely that any naturally occurring threatened flora species would occur within the site.

3.4. Fauna

3.4.1. Fauna Habitat

The primary habitat for native fauna within the site is the native and exotic plantings throughout the campus. This vegetation may fall within the foraging range of a range of native fauna species, including threatened species. The foraging resources of the site 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 site 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 site, ruling out the possibility of breeding habitat for fauna species dependent on hollows for nesting and roosting.

A modified drainage line is present in the west of the site that offers potential habitat for aquatic species such as frogs. The drainage line contains limited fringing vegetation and is considered to provide minimal habitat for common frog species known to occur in the locality.

3.4.2. General Species

Fifteen vertebrate fauna species have been recorded from the site during surveys. A total species list for the site is provided in **Table 2**.

In addition to the introduced Common Myna (*Acridotheres tristis*), the habitat within the site would be expected to be frequented by introduced feral mammals such as the Domestic Cat (*Felis catus*) even though not detected during the field surveys. Evidence of European Foxes (*Vulpes vulpes*) was detected in the form of scat and dens in the riparian corridor along the western boundary of the site.

Table 2 Fauna species list

Family	Common Name	Scientific Name	BC Act Status	EPBC Act Status	Detection Method
Agamidae	Eastern Water Dragon	*Intellagama lesueurii*	-	-	O
Alcedinidae	Laughing Kookaburra	*Dacelo novaeguineae*	-	-	W
Artamidae	Australian Magpie	*Cracticus tibicen*	-	-	O,W
Artamidae	Pied Currawong	*Strepera graculina*	-	-	W
Cacatuidae	Sulphur-crested Cockatoo	*Cacatua galerita*	-	-	O,W
Cacatuidae	Little Corella	*Cacatua sanguinea*	-	-	O,W
Columbidae	Crested Pigeon	*Ocyphaps lophotes*	-	-	O
Corvidae	Australian Raven	*Corvus coronoides*	-	-	W
Meliphagidae	Noisy Miner	*Manorina melanocephala*	-	-	O,W
Monarchidae	Magpie-Lark	*Grallina cyanoleuca*	-	-	O,W
Psittaculidae	Rainbow Lorikeet	*Trichoglossus moluccanus*	-	-	O,W
Scincidae	Eastern Blue-tongue Lizard	*Tiliqua scincoides*	-	-	O
Scincidae	Rainbow Skink	*Lampropholis delicata*	-	-	O
Sturnidae	Common Myna	*Acridotheres tristis*	-	-	O,W
Threskiornithidae	Australian White Ibis	*Threskiornis moluccus*	-	-	O

O = Observed, W = Heard

3.4.3. Threatened Species

No threatened fauna species were recorded within the site during surveys. A limited number of threatened fauna species are known to occur within the locality of the site (see **Table 7** in **Appendix B**). A review of the BioNet Atlas records of threatened fauna species within the locality includes no individuals previously recorded

within the site. Threatened fauna that would be expected to utilise the foraging resources within the site and immediate surrounds include highly mobile, aerial species such as:

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

Of the 28 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 site. 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 649 records of Grey-headed Flying-fox within the locality and there is a breeding camp (i.e. Parramatta Park) located approximately 1.2 km to the east of the site, which is well within foraging range of the species (Department of the Environment and Energy 2015, DoE 2015). Grey-headed Flying-fox individuals from this camp as well as other camps in Sydney are likely to fly over the site in search of foraging resources such as nectar and pollen (OEH 2019d). Whilst Grey-headed Flying-foxes are likely to forage within the site, 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 2019f). 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 2019f). 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 2019f).

The BioNet Atlas holds 41 records of the Powerful Owl within the locality. 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 site as part of a larger foraging range (OEH 2019f); however the Urban Exotic/Native vegetation within the site would not be expected to support an abundance of prey species as no hollow-bearing trees are present. Nonetheless, the Powerful Owl may utilise the limited foraging values within the site 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 site 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*);
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*); and
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

These species of microchiropteran bats are found along the east coast of Australia. Although some primarily root in caves (e.g. Large Bent-winged Bat) or tree hollows (e.g. Greater Broad-nosed Bat and 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. Microchiropteran 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 site. However, the site does not contain suitable breeding or refuge habitat for any of these species as the site lacks hollow-bearing trees and man-made structures considered suitable for roosting (OEH 2019e, a, b, c). Man-made structures are present but are well maintained and lack appropriate entry points and are therefore not considered to comprise potential roosting habitat.

3.5. Riparian Corridor

The riparian corridor encompasses the modified drainage line located on the western side of the site boundary. The drainage line has been mapped from the top of the highest bank and is approximately 10 m wide at its widest point and approximately 4 m wide at its narrowest (see **Figure 7**). The riparian corridor is well outside of the Stage 1 works of the Project and will be entirely retained.

The vegetation community found within this area is identified as the EEC SOFF with some remnant Eucalypts, as described in ***Section 3.2.1***. A detailed list of flora species found within the riparian corridor is included in **Table 5** of **Appendix A**. The riparian corridor is dominated by native canopy species with a degraded and heavily weedy understorey and therefore represents a degraded form SOFF (see **Figure 8**).

The key findings relating to the riparian corridor will be considered for future of stages of the Project. The future intent of the Project is to maintain and augment the biodiversity value of the riparian corridor by retaining existing trees, removing heavy weed infestations and planting SOFF species. The Project will encourage the involvement of students and members of the school community as much as possible in order to provide an opportunity to learn about the revegetation of the EEC located within and adjacent to the site.

Legend

Site

Image Source:
SIX Maps
(dated 1943)

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

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 50 m

I:\...\19208\Figures\RP1\20200221\Figure 5. Historical imagery

Figure 5. Historical imagery of the site

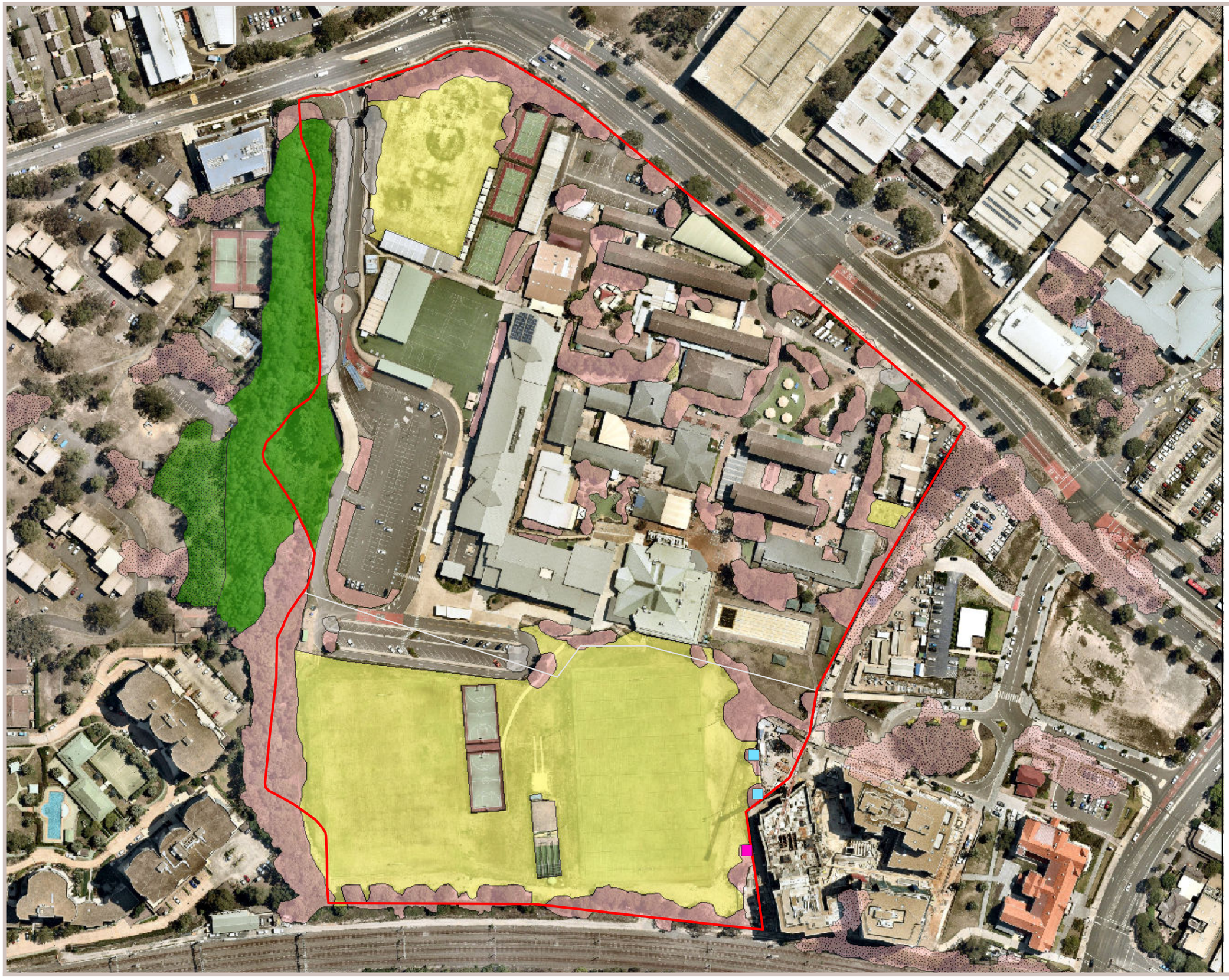
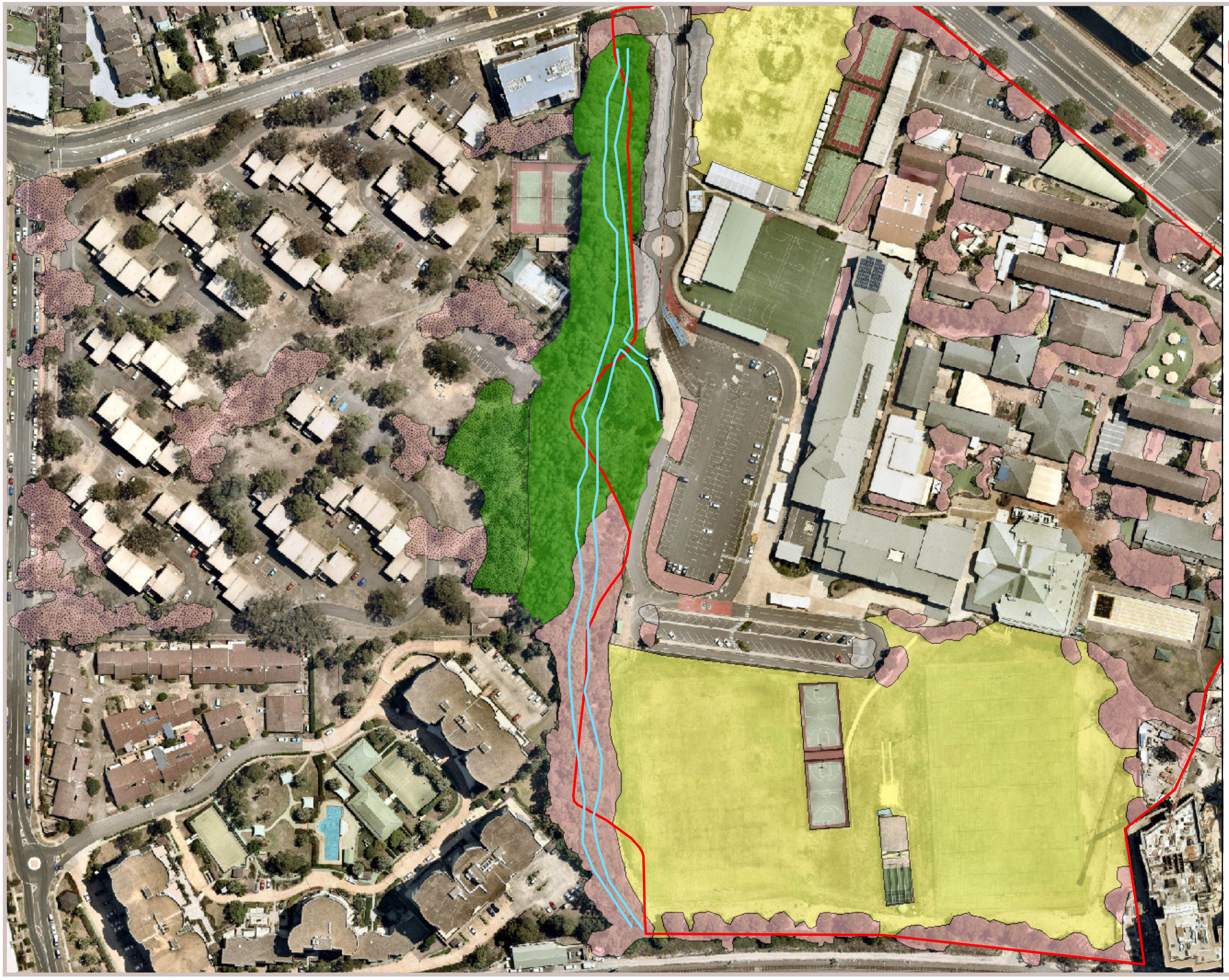


Figure 6. Vegetation, threatened species and fauna habitat within the site



Legend

- Site
- Riparian Corridor Top of Bank

Vegetation Community (CE, 2019)

- Swamp Oak Floodplain Forest
- Urban Exotic/ Native
- Exotic Grassland
- Areas cleared since Sep 2019

Vegetation Community (OEH, 2016)

- S_FoW07: Cumberland Swamp Oak Riparian Forest
- Urban_E/N: Urban Exotic/Native

Image Source:
Image © Nearmap (2020)
Dated: 22/01/2020

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship';

Areas outside of subject land:
OEH (2016). The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage NSW.

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 20 40 60 m

I:\...\19208\Figures\RP1\20200221\Figure 7. Riparian Corridor

Figure 7. Riparian Corridor

Legend

Site

Weed Infestation

Arundo donax (Giant Reed)

Cinnamomum camphor (Camphora laurel)/Ligustrum sp. (Privet)

Erythrina crista-galli (Cockspur Coral Tree)

Tradescantia fluminensis (Trad)

Vegetation Community (CE, 2019)

Swamp Oak Floodplain Forest

Urban Exotic/ Native

Exotic Grassland

Areas cleared since Sep 2019

Vegetation Community (OEH, 2016)

S_FoW07: Cumberland Swamp Oak Riparian Forest

Urban_E/N: Urban Exotic/Native

Image Source:
Image © Nearmap (2020)
Dated: 22/01/2020

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship';

Areas outside of subject land:
OEH (2016). The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage NSW.

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

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I:\...\19208\Figures\RP1\20200221\Figure 8. Weed Infestations_Riparian Corridor

Figure 8. Weed infestations within riparian corridor

4. Impact Assessment

4.1. Introduction

This chapter considers the ecological impacts of the Project on the biodiversity values within the site. 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. As described below, minimal impacts on biodiversity are anticipated for Stage 1 of the Project. Both direct and indirect impacts on threatened ecological communities and threatened species are not anticipated to be significant.

4.2. Direct Impacts

The direct impacts of the Project include the clearing of some 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 site is shown in **Table 3** and **Figure 9**. Direct impacts are discussed further in subsequent sections.

Table 3 Extent of impact from the proposed development

Vegetation Community	Site (ha)	Impact Area (ha)
SOFF	0.27	0.00
Urban Exotic/ Native	1.64	0.18
Exotic Grassland	3.19	0.49
Cleared	0.19	0.03
Total	**5.30**	**0.71**

4.2.1. Vegetation Removal in Impact Area

The impact area consists of 0.71 ha, including 0.18 ha of planted Urban Exotic/Native vegetation and 0.49 ha of Exotic Grassland. All areas of SOFF (0.27ha) within the site will not be impacted by the Project (see **Figure 9**).

A total of 24 trees are prioritised to be removed as part of the Project (22 native species and 2 exotic species)(see TreeiQ, 2020). All of the other trees proposed to be removed consist of planted natives and planted exotics. A total of 146 trees are to be retained as part of the Project.

The removal of Urban Native/Exotic vegetation and Exotic Grassland is not expected to be significant as they do not constitute endemic plant communities and are not listed under either the BC Act or the EPBC Act. Large areas of similar vegetation occur in the locality and will remain intact.

4.2.2. Habitat Feature Removal

The removal of vegetation in the site will result in a small reduction 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 Parramatta Park and the reserve around Toongabbie Creek, and no species are expected to solely rely on the habitat within the site. 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 site, 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 site 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 site 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

4.4.1. Swamp Oak Floodplain Forest

Swamp Oak Floodplain Forest (SOFF) is present surrounding the modified drainage line along the western boundary of the site. It is considered to conform to the BC Act listing for the community following a comparison to the community's final determination (NSW Scientific Committee 2019) but not the EPBC Act listing due to the small patch size (less than 2 ha) and containing an exotic dominated understorey (DOEE 2018).

The majority of SOFF is located outside of the site, with only 0.27 ha occurring within the site boundary. That small area is located well outside of the impact area and therefore no direct or indirect impacts to this vegetation community are anticipated as a result of the Project.

4.5. Impacts to Threatened Flora Species

Two threatened flora species, including two *Eucalyptus scoparia* (Wallangarra White Gum) trees and one *Eucalyptus nicholii* (Narrow-leaved Black Peppermint) tree, were recorded in the site during the field survey. However, the three individuals are cultivated plants which formed part of the landscaping in the south-western corner of the site, and their conservation significance is reduced. Furthermore, these specimens are located on the opposite corner and well outside the impact area. No threatened flora species are considered to have the potential to occur naturally within the site due to the site's highly modified nature. Therefore, the proposed development is unlikely to 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 site 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 site 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 site (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 site for foraging purposes as part of a much broader foraging range.

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 site as potential foraging habitat is present. However, this species is highly mobile and would likely only utilise the site on occasion as part of a much broader foraging range. This species is unlikely to utilise the site 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 site.

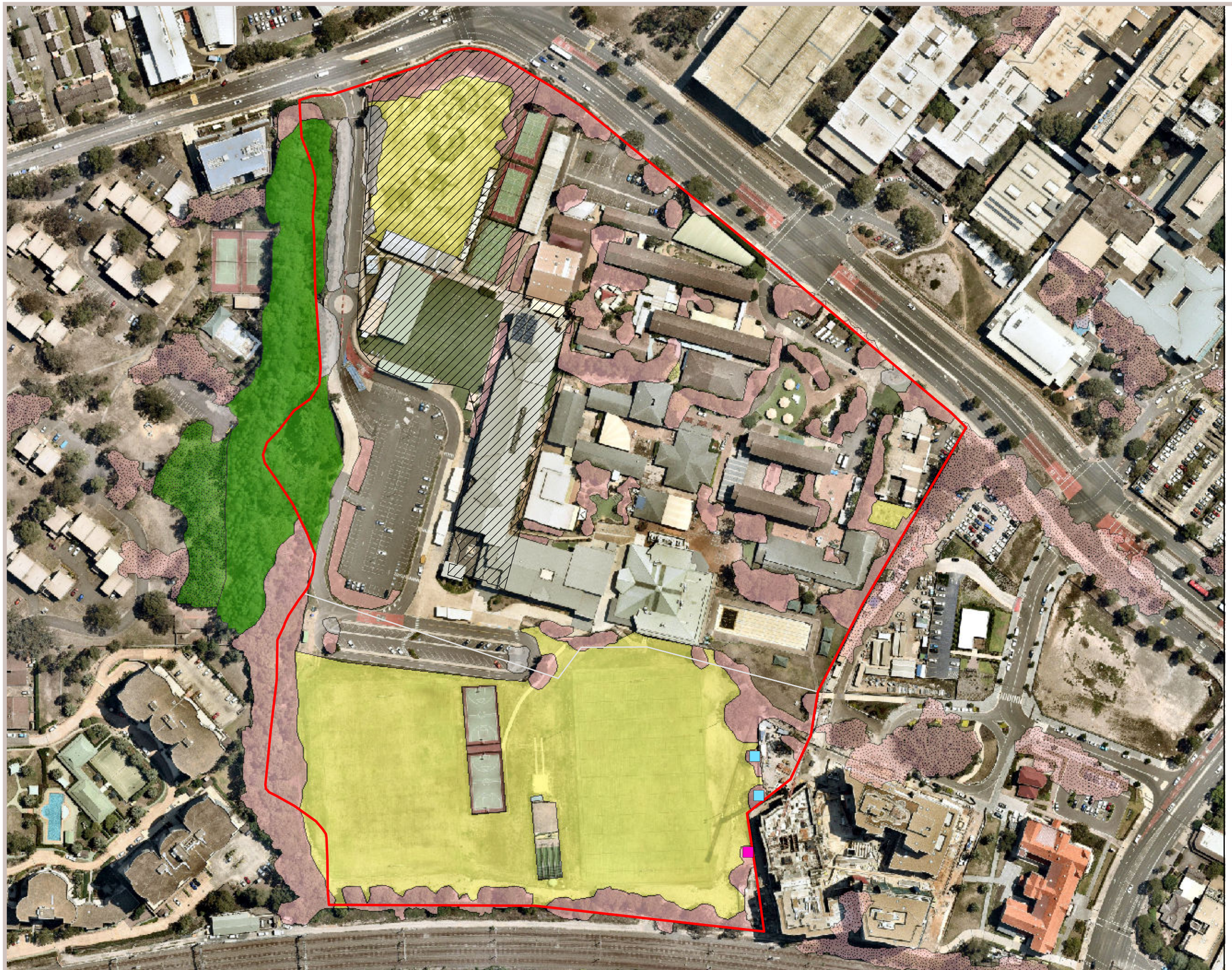
A Test of Significance has been prepared for this species and is presented in **Appendix C**. This assessment indicates that the proposed development is unlikely to have a significant impact on this species.

4.6.3. Microchiropteran Bats

- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*); and
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

The above listed four microchiropteran bat species are considered to have the potential to utilise the site for foraging purposes. These species are highly mobile and would likely only utilise the site as part of a much broader foraging range. No roosting habitat (i.e. tree hollows or suitable man-made structures) were identified during surveys. Therefore, only a small area of potential foraging habitat will be removed by the Project. 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.



Legend

- Site
- Lot Boundary
- Development Footprint

Vegetation Community (CE, 2019)

- Swamp Oak Floodplain Forest
- Urban Exotic/ Native
- Exotic Grassland
- Areas cleared since Sep 2019

Vegetation Community (OEH, 2016)

- S_FoW07: Cumberland Swamp Oak Riparian Forest
- Urban_E/N: Urban Exotic/Native

Threatened Flora Records

- *Eucalyptus nicholii*
- *Eucalyptus scoparia*

Image Source:
Image © Nearmap (2020)
Dated: 22/01/2020

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship';

Areas outside of subject land:
OEH (2016). The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage NSW.

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\19208\Figures\RP1\20200221\Figure 9. Proposed Impacts

Figure 9. Proposed Impacts

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 contains a TEC and 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 site 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 site, 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 bushland; and
- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal.

5.2.5. Landscaping and Revegetation

It is recommended that native plant species endemic to the area be included in any proposed landscaping and revegetation of the site. The Landscape Plan produced by Ground Ink (Ground Ink, 2020) aims to re-introduce SOFF species (and similar vegetation communities such as Shale/Sandstone Transition Forest and Sydney Coastal River Flat Forest) as well as Cumberland Plain Woodland which would historically have been naturally found within the site. Consequently, canopy species such as *Casuarina glauca, Eucalyptus crebra, Eucalyptus moluccana* and *Eucalyptus eugenioides* as well as *Melaleuca* species are proposed to be planted. Shrubs include *Grevillea longifolia* and *Callistemon* species and grasses/groundcover include *Myoporum parvifolium, Dianella caerullea* and *Lomandra* species.

By incorporating the above species into the Landscape Plan, the Project harmonises the use of the site as a school whilst will enhancing the endemic biodiversity of the site.

5.2.6. Weed Control Measures

Priority weed species and WoNS occurring within the site should be managed in order to prevent further spread. As such, it is recommended that all vegetation removed from the site should be disposed of appropriately as identified in the Regional Strategic Weed Management Plan.

6. Conclusion

The Project involves the demolition of existing structures to allow for the construction of new infrastructure, including a school block, parish centre and car park. An assessment was undertaken to determine the potential impacts of the Project on the biodiversity values of the site. The Project does trigger the BOS under the BC Act as it is an 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 site.

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 ~0.18 area of Urban Exotic /Native planted vegetation and 0.49 ha Exotic Grassland that do not conform to any recognised PCT. No areas of the riparian corridor, including the BC Act listed EEC SOFF, are anticipated to be impacted by the Project as it is located outside of the proposed area of works. The management and maintenance arrangements proposed in this FFA, in combination with the Landscape Plan provided by Ground Ink which includes plantings, will result in the augmentation and enhancement of this EEC. Thevegetation on the site comprises potential foraging habitat for a number of highly mobile threatened fauna species including the Grey-headed Flying-fox, Powerful Owl and four species of microchiropteran bats. All of these species access resources from a wide area and are unlikely to be dependent on the resources present within the site. 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 ecological communities and threatened species habitat are manageable and will not result in significant impacts. Notwithstanding this, a suite of mitigation measures are proposed to minimise the impacts on biodiversity values within the site, including the riparian corridor in the west of the site.

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APPENDIX A :
Flora Species List

Table 4 Flora species found within the site

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	*			
Apiaceae	*Foeniculum vulgare*	Fennel	*			
Apocynaceae	*Araujia sericifera*	Moth Vine	*			Yes
Apocynaceae	*Parsonsia straminea*	Common Silkpod				
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	*			Yes
Arecaceae	*Syagrus romanzoffiana*	Cocos Palm	*			
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	*			Yes
Asteraceae	*Ageratina adenophora*	Crofton Weed	*			Yes
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	*			Yes
Asteraceae	*Cirsium vulgare*	Spear Thistle	*			
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	*			
Asteraceae	*Cotula australis*	Common Cotula				
Asteraceae	*Lactuca serriola*	Prickly Lettuce	*			
Asteraceae	*Onopordum acanthium* subsp. *acanthium*	Scotch Thistle	*			
Asteraceae	*Senecio madagascariensis*	Fireweed	*			
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	*			
Asteraceae	*Taraxacum officinale*	Dandelion	*			
Basellaceae	*Anredera cordifolia*	Madeira Vine	*			Yes
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*			

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Brassicaceae	*Brassica fruticulosa*	Twiggy Turnip	*			
Brassicaceae	*Lepidium africanum*	Common Peppercress	*			
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle	*			Yes
Casuarinaceae	*Casuarina cunninghamiana* subsp. *cunninghamiana*	River Oak				
Casuarinaceae	*Casuarina glauca*	Swamp Oak				
Chenopodiaceae	*Chenopodium album*	Fat Hen	*			
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush				
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew	*			Yes
Convolvulaceae	*Convolvulus erubescens*	Pink Bindweed				
Convolvulaceae	*Dichondra repens*	Kidney Weed				
Convolvulaceae	*Ipomoea indica*	Morning Glory	*			Yes
Cupressaceae	*Cupressus sempervirens*	Italian Cypress	*			
Cyperaceae	*Gahnia clarkei*	Tall Saw-sedge				
Euphorbiaceae	*Chamaesyce prostrata*	Red Caustic Weed	*			
Euphorbiaceae	*Ricinus communis*	Castor Oil Plant	*			Yes
Fabaceae (Caesalpinioideae)	*Senna pendula* var. *glabrata*		*			
Fabaceae (Faboideae)	*Erythrina crista-galli*	Cockspur Coral Tree	*			Yes
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine				
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla				

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Fabaceae (Faboideae)	*Medicago polymorpha*	Burr Medic	*			
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	*			
Fabaceae (Faboideae)	*Vicia sativa*	Common vetch	*			
Fabaceae (Mimosoideae)	*Acacia decora*	Western Silver Wattle				
Fabaceae (Mimosoideae)	*Acacia fimbriata*	Fringed Wattle				
Fabaceae (Mimosoideae)	*Acacia implexa*	Hickory Wattle				
Fumariaceae	*Fumaria muralis* subsp. *muralis*	Wall Fumitory	*			
Iridaceae	*Dietes grandiflora*		*			
Lamiaceae	*Stachys arvensis*	Stagger Weed	*			
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	*			Yes
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush				
Lomandraceae	*Lomandra* 'Tanika'	Mat-rush				
Malaceae	*Cotoneaster glaucophyllus*		*			
Malaceae	*Eriobotrya japonica*	Loquat	*			
Malvaceae	*Hibiscus rosa-sinensis*	Chinese Hibiscus	*			
Malvaceae	*Malva parviflora*	Small-flowered Mallow	*			
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	*			
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*			
Meliaceae	*Melia azedarach*	White Cedar				
Moraceae	*Morus alba*	White Mulberry	*			

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Myrtaceae	*Angophora floribunda*	Rough-barked Apple				
Myrtaceae	*Backhousia myrtifolia*	Grey Myrtle				
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush				
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush				
Myrtaceae	*Corymbia citriodora*	Lemon-scented Gum	*			
Myrtaceae	*Corymbia maculata*	Spotted Gum				
Myrtaceae	*Eucalyptus amplifolia*	Cabbage Gum				
Myrtaceae	*Eucalyptus fibrosa*	Red Ironbark				
Myrtaceae	*Eucalyptus leucoxylon* subsp. *leucoxylon*		*			
Myrtaceae	*Eucalyptus microcorys*	Tallowood				
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint		V	V	
Myrtaceae	*Eucalyptus paniculata*	Grey Ironbark				
Myrtaceae	*Eucalyptus scoparia*	Wallangarra White Gum		E	V	
Myrtaceae	*Eucalyptus siderophloia*	Grey Ironbark				
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark				
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum				
Myrtaceae	*Kunzea ambigua*	Tick Bush		P		
Myrtaceae	*Leptospermum petersonii*	Lemon-scented Teatree				
Myrtaceae	*Melaleuca bracteata*	Black Tea-tree				

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Myrtaceae	*Melaleuca decora*					
Myrtaceae	*Melaleuca styphelioides*	Prickly-leaved Tea Tree				
Ochnaceae	*Ochna serrulata*	Mickey Mouse Plant	*			Yes
Oleaceae	*Fraxinus* spp.		*			
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*			Yes
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	*			Yes
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	*			
Phormiaceae	*Dianella caerulea*	Blue Flax-lily				
Pinaceae	*Pinus radiata*	Radiata Pine	*			Yes
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn				
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum				
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	*			
Poaceae	*Arundo donax*	Giant Reed	*			Yes
Poaceae	*Austrostipa rudis*					
Poaceae	*Bromus catharticus*	Praire Grass	*			
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	*			
Poaceae	*Cynodon dactylon*	Common Couch				
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*			Yes
Poaceae	*Eragrostis curvula*	African Lovegrass	*			Yes
Poaceae	*Imperata cylindrica*	Blady Grass				

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Poaceae	*Nassella neesiana*	Chilean Needle Grass	*			Yes
Poaceae	*Poa annua*	Winter Grass	*			
Poaceae	*Themeda triandra*					
Polygonaceae	*Acetosa sagittata*	Rambling Dock	*			Yes
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	*			
Proteaceae	*Grevillea robusta*	Silky Oak				
Proteaceae	*Grevillea* 'Robyn Gordon'					
Rubiaceae	*Galium aparine*	Goosegrass	*			
Solanaceae	*Cestrum parqui*	Green Cestrum	*			Yes
Solanaceae	*Solanum mauritianum*	Wild Tobacco Bush	*			
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*			
Ulmaceae	*Celtis sinensis*	Japanese Hackberry	*			
Verbenaceae	*Lantana camara*	Lantana	*			Yes
Verbenaceae	*Verbena bonariensis*	Purpletop	*			

Key: E = Endangered, V = Vulnerable, P = Protected

Table 5 Flora species found within the riparian corridor

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Amaryllidaceae	*Crinum pedunculatum*	Swamp Lily				
Anacardiaceae	*Schinus molle*	Pepper Tree	*			
Anthericaceae	*Chlorophytum comosum*	Spider Plant	*			Yes
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	*			
Apiaceae	*Foeniculum vulgare*	Fennel	*			
Apiaceae	*Hydrocotyle bonariensis*		*			
Apocynaceae	*Araujia sericiflora*	Moth Vine	*			
Arecaceae	*Livistona australis*	Cabbage Palm				
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	*			Yes
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	*			Yes
Asteraceae	*Ageratina riparia*	Mistflower	*			Yes
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	*			Yes
Asteraceae	*Cirsium vulgare*	Spear Thistle	*			
Asteraceae	*Conyza sumatrensis*	Tall fleabane	*			
Asteraceae	*Onopordum acanthium*	Scotch Thistle	*			
Asteraceae	*Taraxacum officinale*	Dandelion	*			
Basellaceae	*Anredera cordifolia*	Madeira Vine	*			Yes
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*			

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Casuarinaceae	*Casuarina cunninghamiana*	River Oak				
Casuarinaceae	*Casuarina glauca*	Swamp Oak				
Chenopodiaceae	*Chenopodium album*	Fat Hen	*			
Chenopodiaceae	*Einadia hastata*	Berry Saltbush				
Chenopodiaceae	*Einadia nutans* subsp. *linifolia*	Climbing Saltbush				
Commelinaceae	*Commelina cyanea*	Native Wandering Jew				
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew	*			Yes
Convolvulaceae	*Convolvulus erubescens*	Pink Bindweed				
Convolvulaceae	*Dichondra repens*	Kidney Weed				
Convolvulaceae	*Ipomoea indica*	Morning Glory	*			Yes
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	*			Yes
Cyperaceae	*Gahnia clarkei*	Tall Saw-sedge				
Euphorbiaceae	*Ricinus communis*	Castor Oil Plant	*			Yes
Euphorbiaceae	*Triadica sebifera*	Chinese Tallowood	*			Yes
Fabaceae (Caesalpinioideae)	*Senna pendula*		*			Yes
Fabaceae (Faboideae)	*Erythrina crista-galli*	Cockspur Coral Tree	*			Yes
Fabaceae (Faboideae)	*Erythrina x sykesii*	Coral tree	*			
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla				
Fabaceae (Faboideae)	*Robinia pseudoacacia*	Black Locust	*			Yes

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Fabaceae (Mimosoideae)	*Acacia decurrens*	Black Wattle				
Fabaceae (Mimosoideae)	*Acacia fimbriata*	Fringed Wattle				
Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle				
Fabaceae (Mimosoideae)	*Acacia terminalis*	Sunshine Wattle				
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	*			Yes
Malaceae	*Eriobotrya japonica*	Loquat	*			
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	*			
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*			
Meliaceae	*Melia azedarach*	White Cedar				
Moraceae	*Morus alba*	White Mulberry	*			
Myrtaceae	*Angophora floribunda*	Rough-barked Apple				
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush				
Myrtaceae	*Eucalyptus elata*	River Peppermint				
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark				
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum				
Myrtaceae	*Kunzea ambigua*	Tick Bush				
Myrtaceae	*Leptospermum polygalifolium*	Tantoon				
Myrtaceae	*Melaleuca bracteata*	Black Tea-tree				
Myrtaceae	*Melaleuca saligna*					

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Myrtaceae	*Melaleuca styphelioides*	Prickly-leaved Tea Tree				
Ochnaceae	*Ochna serrulata*	Mickey Mouse Plant	*			Yes
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*			Yes
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	*			Yes
Oleaceae	*Olea europaea*	Common Olive	*			Yes
Phormiaceae	*Dianella caerulea var. producta*					
Phormiaceae	*Dianella revoluta*	Blueberry Lily				
Phyllanthaceae	*Phyllanthus tenellus*	Hen and Chicken	*			
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn				
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum				
Plantaginaceae	*Plantago major*	Large Plantain	*			
Poaceae	*Arundo donax*	Giant Reed	*			Yes
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	*			Yes
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*			Yes
Poaceae	*Imperata cylindrica*	Blady Grass				
Poaceae	*Microlaena stipoides*	Weeping Grass				
Poaceae	*Phragmites australis*	Common Reed				
Poaceae	*Themeda triandra*					
Polygonaceae	*Acetosa sagittata*	Rambling Dock	*			Yes
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	*			Yes

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	High Threat Weed
Polygonaceae	*Persicaria decipiens*	Slender Knotweed				
Polygonaceae	*Rumex brownii*	Swamp Dock				
Proteaceae	*Grevillea robusta*	Silky Oak				
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung				
Rosaceae	*Rubus fruticosus*	Blackberry complex	*			
Rutaceae	*Citrus limon*	Lemon	*			
Sapindaceae	*Acer negundo*	Box Elder	*			Yes
Solanaceae	*Cestrum parqui*	Green Cestrum	*			Yes
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*			
Solanaceae	*Solanum seaforthianum*	Climbing Nightshade	*			Yes
Verbenaceae	*Lantana camara*	Lantana	*			Yes
Verbenaceae	*Verbena bonariensis*	Purpletop	*			

APPENDIX B :

Threatened Species Likelihood of Occurrence Tables

Table 6 Threatened flora likelihood of occurrence

Family	Scientific Name	Common Name	No. of Records	BC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence
Apocynaceae	*Marsdenia viridiflora* subsp. *viridiflora*	*Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	7	E2	-	Grows in vine thickets and open shale woodlands.	Unlikely – no suitable habitat found within the site. Furthermore, it was not sighted within the site during surveys conducted by Cumberland Ecology.
Campanulaceae	*Isotoma fluviatilis* subsp. *fluviatilis*	-	1	-	Extinct	Grows in damp places on the Cumberland Plain including freshwater wetland, grassland /alluvial woodland and an alluvial woodland/shale plains woodland ecotone.	Unlikely- not recorded in the area since 1993. Also not sighted within the site during surveys conducted by Cumberland Ecology.
Dilleniaceae	*Hibbertia superans*	-	42	E1	-	Grows in ridgetop woodlands on sandstone from Castle Hill to South Maroota. Most occurrences are near the shale/sandstone boundary. It occurs in	Unlikely – no suitable habitat found within the site due to lack of ridgetop woodlands and not encountered during surveys conducted by Cumberland Ecology.

Family	Scientific Name	Common Name	No. of Records	BC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence
						both open woodland and heathland and appears to have a preference for disturbed areas, such as along the edges of tracks.	
Ericaceae	*Epacris purpurascens* var. *purpurascens*	-	45	V	-	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 – not encountered within the site during surveys conducted by Cumberland Ecology.
Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	2	V	V	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	Unlikely – no suitable habitat found within the site due to the planted nature of the vegetation found within the site. Also, it was not recorded within the site during surveys conducted by Cumberland Ecology.

Family	Scientific Name	Common Name	No. of Records	BC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence
						Forest and Cumberland Plain Woodland.	
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	1	V	V	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.	Present - Recorded within the site.
Myrtaceae	*Eucalyptus scoparia*	Wallangarra White Gum	0	E	V	Species has a restricted distribution in the east of the Wallangarra district, on the Queensland-NSW border. The majority of populations occur at altitudes to 1300m in clefts of large granite outcrops, growing in skeletal soils. It occurs at lower altitudes in damp	Present - Recorded within the site.

Family	Scientific Name	Common Name	No. of Records	BC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence
						situations. In NSW, there are only tree known occurrences locations, all near Tenterfield. The species is widely planted as an ornamental tree throughout south-eastern Australia, including in the Sydney Region.	

Key: E = Endangered, V = Vulnerable

Table 7 Threatened fauna likelihood of occurrence

Family	Scientific Name	Common Name	No. of Records	BC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence
Amphibia							
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	3	E	V	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 - limited records within 5 km radius of site. Additionally, not encountered during surveys conducted by Cumberland Ecology of the site and adjacent riparian area.
Aves							
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	2	V	Mig.	Found in coastal habitats and around terrestrial wetlands, including rivers, swamps, lakes and the sea.	Unlikely - limited records within 5 km radius of site. Additionally, no nests were sighted during surveys conducted by Cumblerland Ecology.

Apodidae	*Hirundapus caudacutus*	White-throated Needletail	2		Mig.	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 5 km radius of site. Site contains only small area of mowed grassland. Additionally, it was not sighted during surveys conducted by Cumberland Ecology.
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew	1	E	-	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 records within 5 km radius of site. No suitable habitat found within the site or not sighted during surveys conducted by Cumberland Ecology.
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	1	V	-	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 (*Allocasuarina littoralis*), Forest She-oak (*A.*	Unlikely - limited records within 5 km radius of site. Degraded habitat is present adjacent to site in the form of Swamp Oak Floodplain Forest,

						torulosa) or Drooping She-oak (*A. verticillata*) occur.	however not sighted during surveys conducted by Cumberland Ecology.
Meropidae	*Merops ornatus*	Rainbow Bee-eater	2	-	Mig.	In Australia it is widespread, except in desert areas, and breeds throughout most of its range, although southern birds move north to breed. The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels.	Unlikely - limited records within 5 km radius of site. Limited degraded habitat present adjacent to the site, however neither the species or its nests were sighted during surveys conducted by Cumberland Ecology.
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	6	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with	Unlikely - limited records within 5 km radius of site. No suitable habitat found within the site

						dead branches, mallee and Acacia woodland.	and not sighted during Cumberland Ecology surveys.
Petroicidae	*Petroica boodang*	Scarlet Robin	1	V	-	Lives in mature and regrowth dry eucalypt forests and woodlands. Occasionally found in mallee, or wetter forests, or in wetlands and tea-tree swamps. The understorey is usually open and grassy with few scattered shrubs. Habitat usually contains abundant logs and fallen timber. It breeds on ridges, hills and foothills of the Great Dividing Range, Western Slopes, and in eastern coastal regions. The species predominately inhabits forests and woodlands though some individuals may disperse to more open habitats following breeding. In Autumn and Winter the predominate habitat is open grassy woodlands, grasslands, or grazed	Unlikely - limited records within 5 km radius of site. No suitable habitat found within the site due to limited planted vegetation and not recorded during Cumberland Ecology surveys.

						paddocks with scattered trees. Birds pounce on insects and other invertebrates from low perches, though occasionally forage in the shrub and canopy layer.	
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	2	V	-	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	Unlikely - limited records within 5 km radius of site. No suitable habitat found within the site due to limited vegetation. Adjacent riparian habitat is considered too degraded. Furthermore, species was not sighted during Cumberland Ecology surveys.

						at a height of between two and fifteen metres. Often nest trees are in riparian areas, and include trees of species like *Allocasuarina* spp.	
Psittacidae	*Lathamus discolor*	Swift Parrot	7	E	CE	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 records within 5 km radius of site. Limited foraging habitat present due to the small number of plantedEucalypt trees. Furthermore, it was not recorded suring Cumberland Ecology surveys.
Psittacidae	*Polytelis swainsonii*	Superb Parrot	2	V	V	Species occurs only in south-eastern Australia. In NSW it occurs predominately west of the great divide, on inland slopes and adjacent plains. It breeds in areas along large inland river systems, and inhabits forests and woodlands dominated by eucalypts, especially River	Unlikely - limited records within 5 km radius of site. No suitable habitat found on site due to the lack of eucalypt woodland. Furthermore, it was not recorded during Cumberland Ecology surveys.

						Red Gum (*Eucalyptus camaldulensis*), and box eucalypts such as the Yellow Box (*Eucalyptus melliodora*). It forages predominately in box gum woodlands.	
Strigidae	*Ninox connivens*	Barking Owl	3	V	-	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	Unlikely - limited records within 5 km radius of site. No suitable habitat found within the site due to lack of large tree hollows.

						most habitats due to sparse prey densities.	
Strigidae	*Ninox strenua*	Powerful Owl	41	V	-	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 such as the Greater Glider, Common Ringtail Possum, and Sugar Glider. As most prey species require hollows and a shrub layer these are important habitat components also of the Powerful Owl. Nests	Potential – would only utilise habitat periodically as part of a broader foraging range. No breeding habitat present due to lack of large tree hollows.

						are in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	4	-	Mig.	Generally located east of the Kimberleys in Western Australia and Eyre Peninsula in South Australia. Requires shallow water and mudflats. Found in well-vegetated wetlands, floodplains and ricefields.	Unlikely - limited records within 5 km radius of site. No suitable habitat found within the site. Additionally, it was not sighted during Cumberland Ecology surveys.
Tytonidae	*Tyto novaehollandiae*	Masked Owl	3	V	-	Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling	Unlikely - limited records within 5 km radius of site. No suitable habitat found within the site due to lack of forested gullies and large tree hollows.

							and ground mammals, especially rats.	
Tytonidae	*Tyto tenebricosa*	Sooty Owl		1	V	-	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 - limited records within 5 km radius of site. No suitable habitat founf within the site due to lack of rainforest or moist eucalypt forests and large tree hollows.
Gastropoda								
Camaenidae	*Meridolum corneovirens*	Cumberland Land Snail	Plain	4	E	-	Primarily inhabits Cumberland Plain Woodland (an endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil	Unlikely - limited records within 5 km radius of site. No suitable habitat found within the site due to lack of Cumberland Plain Woodland. Species also not detected

						around grass clumps. Occasionally shelters under rubbish.	during Cumberland Ecology surveys.
Camaenidae	*Pommerhelix duralensis*	Dural Land Snail	5	E	E	Inhabits areas that are between shale-derived and sandstone-derived soils with forested vegetation that have good native cover and woody debris. Species prefers sheltering under rocks, inside curled-up bark and underneath leaf litter and light woody debris.	Unlikely - limited records within 5 km radius of site. No suitable habitat due to lack of foreseted vegetation and woody debris. Species also not detected during Cumberland Ecology surveys.
Mammalia							
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	3	V	E	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 - limited records within 5 km radius of site. No suitable habitat found within the site due to the lack of woodland or forested vegetation. Additionally, no dens were sighted during Cumberland Ecology surveys.

Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	7	V	-	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Potential – would only utilise habitat periodically as part of a broader foraging range. No breeding habitat present due to lack of tree hollows or decrepit buildings.
Miniopteridae	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	10	V	-	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 only utilise habitat periodically as part of a broader foraging range. No breeding habitat present due to the lack of maternal caves.
Molossidae	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	7	V	-	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts in tree hollows but will also roost	Potential – would only utilise habitat periodically as part of a broader foraging range. No

						under bark or in man-made structures.	breeding habitat present due to lack of tree hollows or decrept buildings.
Phascolarctidae	*Phascolarctos cinereus*	Koala	2	V	V	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 - limited records within 5 km radius of site. No suitable habitat due to the highly urbanised nature of the site and lack of eucalypt woodland. Furthermore, it was not sighted suring Cumberland Ecology surveys.
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	649	V	V	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 only utilise habitat periodically as part of a broader foraging range. No breeding habitat present as no camps were observed during Cumberland Ecology surveys.
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	1	V	V	Roosts in caves (near their entrances), crevices in	Unlikely - limited records within 5 km

							cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin. Found in well-timbered areas containing gullies.	radius of site and no preferred habitat present due to lack of caves, cliffs and mines.
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern Pipistrelle	False	4	V	-	Occurs in moist habitat with trees over 20m in height, hunting insects above or just below the tree canopy. Roosts in eucalypt hollows, under bark and in buildings	Potential – would only utilise habitat periodically as part of a broader foraging range. No breeding habitat present due to lack of tree hollows and decrepit buildings.
Vespertilionidae	*Myotis macropus*	Southern Myotis		6	V	-	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	Unlikely - limited records within 5 km radius of site and no preferred habitat present due to lack of pools, tree hollows and decrepit buildings.

Vespertilionidae	*Scoteanax rueppellii*	Greater Bat	Broad-nosed	4	V	-	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.	Potential – would only utilise habitat periodically as part of a broader foraging range. No breeding habitat present due to lack of tree hollows and decrepit buildings.

Key: E = Endangered, V = Vulnerable, M = 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

a. *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 not been recorded within the site; however, it has been recorded in the locality. The local population is considered to extend beyond the site, particularly into nearby Parramatta Park and the reserve surrounding Toongabbie Creek. This species would be expected to utilise the foraging resources within the site 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 foraging habitat within the site. Due to the modified nature of the habitat within the site, and the lack of suitably large tree hollows, this species is not considered likely to breed within the site. The habitat to be impacted within the site is not considered important for the long-term survival of the species within the locality. Sufficient foraging habitat will be retained within the site. 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.

a. *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.

a. *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 0.71 ha of vegetation will be removed from within the site, 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 site 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 site. 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.

a. *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 for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

a. *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 0.42 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 site 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. Previous land use has resulted in the modification of the habitat for the Powerful Owl within the site, with its occurrence comprising of 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 Parramatta 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

a. *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 site; 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 site does not contain a roosting camp of the species and therefore it would not breed within the site. The local population of this species is considered to extend far beyond the site, with a known breeding camp located approximately 1.2 km east, in nearby Parramatta Park. This species is aerial and highly mobile and would be expected to occasionally utilise the foraging resources within the site 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 site. The habitat to be impacted within the site 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 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.

a. *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.

a. *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 0.42 ha of Urban Native/Exotic vegetation occurring within the site 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 site. 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.

a. *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 site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

a. *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 0.42 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 site 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 site, and it comprises a 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 Parramatta 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

a. *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 site due to the presence of suitable foraging habitat. The local populations of these potentially occurring species are considered to extend far beyond the site into nearby Parramatta Park and the reserve around Toongabbie Creek. This group of species are aerial and highly mobile and would be expected to occasionally utilise the foraging resources within the site as part of a larger foraging range.

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

a. *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.

a. *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 0.46 ha of vegetation will be removed from within the site, constituting foraging habitat for microchiropteran bats. No 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 site, thereby maintaining connectivity in the landscape.

Previous land uses have resulted in the modification of the habitat for microchiropteran bats within the site. 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.

a. *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 site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

a. 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 site 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 Parramatta Park and locality. Accordingly, the direct and indirect impacts of the Project are not considered to result in a significant impact to microchiropteran bats.