4-18 NORTHWOOD RD & 274 & 274A LONGUEVILLE RD LANE COVE

Flora and Fauna Assessment

For:

Pathways Property Group

August 2016

Final

PO Box 2474

Carlingford Court 2118

Report No. 16124RP1

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 recommendations 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: Dr David Robertson

Position: Director

Signed: David Robertson

Date: *18 August, 2016*

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Glossary of Terms

CEEC	Critically Endangered Ecological Community
Council	Blacktown City Council
DA	Development Application
DoE	Department of the Environment
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
GIS	Geographic Information System
Locality	The area within a 10km radius of the subject site
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
Subject site	Lot 1 DP857133, Lot 2 DP857133, Lot 1 DP663462, Lot 4 DP321048, Lot A DP307899, Lot B DP307899, Lot 1 DP445348, Lot 2 DP445348 Lot D DP307899, Lot C DP307899, Lot G DP307899, Lot B DP370042, Lot D DP370042 and Lot A DP370042 (see **Figure 1.1**)
TEC	Threatened Ecological Community
TSC Act	NSW *Threatened Species Conservation Act 1995*

Chapter 1

Introduction

1.1 Purpose

Cumberland Ecology Pty Ltd (Cumberland Ecology) has been commissioned by Morrison Design Partnership Architects PTY Ltd. (the 'client') to conduct an ecological assessment to support a proposed Development Application (DA) for 4-18 Northwood Road and 274-274A Longueville Road, Land Cove ('the subject site').

The purpose of this report is to describe the current biodiversity values of the subject site and to assess the potential impacts of the proposed development on flora and fauna, particularly threatened species, populations and communities that are listed under the New South Wales (NSW) *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The specific objectives of this report are to:

- Describe the vegetation communities on the subject site;
- Describe fauna habitats and fauna usage of the subject site;
- Identify any threatened species, populations or ecological communities (as listed under the TSC Act and/or EPBC Act) existing on the subject site;
- Assess the likelihood of occurrence of threatened species, populations or communities (as listed under the TSC Act and/or EPBC Act) within the subject site;
- Assess the potential impact of the project on threatened communities, flora and fauna, including the completion of Assessments of Significance under Section 5A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act); and
- Where relevant, recommend mitigation measures to reduce the impacts of the proposed development on biodiversity values.

1.2 Background

1.2.1 Site Description

The subject site is located at 4-18 Northwood Road, and 274 and 274A Longueville Road, Lane Cove and consists of 14 individual lots (see **Figure 1.1**) currently zoned as B1-Neighbourhood Centre under the Land Cove Council Local Environment Plan (2009). **Table 1.1** provides the total area of all lots within the subject site. The total area of the subject site is 0.5 ha and is comprised of a mixture of residential and business developments along with small areas of vegetation primarily located within the northern and eastern boundaries of the subject site.

The subject site is bounded by residential developments to the north and south, a strip of native bushland within Gore Creek to the east, and Longueville and Northwood Roads to the west (see **Figure 1.2**). Generally, the subject site's topography slopes downward from east to west.

Table 1.1 Area of individual lots and the entire subject site

Lot and DP	Area (ha)
Lot 1 DP857133	0.05
Lot 2 DP857133	0.05
Lot 1 DP663462	0.09
Lot 4 DP321048	0.08
Lot A DP307899	0.03
Lot B DP307899	0.02
Lot 1 DP445348	0.03
Lot 2 DP445348	0.02
Lot D DP307899	0.03
Lot C DP307899	0.03
Lot G DP307899	0.02
Lot B DP370042	0.02
Lot D DP370042	0.02
Lot A DP370042	0.02
Total Subject Site	**0.50**

1.2.2 Description of the Proposed Development

The client is proposing to develop a combined mixed use residential aged care facility within the subject site. The proposed development will include a veterinarian clinic, retail centre,

restaurant/cafe, aged care facility and parking areas (see **Figure 1.3**). To facilitate the construction of the proposed development, all existing structures within the subject site will be demolished. Additionally, all extant vegetation within the subject site will be cleared.

Coordinate System: MGA Zone 56 (GDA 94)

Legend

- Subject Site
- Lot Boundary

Grid North

Image Source:
Image © SIX Maps
(dated 6-1-2014)

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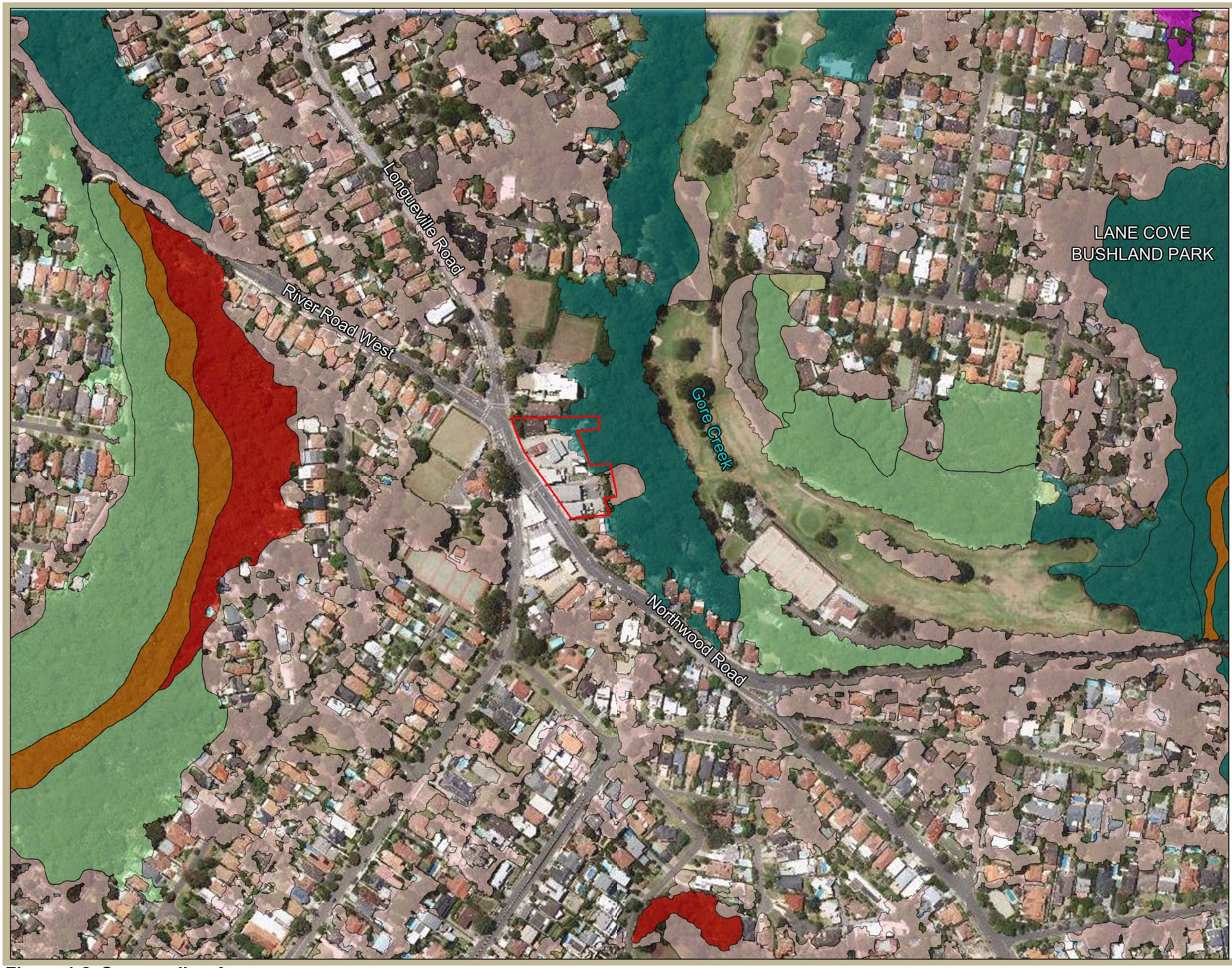
I:\...\16124\FiguresRP1\20160714\Figure 1.1. The Subject Site

Figure 1.1. The Subject Site

10 0 10 20 30 40 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Subject Site

Vegetation Community (OEH, 2013)

- Blue Gum High Forest
- Coastal Enriched Sandstone Dry Forest
- Coastal Enriched Sandstone Moist Forest
- Coastal Escarpment Littoral Rainforest
- Coastal Sandstone Foreshores Forest
- Urban Native and Exotic Cover
- Weeds and Exotics
- Cleared

N
Grid North

Image Source:
Image © SIX Maps
(dated 6-1-2014)

Data Source:
OEH (2013). The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage NSW.

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I:\...\16124\Figures\RP1\20160714\Figure 1.2. Surrounding Area

Figure 1.2. Surrounding Area

50 0 50 100 150 200 m

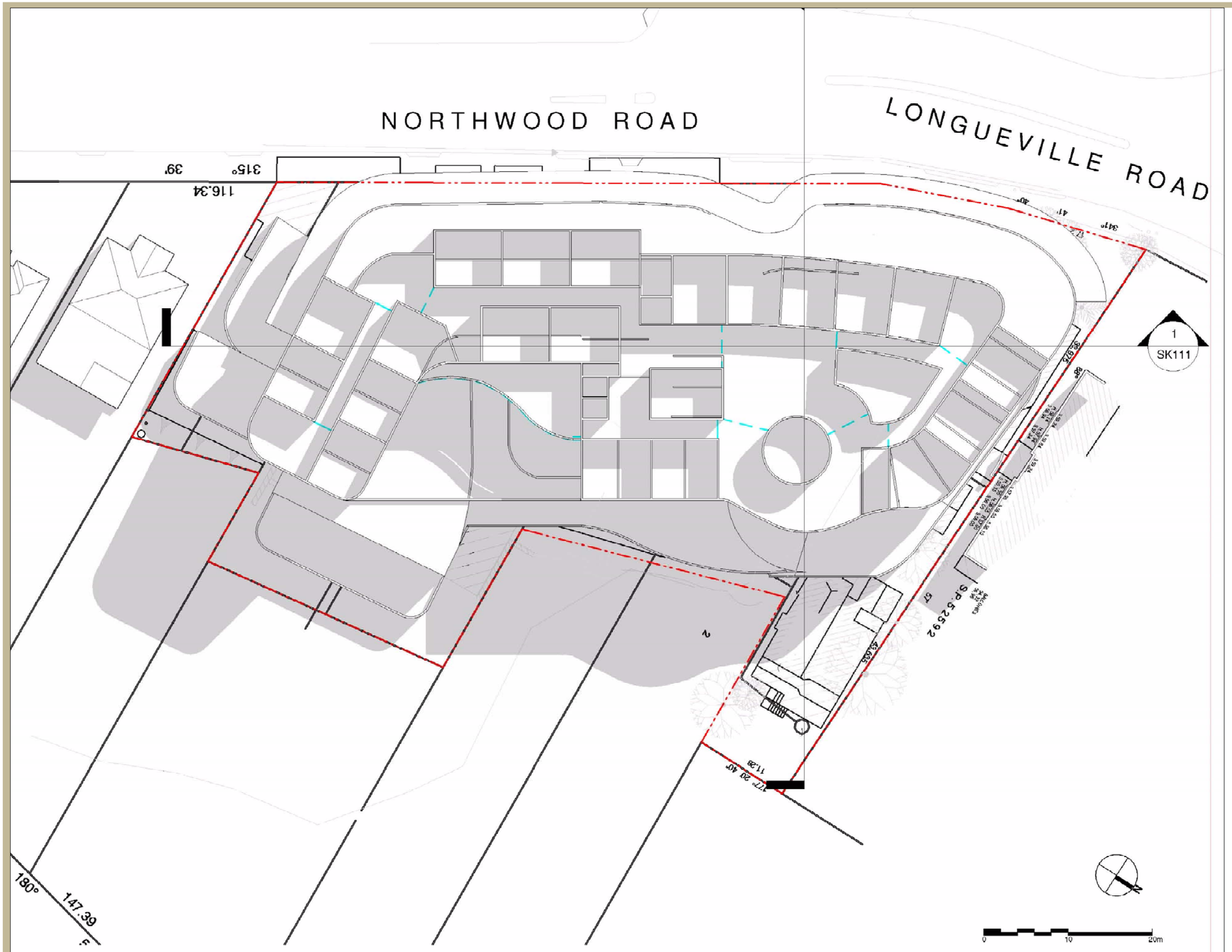

Figure 1.3. Preliminary Site Plan

Chapter 2

Methodology

2.1 Database Analysis

Database analysis was conducted for the locality using both the NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife (OEH 2016) and the Commonwealth Department of the Environment (DoE) Protected Matters Search Tool (DoE 2016). The locality is defined as the area within a 10 km radius of the subject site. The Atlas of NSW Wildlife Database search was used to generate records of threatened flora and fauna species listed under the TSC Act within the locality of the subject site. The Protected Matters Search Tool generated a list of Matters of National Environmental Significance listed under the EPBC Act potentially occurring within the locality of the subject site. Fish and marine species were excluded for the purpose of this report as no permanent waterbodies are present within the subject site. The lists generated from these databases were reviewed against available knowledge of the subject site, in conjunction with an analysis of the abundance, distribution and age of records, to ascertain the likelihood of occurrence of threatened species within the subject site.

2.2 Flora Survey

Flora surveys were undertaken within the subject site by Cumberland Ecology on 12 July 2016 by a botanist and ecologist over a 3.5 hour period. Surveys included vegetation mapping, random meander survey and targeted threatened flora searches. Further details of each of the survey methods are provided below.

All vascular plants recorded or collected were identified using keys and nomenclature provided in Harden (1990-1993). Where known, taxonomic and nomenclatural changes have been incorporated into the results, as derived from PlantNET (Botanic Gardens Trust 2016).

2.2.1 Vegetation Mapping

Previous broad-scale vegetation mapping conducted for the Sydney Metropolitan Catchment Management Authority (SMCMA) Vegetation Mapping project (OEH 2013) was utilised to determine potential vegetation communities likely to occur within the subject site. Cumberland Ecology conducted additional vegetation surveys to revise and update the vegetation mapping prepared by OEH. The vegetation within the subject site was then ground-truthed to examine and verify the mapping, including the condition of vegetation and the extent of the different vegetation communities. Where vegetation community boundaries

were found to differ from the OEH mapping, records were made of proposed new boundaries using a hand-held Global Positioning System (GPS) and mark-up of aerial photographs.

The resultant information was synthesised using a Geographic Information System (GIS) to create a spatial database that was used to interpret and interpolate the data to produce a vegetation map of the subject site.

2.2.2 Random Meander Survey

Random meander survey was undertaken within the subject site to obtain information on species composition and community structure. Surveys were undertaken within all vegetation communities.

2.2.3 Targeted Threatened Flora Surveys

Targeted threatened flora searches via random meanders were undertaken within suitable habitat of threatened flora species known from the locality. The locations of threatened flora specimens observed during surveys were recorded using a hand-held GPS.

2.3 Fauna Survey

Fauna surveys were undertaken within the subject site by Cumberland Ecology on 12 July, 2016. Surveys included a fauna habitat assessment, and incidental observations. Further details of each of the survey methods are provided below.

2.3.1 Habitat Assessments

The assessment 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. Structural features considered included the nature and extent of the understorey and ground stratum and extent of canopy. The survey also included an assessment of the presence of habitat features suitable for use by threatened fauna species known from the locality.

2.3.2 Incidental Observations

Any incidental fauna species that were observed, heard calling, or otherwise detected on the basis of tracks or signs, were recorded and listed in the total species list for the subject site.

2.4 Limitations

Vertebrate fauna and vascular flora of the locality are well known based upon a sizeable database of past records and various published reports. The surveys by Cumberland Ecology added to the existing database and helped to provide a clear indication of the likelihood that various species occur, or are likely to occur within the subject site. The data obtained from database assessment and surveys of the subject site furnished an appropriate level of information to support this assessment.

The weather conditions at the time of the flora surveys were generally favourable for plant growth and production of features required for identification of most species. Shrubs, grasses, herbs and creepers were readily identifiable in most instances. It is expected that not all flora species present would have been recorded during surveys, particularly within planted garden areas. Despite this, it is considered that sufficient information has been collected to assess issues including conservation significance of the flora, condition and viability of bushland and likely impact on native vegetation. An assessment of the likelihood of occurrence of threatened flora species recorded within the locality of the subject site in the database searches was undertaken to supplement the flora survey.

Fauna surveys undertaken for this assessment relied on database analysis and fauna habitat assessment. In general, opportunistic observations of fauna provide a "snapshot" of some of the fauna present on a site that were active during time of the surveys. The data produced by the surveys is intended to be indicative of the types of species that could occur and not an absolute census of all vertebrate fauna species occurring within the subject site. Therefore not all fauna utilising the subject site are likely to have been recorded during surveys. An assessment of the likelihood of occurrence of threatened and migratory fauna species listed for the locality in the database searches was undertaken to supplement the fauna surveys. The combination of these techniques is considered appropriate for assessing the habitat values of the site for threatened fauna within the subject site.

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Chapter 3

Results

3.1 Vegetation Communities

The subject site was previously mapped for the SMCMA Vegetation Mapping (2013) project which identified the presence of the following two vegetation communities within the subject site:

- Coastal Enriched Sandstone Moist Forest; and
- Urban Native and Exotic Cover.

Flora surveys by Cumberland Ecology in July 2016 refined this previous mapping of the subject site. **Table 3.1** lists the vegetation communities occurring within the subject site, their conservation status and their extent. The distribution of these vegetation communities within the subject site is shown in **Figure 3.1** and detailed descriptions of each are provided below.

Table 3.1 Conservation status and extent of vegetation communities

Vegetation Community	TSC Act Status	EPBC Act Status	Area (ha)
Coastal Enriched Sandstone Moist Forest	Not listed	Not listed	0.064
Urban Native and Exotic Cover	Not listed	Not listed	0.071
Total			**0.135**

3.1.1 Coastal Enriched Sandstone Moist Forest

TSC Act Status: Not listed

EPBC Act Status: Not listed

Coastal Enriched Sandstone Moist Forest is the most commonly occurring native vegetation community within the Lane Cove Local Government Area with an estimated 43.5 ha present (Storm Consulting Pty Ltd. 2010). Approximately 0.064 ha of Coastal Enriched Sandstone Moist Forest is present on the subject site. The total extent of this community within the subject site is located within Lots 1 and 2 DP857133 (274 and 274A Longueville Road),

which are in the northern section of the subject site. This community has a highly modified understorey and does not conform to a threatened ecological community (TEC) listed under the TSC Act or EPBC Act. A complete list of all plant species recorded within this community is provided in **Appendix A**.

The community is dominated by *Syncarpia glomulifera* (Turpentine) trees which occur in scattered patches throughout the community's extent (see **Photograph 3.1**). One *Angophora costata* (Smooth-barked Apple) is present just outside the subject site's northern boundary; however its canopy extends into the subject site. None of these trees are naturally regenerating within the subject site as their understories are comprised of planted garden beds and mown grass.

The sub-canopy of this community is comprised almost entirely of exotic species with the exception of a few *Pittosporum undulatum* (Sweet Pittosporum) small trees located along the community's western boundary (see **Photograph 3.2**). Exotic sub-canopy species include a *Phoenix canariensis* (Canary Island Date Palm) and a *Cupressus* sp. (Cypress) tree located in the community's western edge, and several *Archontophoenix cunninghamiana* (Bangalow Palm) that are located in the centre of the community (see **Photographs 3.3 and 3.4**). All of these species are planted individuals.

The shrub layer is comprised almost entirely of planted exotic and native shrub species (see **Photograph 3.5**). Planted native shrubs include *Syzygium australe* (Brush Cherry), *Syzygium oleosum* (Blue Lilly Pilly), *Syzygium paniculatum* (Magenta Lilly Pilly), *Callistemon viminalis* (Weeping Bottlebrush), *Grevillea* spp. and *Westringia longifolia* (Long-leaved Westringia). Planted exotic shrubs included *Jacaranda mimosifolia* (Jacaranda), *Plectranthus ciliatus*, *Photinia serrulata* (Chinese Photinia), *Murraya paniculata* (Orange Jasmine) and *Rosa* sp. The eastern edge of the community contains non-planted exotic species including the noxious *Ligustrum lucidum* (Large-leaved Privet), *Ligustrum sinense* (Small-leaved Privet) and *Cinnamomum camphora* (Camphor Laurel).

The community's entire ground layer has been previously cleared and exists within landscaped areas, including mown lawn or planted gardens (see **Photograph 3.6**). As such, the ground layer of this community is dominated by exotic herbs and grasses with scattered occurrences of native herbs, grasses and ferns. Commonly occurring exotic species include: *Bidens pilosa* (Cobbler's Pegs), *Taraxacum officinale* (Dandelion), *Sonchus oleraceus* (Common Sowthistle), *Sida rhombifolia* (Paddy's Lucerne), *Anagallis arvensis* (Scarlet Pimpernel), *Viola odorata* (Sweet Violet), *Ehrharta erecta* (Panic Veldtgrass), *Sporobolus africanus* (Marsh Bristlegrass) and *Stenotaphrum secundatum* (Buffalo Grass).

Native understorey species are most abundant within mown lawn located on the western and eastern edges of the community. Native herbs occurring sporadically in these areas include *Centella asiatica* (Indian Pennywort), *Cotula australis* (Carrot Weed), *Dichondra repens* (Kidney Weed) and *Viola banksii* (Wild Violet). *Microlaena stipoides* (Weeping Grass) and *Oplismenus aemulus* (Basket Grass) were the only native grass species recorded within the community, with all individuals occurring sporadically within the mown lawns in the community's east and west. Native fern species occurring include *Asplenium australasicum*

(Bird's Nest Fern), *Cyathea cooperi* (Straw Treefern) and *Psilotum nudum* (Skeleton Fork-fern).

Photograph 3.1 *Syncarpia glomulifera* (Turpentine) trees located along the community's western boundary

Photograph 3.2 *Pittosporum undulatum* (Sweet Pittosporum) (circled in red) small trees located along the community's western boundary

Photograph 3.3 *Phoenix canariensis* (Canary Island Date Palm) located in the western section of the community

Photograph 3.4 *Archontophoenix cunninghamiana* (Bangalow Palm) trees located in the centre of the community

Photograph 3.5 Planted shrubs within landscaped areas

Photograph 3.6 Mown lawn within eastern edge of the community

3.1.2 Urban Native and Exotic Cover

TSC Act Status: Not listed

EPBC Act Status: Not listed

This community exists as four separate patches within the subject site and has a total area of 0.071 ha. The community does not contain canopy trees as most of the community has been previously cleared. The largest patch exists primarily as a previously cleared easement located along the subject sites western boundary (see **Photograph 3.7**). Three additional areas of the community exist as isolated patches within the northern, central and southern sections of the subject site (see **Figure 3.1**). The patch in the north contains planted shrubs along a fence, the patch in the centre is comprised of a mown lawn, and the patch in the south consists of one planted *Cotoneaster pannosus* tree that is surround be concrete. The vegetation within this community as a whole is dominated by exotic species in all stratums, which is typical of previously cleared areas that are down slope and receive elevated amounts of nutrient rich run-off.

The sub-canopy of this community is comprised entirely of exotic species consisting of *Erythrina X sykesii* (Coral Tree), *C. pannosus*, *Musa* sp. and *L. lucidum* (Large-leaved Privet).

The shrub layer of this community is dominated by exotic species with only two native planted trees present consisting of *Homalanthus populifolius* (Bleeding Heart) and *S. australe* (Brush Cherry) (see **Photograph 3.8**). The remainder of this layer is dominated by the noxious *L. lucidum* (Large-leaved Privet), *L. sinense* (Small-leaved Privet) and *Lantana camara* (Lantana). Other exotic shrubs include *Bougainvillea* sp, *Citrus X Limon* (Rough Lemon), *Brachychiton acerifolius* (Flame Tree) and *Ochna serrulata* (Mickey Mouse Plant).

The groundcover vegetation within this community is highly degraded and dominated by exotic species including: *B. pilosa* (Cobbler's Pegs), *T. officinale* (Dandelion), *Medicago polymorpha* (Medic Burr), *S. rhombifolia* (Paddy's Lucerne), *Plantago lanceolata* (Lamb's Tongue) and *Stellaria media* (Common Chickweed) (see **Photograph 3.9**). Native groundcover species occurring predominately as isolated individuals include: *Cotula australis* (Carrot Weed), *D. repens* (Kidney Weed), *Commelina cyanea* and *Cyperus gracilis* (Slender Flat-sedge).

Photograph 3.7 Easement located along the community's eastern boundary

Photograph 3.8 *Homalanthus populifolius* (Bleeding Heart) tree located along community's eastern boundary

Photograph 3.9 Condition of groundcover vegetation within the community

3.2 Flora Species

3.2.1 General Species

Approximately 110 flora species were recorded within the subject site. Of these species 82 were exotic species. Ten of these species are listed as noxious weeds under the NSW *Noxious Weeds Act 1993*, and three are also listed as a Weed of National Significance (WONS) (see **Table 3.2**). A list of plant species that were detected on the subject site is provided in **Appendix A**.

Table 3.2 Noxious weeds and WONS occurring on the subject site

Scientific Name	Common Name	Noxious Class	WONS
Acetosa sagittata	Rambling Dock	Class 4	-
Araujia sericifera	Moth Vine	Class 4	-
Asparagus aethiopicus	Ground Asparagus	Class 4	Yes
Cinnamomum camphora	Camphor Laurel	Class 4	-
Ipomoea cairica	Coastal Morning Glory	Class 4	-
Ipomoea indica	Morning Glory	Class 4	-

Table 3.2 Noxious weeds and WONS occurring on the subject site

Scientific Name	Common Name	Noxious Class	WONS
Lantana camara	Lantana	Class 4	Yes
Ligustrum lucidum	Large-leaved Privet	Class 4	-
Ligustrum sinense	Small-leaved Privet	Class 4	-
Rubus sp. aggregate	Blackberry	Class 4	Yes

3.2.2 Threatened Species

One *Syzygium paniculatum* (Magenta Lily Pilly) was recorded within the Coastal Enriched Sandstone Moist Forest vegetation community within the subject site (see **Figure 3.1**). This species is listed as vulnerable under the TSC Act. Although this species is listed under the TSC Act, the individual recorded has been planted as part of a landscaped garden and does not occur naturally.

No other threatened flora species were recorded during surveys.

An analysis of the likelihood of occurrence on the subject site for each threatened flora species recorded within the locality is provided in **Appendix C**. This assessment concluded that due to the degraded nature of the subject site, no threatened flora species listed under the TSC Act and/or EPBC Act are likely to occur.

3.3 Fauna

3.3.1 Fauna Habitat

The vegetation of the subject site provides some potential habitat for native fauna known to occur in the locality, including threatened species. Microhabitats present within the subject site are limited, but included crevices within roofing suitable for microbats, palm tree fronds suitable for medium sized birds and ground litter suitable for reptiles (see **Photograph 3.10**). **Figure 3.1** identifies the location of all potential habitats within the subject site. In addition to these microhabitats, the subject site contains numerous flowering plants and trees which can provide potential foraging resources for a range of birds that may use the subject site on occasion as part of a larger foraging range. Microhabitats such as tree hollows and decorticating bark are absent from the subject site. During surveys, it was evident that the southern sections of the subject site contained the highest number of foraging birds.

Photograph 3.10 Crevices in roofing (outlined in red) suitable for microbats

3.3.2 General Species

Six vertebrate fauna species were recorded within the subject site through incidental observations during the habitat assessment. All of these species were common bird species of the area, including high abundances of the Noisy Miner (*Manorina melanocephala*) within the northern and southern sections of the subject site. A full list of fauna species observed is provided in **Table 3.3**.

Table 3.3 Fauna identified during surveys

Common Name	Scientific Name
Australian Brush Turkey	*Alectura lathami*
Australian Raven	*Corvus coronoides*
Indian Myna*	*Acridotheres tristis*
Noisy Miner	*Manorina melanocephala*
Pied Currawong	*Strepera graculina*
Rainbow Lorikeet	*Trichoglossus haematodus*
Sulphur-crested Cockatoo	*Cacatua galerita*

** denotes exotic species*

3.3.3 Threatened Species

No threatened fauna species were recorded within the subject site during surveys. An analysis of the likelihood of occurrence on the subject site for each threatened fauna species recorded within the locality is provided in **Appendix C**. This assessment concluded that two threatened vertebrate fauna species and two migratory species have the potential to occur within the subject site. **Table 3.4** lists the threatened fauna species considered to have the potential to occur within the subject site.

Table 3.4 Threatened fauna species with potential to occur on the subject site

Family	Common Name	Scientific Name	TSC Act Status	EPBC Act Status
Aves				
Apodidae	Fork-tailed Swift	*Apus pacificus*		Mig.
Apodidae	White-throated Needletail	*Hirundapus caudacutus*		Mig.
Falconidae	Black Falcon	*Falco subniger*	V	
Mammalia				
Pteropodidae	Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V
Vespertilionidae	Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	V	

Note: V=vulnerable, Mig.=Migratory

Coordinate System: MGA Zone 56 (GDA 94)

Legend

Subject Site

Vegetation Community

Coastal Enriched Sandstone Moist Forest

Urban Native and Exotic Cover

Treatened Flora

Syzygium paniculatum

Habitat Features

Potential Microbat Habitat

Potential Bird Nesting Habitat

Image Source:
Image © SIX Maps
(dated 6-1-2014)

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N
Grid North

5 0 5 10 15 20 m

I:\...\16124\Figures\RP1\20160714\Figure 3.1. Vegetation Communities and Threatened Species

Figure 3.1. Vegetation Communities, Threatened Species and Fauna Habitat within the Subject Site

Chapter 4

Impact Assessment

4.1 Introduction

Approximately 0.135 ha of vegetation will be cleared as a result of the proposed development. The majority of the proposed development will be restricted to previously developed or cleared areas and its impact is likely to be negligible in terms of biodiversity loss. These areas are inhabited primarily by planted native and exotic tree species with a predominately exotic understorey, and offers little natural habitat to endemic fauna species.

4.2 Ecological Communities

4.2.1 Coastal Enriched Sandstone Moist Forest

Approximately 0.064 ha of this community is present within the subject site. The proposed development will clear all of this community present. This community is highly degraded and exists as previously cleared areas containing landscaped gardens and mown lawns with scattered canopy trees. As such, the vegetation to be cleared is unlikely to provide important habitat for threatened species known to occur in the locality. Furthermore, larger patches of the same community in better condition occur in areas adjacent to the subject site within Gore Creek to the east. Therefore, the removal of 0.064 ha of this community within the subject site is unlikely to significantly impact biodiversity values of the locality.

The vegetation within this community is not listed under the TSC Act or EPBC Act; therefore further ecological assessments are not recommended.

4.2.2 Urban Native and Exotic Cover

Approximately 0.071 ha of this community is present within the subject site, all of which will be cleared by the proposed development. The vegetation within this community is highly degraded and is unlikely to provide important habitat to threatened species known to occur in the locality. Therefore, its removal is unlikely to significantly impact on the biodiversity values of the subject site or locality.

The vegetation within this community is not listed under the TSC Act or EPBC Act; therefore further ecological assessments are not recommended.

4.3 Flora Species

One *Syzygium paniculatum* (Magenta Lilly Pilly), listed as vulnerable under the TSC Act will be removed as a result of the proposed development. This individual has been planted and does not occur naturally within the subject site as no suitable habitat is present. Although the individual to be removed does not occur naturally within the subject site, an assessment of significance was undertaken as a precaution. The assessment concluded that the proposed development is unlikely to have a significant impact on the species and therefore a Species Impact Statement is not required.

4.4 Fauna Species

No threatened fauna species were recorded as occurring in the study area during the time of the field survey. A total of two threatened fauna species listed under the TSC Act, one of which is also listed under the EPBC Act, and two migratory species listed under the EPBC Act were considered to have the potential to occur within the subject site.

Threatened fauna species listed under the TSC Act include two bat species. A total of approximately 0.135 ha of suitable foraging habitat for both species and 20 m^2 of potential roosting habitat for one species will be removed as a result of the proposed development. An assessment of significance was undertaken for the two bat species considered to have the potential to occur within the subject site. Neither of the assessed species are considered to be significantly impacted by the proposed development and therefore no Species Impact Statement is required.

4.4.1 Eastern Bentwing-bat (Miniopterus schreibersii oceanensis)

The Eastern Bentwing-bat is considered to have the potential to occur as it may utilise the subject site for foraging and roosting purposes. Potential roosting habitat is limited to one structure in the south of the site containing an opening in the roof. Although this species is known to roost in such structures, it is not its preferred roosting habitat. This species is highly mobile and if the subject site is utilised as foraging habitat, it is likely only utilised on occasion as part of a much broader foraging range. The potential foraging habitat within the site is relatively small and exposed to a high degree of edge effects being bounded by development. As more suitable foraging habitat is present within bushland bounding the site's eastern edge, this species is unlikely to be dependent on the subject site for its long-term survival in the locality. Therefore, the proposed development is unlikely to have a significant impact on this species.

4.4.2 Grey-headed Flying-fox

The Grey-headed Flying-fox is considered to have the potential to utilise the subject site for foraging purposes as part of a much broader foraging range. As a camp is not present and only a small amount of foraging habitat is available, this species is unlikely to be reliant on the subject site for survival and the removal of vegetation as a result of the proposed development is unlikely to adversely impact this species

4.4.3 Migratory Species

- Fork-tailed Swift (*Apus pacificus); and*
- White-throated Needletail (*Hirundapus caudacutus)*

The two migratory bird species listed under the EPBC Act are highly mobile species that may utilise the site on occasion as part of much broader foraging range. Both species are almost exclusively aerial species and would not be reliant on the habitat within the subject site and would only forage overhead. Therefore, the proposed development is unlikely to impact on these species.

Chapter 5

Mitigation Measures

A number of mitigation measures are recommended for the proposed development. These measures should be implemented to minimise impacts to the ecological values of the subject site and adjoining properties.

5.1.1 Vegetation Protection

To avoid unnecessary removal or damage to vegetation to be retained within the subject site, the clearing area should be clearly demarcated and signed, where appropriate, to ensure no vegetation beyond these boundaries is removed. Clearing works and equipment should be excluded from areas outside the clearing area. Site inductions are to be given by the civil contractor to ensure all site workers and visitors are aware of any no-access areas.

5.1.2 Erosion, Sedimentation and Pollution Control

Potential impacts to flora and fauna occurring in the construction phase that can be managed include: run-off, sedimentation, erosion and pollution. 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 from heavy rainfall. Sediment fences should be established around the perimeter of the development area, especially in down slope areas to prevent the impacts of sedimentation on the adjoining vegetation and Gore Creek. 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.

5.1.3 Pre-clearing and Clearing Surveys

Pre-clearing surveys are to be undertaken by a suitably qualified ecologist within one week of any clearing activities. Pre-clearing surveys will include:

- Demarcation of key habitat features such as hollow-bearing trees, nests, fallen logs and bushrock;
- Inspection of the building's roof containing potential roosting habitat for microbats; and

- Provision of a report following the completion of a pre-clearing survey, detailing the location and type of all habitat items.

To minimise impacts to native fauna species, clearing should 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 as gently as possible, followed by an inspection.

If possible, trees marked as containing hollows/nests will be shaken by machinery prior to clearing to encourage any animals remaining to leave the hollows/nests and move on. An ecologist should investigate all hollows/nests for the presence of fauna following felling of the tree.

An ecologist should be present while clearing to rescue animals injured during the clearance operation. Provisions will be made to protect any 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 to the east of the subject site; and

- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal (either taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanized).

5.1.4 Weed Control Measures

Noxious weed species and WONS occurring within the subject site should be managed in order to prevent further spread. Prior to any vegetation clearance, noxious weeds should be demarcated during the pre-clearance survey in order for these to be disposed of separately from native material.

5.1.5 Revegetation Works

It is recommended that any revegetation works be carried out in accordance with an approved landscape plan that aims to provide suitable foraging/nesting habitat for native fauna. All plants should be sourced from local nurseries or come from seed sourced from areas of native vegetation to the east of the property.

cumberland ecology

Chapter **6**

Conclusion

The subject site is approximately 0.5 ha in area, and is comprised primarily of previously developed areas. Approximately 0.135 ha of vegetation is present within the subject site's northern and eastern edges. With the exception of several scattered canopy trees in the north of the subject site, all of the vegetation has been previously cleared and none of the vegetation communities present are listed as a TEC under the TSC Act or EPBC Act.

Even though none of the vegetation communities within the subject site are listed as a TEC, an impact assessment was undertaken to examine the impacts of the proposed development on the biodiversity values of the subject site.

Approximately 0.135 ha ha of non-TEC vegetation, including one planted threatened species will be cleared as a result of the proposed development. Due to the degraded nature of the vegetation present and the fact that bigger patches of better condition habitat will remain in areas adjacent to the east of the subject site, the proposed development is unlikely to have a significant impact on the biodiversity values of the locality. Additionally, the one threatened plant species present exists as a planted individual and its removal is unlikely to have a significant impact on a local population.

One building potentially offers roosting habitat for one threatened bat species and the vegetation present offers foraging habitat for two threatened bat species; however the potential roosting habitat is not preferred habitat for the species, and foraging habitat present is unlikely to be important to either of the species as it is likely only utilised periodically as part of a much broader foraging range. Therefore, the proposed development is unlikely to have a significant impact on either of the bat species that have potential to occur.

The impact assessment conducted has determined that if all mitigation measures provided in this report are implemented, the proposed development is unlikely to have a significant impact on the long-term survival of any threatened species and/or ecological communities occurring, or that have the potential to occur within the subject site or locality. Therefore a Species Impact Statement or further ecological assessments are not required.

References

Botanic Gardens Trust. 2016. PlantNET. National Herbarium of NSW, Royal Botanic Garden, Sydney.

DoE. 2016. EPBC Protected Matters Search Tool. Department of the Environment, Canberra.

Harden, G. J. 1990-1993. Flora of NSW Volumes 1-4. New South Wales University Press, Kensington.

Lane Cove Council. 2009. Lane Cove Local Environment Plan.

OEH. 2013. The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage, Sydney.

OEH. 2016. Atlas of NSW Wildlife Office of Environment and Heritage.

Storm Consulting Pty Ltd. 2010. Native Vegetation of the Lane Cove Council Local Government Area.

Appendix A

Flora Species List

Table A.1 Flora species recorded on the subject site

Family	Species Name	Common Name	Exotic	Noxious Class	WONS	Coastal Enriched Sandstone Moist Forest	Exotic and Native Urban
Trees							
Myrtaceae	*Angophora costata*	Smooth-barked Apple				x	
Myrtaceae	*Syncarpia glomulifera*	Turpentine				x	
Small Trees							
Arecaceae	*Archontophoenix cunninghamiana*	Bangalow Palm	*			x	
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	*			x	
Cupressaceae	*Cupressus* sp.	Cypress	*			x	
Fabaceae (Faboideae)	*Erythrina* X *sykesii*	Coral Tree	*				x
Malaceae	*Cotoneaster pannosus*		*				x
Musaceae	*Musa* sp.		*				x
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*	4			x
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum				x	
Shrubs							
Apocynaceae	*Plumeria* sp.		*			x	
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*			x	
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart					x
Lamiaceae	*Plectranthus ciliatus*		*			x	
Lamiaceae	*Westringia longifolia*	Long-leaved Westringia				x	
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	*	4		x	
Malvaceae	*Brachychiton*	Flame Tree	*				x

Table A.1 Flora species recorded on the subject site

Family	Species Name	Common Name	Exotic	Noxious Class	WONS	Coastal Enriched Sandstone Moist Forest	Exotic and Native Urban
	acerifolius						
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush				x	
Myrtaceae	*Leptospermum laevigatum*	Coast Teatree	*			x	
Myrtaceae	*Leptospermum petersonii*	Lemon-scented Teatree	*				x
Myrtaceae	*Sannantha similis*		*			x	
Myrtaceae	*Syzygium australe*	Brush Cherry				x	x
Myrtaceae	*Syzygium oleosum*	Blue Lilly Pilly				x	
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly				x	
Nyctaginaceae	*Bougainvillea* sp.		*				x
Ochnaceae	*Ochna serrulata*	Mickey Mouse Plant	*			x	x
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*	4		x	x
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	*	4		x	x
Proteaceae	*Grevillea banksii* X *bipinnatifida*	Robyn Gordon	*			x	
Proteaceae	*Grevillea baueri* X *rosmarinifolia*	John Evans	*			x	
Rosaceae	*Photinia serrulata*	Chinese Photinia	*			x	
Rosaceae	*Rosa sp.*		*			x	
Rutaceae	*Citrus x Limon*	Rough Lemon	*				x
Rutaceae	*Murraya paniculata*	Orange Jasmine	*			x	
Verbenaceae	*Lantana camara*	Lantana	*	4	Yes		x

Table A.1 Flora species recorded on the subject site

Family	Species Name	Common Name	Exotic	Noxious Class	WONS	Coastal Enriched Sandstone Moist Forest	Exotic and Native Urban
Dicots							
Apiaceae	*Centella asiatica*	Indian Pennywort				x	
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	*			x	x
Asteraceae	*Ageratina adenophora*	Crofton Weed	*			x	
Asteraceae	*Bidens pilosa*	Cobblers Pegs	*			x	x
Asteraceae	*Conyza sumatrensis*	Tall Fleabane	*			x	x
Asteraceae	*Cotula australis*	Carrot Weed				x	x
Asteraceae	*Galinsoga parviflora*	Potato Weed	*				x
Asteraceae	*Gamochaeta calviceps*	Cudweed	*				x
Asteraceae	*Hypochaeris radicata*	Catsear	*				x
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	*			x	x
Asteraceae	*Taraxacum officinale*	Dandelion	*			x	
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse	*				x
Brassicaceae	*Cardamine hirsuta*	Common Bittercress	*				x
Brassicaceae	*Lepidium didymum*	Lesser Swinecress	*				x
Caryophyllaceae	*Cerastium glomeratum*	Mouse-ear Chickweed	*				x
Caryophyllaceae	*Stellaria media*	Common Chickweed	*			x	x
Convolvulaceae	*Dichondra repens*	Kidney Weed				x	x

Table A.1 Flora species recorded on the subject site

Family	Species Name	Common Name	Exotic	Noxious Class	WONS	Coastal Enriched Sandstone Moist Forest	Exotic and Native Urban
Euphorbiaceae	*Euphorbia peplus*	Petty Spurg	*				x
Fabaceae	*Medicago arabica*	Spotted Burr Medic	*				x
Fabaceae	*Medicago polymorpha*	Burr Medic	*				x
Fabaceae	*Trifolium repens*	White Clover	*				x
Fumariaceae	*Fumaria muralis*	Wall Fumitory	*				x
Geraniaceae	*Geranium solanderi*	Native Geranium	*			x	
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	*				x
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*			x	
Myrsinaceae	*Anagallis arvensis*	Scarlet Pimpernel	*			x	x
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	*	4		x	x
Oxalidaceae	*Oxalis corniculata*		*			x	x
Phyllanthaceae	*Phyllanthus tenellus*	Hen and Chicken	*			x	
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	*				x
Plantaginaceae	*Veronica arvensis*	Wall Speedwell	*				x
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell					
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*			x	x
Tropaeolaceae	*Tropaeolum majus*	Nasturtium	*				x
Urticaceae	*Parietaria judaica*	Pellitory	*			x	x

Table A.1 Flora species recorded on the subject site

Family	Species Name	Common Name	Exotic	Noxious Class	WONS	Coastal Enriched Sandstone Moist Forest	Exotic and Native Urban
Violaceae	*Viola banksii*	Wild Violet				x	
Violaceae	*Viola odorata*	Sweet Violet	*			x	
Monocots (grasses)							
Poaceae	*Bromus catharticus*	Prairie Grass	*				x
Poaceae	*Cynodon dactylon*	Couch	*				x
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*			x	x
Poaceae	*Microlaena stipoides*	Weeping Grass				x	
Poaceae	*Oplismenus aemulus*	Basket Grass				x	
Poaceae	*Pennisetum clandestinum*	Kikuyu	*				x
Poaceae	*Poa annua*	Winter Grass	*				x
Poaceae	*Sporobolus africanus*	Marsh Bristlegrass	*			x	x
Poaceae	*Stenotaphrum secundatum*	Buffalo Grass	*			x	
Monocots (other)							
Amaryllidaceae	*Clivia miniata*	Natal Lily	*			x	
Amaryllidaceae	*Nothoscordum borbonicum*	Honeybells	*			x	
Anthericaceae	*Chlorophytum comosum*	Spider Plant	*			x	
Araceae	*Monstera deliciosa*	Fruit Salad Plant	*				x
Asparagaceae	*Asparagus aethiopicus*	Ground Asparagus	*	4	Yes	x	x
Asparagaceae	*Ophiopogon japonicus*	Mondo Grass	*			x	

Table A.1 Flora species recorded on the subject site

Family	Species Name	Common Name	Exotic	Noxious Class	WONS	Coastal Enriched Sandstone Moist Forest	Exotic and Native Urban
Asteliaceae	*Cordyline australis*	Cabbage Tree	*			x	
Asteliaceae	*Cordyline stricta*	Narrow-leaved Palm Lily	*				x
Commelinaceae	*Commelina cyanea*						x
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew	*			x	x
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge				x	x
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush				x	
Orchidaceae	*Pterostylis* sp.					x	
Phormiaceae	*Dianella caerulea var. caerulea*	Blue Flax Lily				x	
Strelitziaceae	*Strelitzia reginae*	Bird of Paradise	*			X	
Climbers/Vines							
Apocynaceae	*Araujia sericifera*	Moth Vine	*	4			x
Apocynaceae	*Trachelospermum jasminoides*	Star Jasmine				x	
Basellaceae	*Anredera cordifolia*	Madeira Vine	*				x
Bignoniaceae	*Pyrostegia venusta*	Golden Shower	*			x	
Convolvulaceae	*Ipomoea cairica*	Coastal Morning Glory	*	4		x	
Convolvulaceae	*Ipomoea indica*	Morning Glory	*	4		x	x
Rosaceae	*Rubus* sp. aggregate	Blackberry	*	4	Y		x
Ferns and Allies							
Aspleniaceae	*Asplenium australasicum*	Bird's Nest Fern				x	

Table A.1 Flora species recorded on the subject site

Family	Species Name	Common Name	Exotic	Noxious Class	WONS	Coastal Enriched Sandstone Moist Forest	Exotic and Native Urban
Convolvulaceae	*Calystegia sepium*		*			x	
Cyatheaceae	*Cyathea cooperi*	Straw Treefern				x	
Lomariopsidaceae	*Nephrolepis cordifolia*	Fishbone Fern	*			x	
Polygonaceae	*Acetosa sagittata*	Rambling Dock	*	4			x
Psilotaceae	*Psilotum nudum*	Skeleton Fork-Fern				x	
Pteridaceae	*Adiantum aethiopicum*	Common Maidenhair					x

Appendix B

Threatened Flora Likelihood of Occurrence

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Flora	Casuarinaceae	*Allocasuarina glareicola*		E	E	Species or species habitat likely to occur within area.	Grows in Castlereagh woodland on lateritic soil with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*. Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.	Unlikely. No records from the locality and no suitable habitat is present.
Flora	Convolvulaceae	*Wilsonia backhousei*	Narrow-leafed Wilsonia	V		1	Occurs on margins of salt marshes and lakes.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Dilleniaceae	*Hibbertia* sp. *Turramurra*	Julian's Hibbertia	CE		1	Occurs in the Cumberland and Pittwater CMAs and grows in forest with the canopy species *Eucalyptus pilularis*, *E. resinifera*, *Corymbia gummifera* and *Angophora costata*. Prefers light clay soils occurring on shale sandstone soil transition.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Elaeocarpaceae	*Tetratheca glandulosa*		V		3	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone. Occupies	Unlikely. Low number of records from the locality and no suitable habitat is

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Occurs in open woodland, woodland and open forest.	present.
Flora	Ericaceae	*Epacris purpurascens* var. *purpurascens*		V		13	Found in a range of habitat types, most of which have a strong shale soil influence.	Unlikely. Low number of records from the locality and no suitable habitat is present.
Flora	Fabaceae (Faboideae)	*Dillwynia tenuifolia*		V		1	Locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E	V	1	Found in heath and woodland on sandy soils. Prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include *Corymbia gummifera* (Red Bloodwood),	Unlikely. Only one record from the locality and no suitable habitat is present.

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							Eucalyptus haemastoma (Scribbly Gum), *Eucalyptus parramattensis* (Parramatta Red Gum), Banksia serrata (Saw Banksia) and *Angophora bakeri* (Narrow-leaved Apple).	
Flora	Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V	V	1	Occurs on alluviums, shales and at the intergrade between shales and sandstones. Occur in open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Fabaceae (Mimosoideae)	*Acacia terminalis* subsp. *terminalis*	Sunshine Wattle	E	E	6	Coastal scrub and dry sclerophyll woodland on sandy soils .	Unlikely. Low number of records from the locality and no suitable habitat is present.
Flora	Geraniaceae	*Pelargonium* sp. *Striatellum (G.W.Carr 10345)*	Omeo Stork's-bill	E	E	Species or species habitat likely to occur within area.	Has a narrow habitat that is usually just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the wetland or aquatic communities.	Unlikely. No records from the locality and no suitable habitat is present.

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Flora	Lobeliaceae	*Hypsela sessiliflora*		E	X	1	Currently known from one site located in Erskine Park. All previous sightings are from western Sydney at Homebush and at Agnes Banks.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Myrtaceae	*Callistemon linearifolius*	Netted Bottle Brush	V		5	Grows in dry sclerophyll forest on the coast and adjacent ranges.	Unlikely. Low number of records from the locality and no suitable habitat is present.
Flora	Myrtaceae	*Biconvex Paperbark*	Melaleuca biconvexa	V	V	Species or species habitat likely to occur within area.	Found in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Unlikely. No records from the locality and no suitable habitat is present.
Flora	Myrtaceae	*Darwinia biflora*		V	V	150	Occurs on the edges of weathered shale-capped ridges, where these integrade with Hawkesbury Sandstone.	Unlikely. Although a high number of records from the locality, no suitable habitat is present within the site.
Flora	Myrtaceae	*Eucalyptus camfieldii*	Camfield's Stringybark	V	V	1	Found in exposed areas on sandstone ridges, slopes and plateaus near tall coastal heath or low open woodland.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black	V	V	6	Occurs in dry grassy woodland on shallow soils of slopes and ridges.	Unlikely. Low number of records from the locality

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
			Peppermint				Prefers infertile soils derived from granite or metasedimentary rock on the lower slopes of the landscape.	and no suitable habitat is present.
Flora	Myrtaceae	*Melaleuca deanei*	Deane's Paperbark	V	V	4	Found in marshy heath on coastal sandstone plateaus. Restricted to sandstones of Sydney and south coast.	Unlikely. Low number of records from the locality and no suitable habitat is present.
Flora	Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E	V	10	On south coast of NSW occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Present. Individual present is a planted species. Natural occurrence of this species within the subject site is unlikely as all understorey vegetation has previously been cleared.
Flora	Orchidaceae	*Caladenia tessellata*	Thick Lip Spider Orchid	E	V	1	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Orchidaceae	*Genoplesium baueri*	Bauer's Midge Orchid	E	E	1	Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Orchidaceae	*Pterostylis*	Sydney Plains	E	E	1	The species occurs in small pockets of	Unlikely. Only one record

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
		saxicola	Greenhood				shallow soil in flat areas on top of sandstone rock shelves above cliff lines, or on mossy rocks in gullies. Sclerophyll forest/woodland often occurs growing above where the species occurs, on shale or shale/sandstone transition soils. Flowering time is from October to December. It is currently only known to occur at five locations within western Sydney: Georges River National Park, close to Yeramba Lagoon, Peter Meadows Creek, and St Marys Towers.	from the locality and no suitable habitat is present.
Flora	Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue-orchid	V	V	Species or species habitat likely to occur within area.	Occur in a wide variety of habitats including heathlands, heathy woodlands, sedgelands, Xanthorrhoea spp. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests. Soils are generally considered to be moist and sandy, however, this species is also known to	Unlikely. No records from the locality and no suitable habitat is present.

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							grow in dry or peaty soils. Is associated with the community Bloodwood / Scribbly Gum / Silver-top Ash Forest on the South Coast. Species is known to have occurrence associated with other *Cryptostylis* species. Flowering occurs generally from November to February.	
Flora	Poaceae	*Deyeuxia appressa*		E	E	1	A highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. Was first collected in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown. Was then collected in 1941 from Killara, near Hornsby. Possibly extinct in wild.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Proteaceae	*Persoonia hirsuta*	Hairy Geebung	E	E	1	Occurs in dry sclerophyll forest and woodland with a shrubby understorey.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Proteaceae	*Grevillea parviflora* subsp. *parviflora*	Small-flower Grevillea	V	V	1	Grows in light sandy or clay soils over thin shales, often with lateritic ironstone gravels and nodules. Is known to occur in Shale/Sandstone Transition Forest.	Unlikely. Only one record from the locality and no suitable habitat is present.
Flora	Rutaceae	*Asterolasia*		E	E	Species or	Occurs on Hawkesbury sandstone	Unlikely. No records from

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
		elegans				species habitat likely to occur within area.	growing between sandstone boulders and rocky outcrops found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. It is currently only known from 7 populations occurring in the hills north of Maroota within a 22 km^2 extent of occurrence.	the locality and no suitable habitat is present.
Flora	Santalaceae	*Austral Toadflax*	Thesium australe	V	V	Species or species habitat likely to occur within area.	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast.	Unlikely. No records from the locality and no suitable habitat is present.
Flora	Thymelaeaceae	*Pimelea curviflora* var. *curviflora*		V	V	2	Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Unlikely. Low number of records from the locality and no suitable habitat is present.
Flora	Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E	E	Species or species habitat likely	On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain	Unlikely. No records from the locality and no suitable habitat is present.

Table B.1 Threatened flora likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						to occur within area.	Woodland variants and Moist Shale Woodland) and in areas of ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey. Coastal headlands and hilltops are the favoured sites.	

Appendix C

Threatened Fauna Likelihood of Occurrence

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Amphibia	Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E	V	2	The species is found in a wide range of water bodies except fast moving streams. It commonly inhabits disturbed sites such abandoned quarries and mines, though generally breeds in habitats that include still, shallow, unpolluted water bodies, that are unshaded, contain aquatic plants are free of Mosquito fish and other predators, with a range of diurnal shelter sites (emergent aquatic vegetation).	Unlikely. Low number of records in the locality and no suitable habitat is present.
Amphibia	Myobatrachidae	*Mixophyes balbus*	Stuttering Frog	E	V	Species or species habitat likely to occur within area.	Typically found in association with permanent streams through temperate and sub-tropical rainforest, and wet sclerophyll forest. It is rarely found in dry, open, tableland, riparian vegetation, and moist gullies in dry forest.	Unlikely. No records from the locality and no suitable habitat is present.
Amphibia	Myobatrachidae	*Pseudophryne australis*	Red-crowned Toadlet	V		33	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or	Unlikely. Although a moderate number of records from the locality, no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters.	
Amphibia	Myobatrachidae	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	Suitable habitat within the locality	Occurs in heath, woodland and open dry sclerophyll forest on a variety of soil types. Breeding habitat for this species usually contains soaks or pools within first of second order streams.	Unlikely. No records from the locality and no suitable habitat is present.
Aves	Accipitridae	*Pandion cristatus*	Eastern Osprey	V		5	Found in littoral and coastal habitats and terrestrial wetlands. They generally are found in coastal areas though will travel inland along major water courses. They visit a wide range of wetland habitats including inshore waters, reefs, bays, coastal cliffs, estuaries, mangrove swamps, broad rivers, reservoirs, large lakes, and water holes. They feed on fish over clear, open water, and nest in trees or dead trees, generally within one kilometre of the ocean.	Unlikely. Low number of records in the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Aves	Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V		2	The Little Eagle occupies habitats rich in prey within open eucalypt forest, woodland, or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Anatidae	*Nettapus coromandelianus*	Cotton Pygmy-Goose	E		4	Species is a rare visitor to NSW but occurs in freshwater lakes, lagoons, swamps and dams, preferring areas with waterlilies and other floating and submerged aquatic vegetation.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Apodidae	*Apus pacificus*	Fork-tailed Swift		Mig.	Species or species habitat likely to occur within area.	Species has been recorded throughout NSW, but mostly east of the Great Divide. The species is almost exclusively aerial in Australia and breeds overseas. It forages from a metre above the ground, up to hundreds of metres in altitude, and mostly occur over inland plains, though sometimes over foothills, and coastal areas.	Potential. Species may periodically forage overhead of the site.
Aves	Apodidae	*Hirundapus*	White-throated		Mig.	Species or	Almost exclusively aerial, from heights of	Potential. Species may

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
		caudacutus	Needletail			species habitat likely to occur within area.	less than 1 m up to more than 1000 m above the ground. Occur over most types of habitat, particularly above wooded areas including open forest and rainforest, between trees or in clearings and below the canopy.	periodically forage overhead of the site.
Aves	Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	E	E	2	Occurs in freshwater wetlands, and more rarely, estuarine wetlands. It favours wetlands with tall, dense vegetation, and forages in shallow water up to a depth of 0.3m. It nests in deep vegetative cover over shallow pools.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Ardeidae	*Ixobrychus flavicollis*	Black Bittern	V		5	Inhabits terrestrial and estuarine wetlands, generally in areas containing permanent water and dense vegetation. The species can occur in flooded grassland, woodland, rainforest, and mangroves. It feeds on frogs, reptiles, fish, and invertebrates such as snails, dragonflies, shrimp and crayfish. It roosts during the day on the ground amongst dense reeds or within trees. It nests in branches overhanging water.	Unlikely. Low number of records in the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Aves	Burhinidae	*Burhinus grallarius*	Bush Stone-curlew	E		1	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. Low number of records in the locality and no suitable habitat is present.
Aves	Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V		3	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. In NSW, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo population in the Hornsby	E		3	More often found in forest and woodland habitats containing old growth attributes. Known occurrences in Lane Cove National Park and Pennant Hills Park as	Unlikely. Low number of records in the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
			and Ku-ring-gai Local Government Areas				well as other forested gullies.	
Aves	Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V		5	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (Allocasuarina littoralis), Forest She-oak (A. torulosa) or Drooping She-oak (A. verticillata) occur.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork	E		1	Occurs in floodplain wetlands of major coastal rivers along with minor floodplains, coastal sandplain wetlands and estuaries. Species builds nest in high in trees close to water.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Columbidae	*Ptilinopus superbus*	Superb Fruit-Dove	V		5	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	Unlikely. Low number of records in the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Aves	Cuculidae	*Cuculus optatus*	Oriental Cuckoo		Mig.	Species or species habitat likely to occur within area.	Non-breeding visitor to Australia who is a brood parasite. Usually inhabits forested areas and can be found at all levels of the canopy and at a range of elevations.	Unlikely. No records from the locality and no suitable habitat is present.
Aves	Laridae	*Sternula albifrons*	Little Tern	E	Mig.	2	Occurs in sheltered coastal environments.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Monarchidae	*Myiagra cyanoleuca*	Satin Flycatcher		Mig.	Suitable habitat within the locality	Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	Unlikely. No records from the locality and no suitable habitat is present.
Aves	Motacillidae	*Motacilla flava*	Yellow wagtail		Mig.	Species or species habitat likely to occur within area.	Species is believed to be a regular summer visitor to NSW, preferring open grassy flats near water.	Unlikely. No records from the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Aves	Muscicapidae	*Monarcha melanopsis*	Black-faced Monarch		Mig.	Species or species habitat likely to occur within area.	Found along the coast of eastern Australia, becoming less common further south. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Unlikely. No records from the locality and no suitable habitat is present.
Aves	Muscicapidae	*Monarcha trivirgatus*	Spectacled Monarch		Mig.	Species or species habitat likely to occur within area.	Found along the entire eastern seaboard of Australia. More often found where there is thick understorey in rainforests, wet gullies, waterside vegetation and also in mangroves.	Unlikely. No records from the locality and no suitable habitat is present.
Aves	Muscicapidae	*Rhipidura rufifrons*	Rufous Fantail		Mig.	Suitable habitat within the locality	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground.	Unlikely. No records from the locality and no suitable habitat is present.
Aves	Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V		1	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches,	Unlikely. Only one record from the locality and no suitable habitat present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							mallee and Acacia woodland. Inhabits most of mainland Australia except the treeless deserts and open grasslands.	
Aves	Psittacidae	*Lathamus discolor*	Swift Parrot	E	CE	5	In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon, and E. albens. Breeds in Tasmania in spring and summer.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V		2	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Also utilises isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban	Unlikely. Low number of records in the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							trees. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts.	
Aves	Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	E	Mig.	4	The Curlew Sandpiper is found in coastal areas with intertidal mudflats, including estuaries, inlets and lagoons, and ponds in saltworks. The species have also occasionally been recorded inland around lakes , dams and waterholes with mud or sand present. Main requirements for feeding habitats are the presence of mudflats or shallow water up to 60mm. The Curlew Sandpiper may also forage in saltmarsh environments and flooded paddocks.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Scolopacidae	*Numenius madagascariensis*	Eastern Curlew		Mig.	1	Prefers sheltered coasts, especially estuaries, bays, harbours, inlets and lagoons. Also known to occur in sewage farms, wetlands and mangroves. Species roosts on sandy spits and in low Saltmarsh or mangroves.	Unlikely. Low number of records in the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Aves	Strigidae	*Ninox connivens*	Barking Owl	V		6	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Dense vegetation is used occasionally for roosting. Nests in hollows of large, old eucalypts. Hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations it becomes more reliant on birds, invertebrates and terrestrial mammals. Requires very large permanent territories in most habitats due to sparse prey densities.	Unlikely. Low number of records in the locality and no suitable habitat is present.
Aves	Strigidae	*Ninox strenua*	Powerful Owl	V		245	In NSW the Powerful Owl lives in forests and woodlands occurring in the coastal, escarpment, tablelands and western slopes environments. Specific habitat requirements include eucalypt forests and woodlands on productive sites on gentle terrain; a mosaic of moist and dry types, with mesic gullies and permanent streams; presence of leafy sub canopy	Unlikely. Although a high number of occurrences from the locality, no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							trees or tall shrubs for roosting; presence of large old trees to provide nest hollows. Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials.	
Aves	Tytonidae	*Tyto tenebricosa*	Sooty Owl	V		1	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. Only one record from the locality and no suitable habitat present.
Gastropoda	Camaenidae	*Pommerhelix duralensis*	Dural Woodland Snail		E	Species or species habitat likely to occur within area.	Species occurs under rocks or inside curled-up bark within communities in the interface region between sandstone-derived and shale-derived soils.	Unlikely. No records from the locality and no suitable habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Mammalia	Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	1	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	Unlikely. Only one record from the locality and no suitable habitat present.
Mammalia	Macropodidae	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V	Species or species habitat known to occur within area	Prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges, and isolated rock stacks. Vegetation types associated with the species include dense forest, wet sclerophyll forest, vine thicket, dry sclerophyll forest, and open forest.	Unlikely. No records from the locality and no suitable habitat is present.
Mammalia	Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V		10	Found in dry sclerophyll forest, woodland, swamp forest and mangrove forests east of the Great dividing Range. Primarily roosts in tree hollows but will also utilise man-made structures.	Unlikely. Low number of records from the locality and no preferred habitat is present.
Mammalia	Muridae	*Pseudomys novaehollandiae*	New Holland Mouse		V	Species or species	Occurs in open habitats (heathland, woodland and forest) with a heath	Unlikely. No records from the locality and no suitable habitat is

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						habitat known to occur within area	understorey and vegetated sand dunes. The species prefers deep soft top soils in order to burrow.	present.
Mammalia	Otariidae	*Arctocephalus pusillus doriferus*	Australian Fur-seal	V		1	Exclusively marine species.	Unlikely. Site is not within a marine area.
Mammalia	Peramelidae	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	E	E	1	Within NSW, the species is rare and almost exclusively restricted to the coastal fringe of the state, from the southern side of the Hawkesbury River in the north to the Victorian border in the south. More specifically, the subspecies is considered to occur primarily in two areas: Ku-ring-gai Chase and Garigal National Parks; and in the far south-east corner of the state. Occurs within their distribution in a variety of habitats including heathland, shrubland, sedgeland, heathy open forest and woodland.	Unlikely. Only one record from the locality and no suitable habitat present.
Mammalia	Peramelidae	*Perameles nasuta*	Long-nosed Bandicoot	E		2	Population is not clearly defined but is known to occur within the Marrickville	Unlikely. Low number of records in the locality and no suitable

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
			population in inner western Sydney				and Canada Bay LGAs. It is thought to likely occur in the Canterbury, Ashfield and Leichhardt LGA. Shelters under old houses and buildings and forages in backyards and parklands.	habitat is present.
Mammalia	Petauridae	*Petaurus australis*	Yellow-bellied Glider	V		1	Occurs in tall, mature, eucalypt forest generally in areas with high rainfall and nutrient rich soils. It feeds primarily on plant and insect exudate, with insects providing protein. It extracts sap from trees by biting into the trunk and branches leaving distinctive 'V' shaped scars. It dens in large hollows within trees, in groups of two to six individuals.	Unlikely. Only one record from the locality and no suitable habitat present.
Mammalia	Phascolarctidae	*Phascolarctos cinereus*	Koala (combined population of Qld, NSW and the ACT)	V	V	Species or species habitat known to occur within area	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred feed species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	Unlikely. No records from the locality and no suitable habitat is present.
Mammalia	Pseudocheiridae	*Petauroides*	Greater Glider		V	Species or	Occurs in eucalypt forests and	Unlikely. No records from the

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
		volans				species habitat likely to occur within area.	woodlands from north-eastern Queensland to the Central Highlands of Victoria. The species has a relatively small home range which consists of numerous tree hollows.	locality and no suitable habitat is present.
Mammalia	Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	187	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. 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.	Potential. High number of records from the locality and small area of suitable foraging habitat available. Species would likely only utilise site periodically as part of a much broader foraging range.
Mammalia	Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	Species or species habitat known to occur within area	The species is associated with areas dominated by sandstone escarpments; sandstone cliffs and fertile woodland valley habitat occurring in close proximity to each other is important for the species. It roosts in cliff/escarpment areas and forages in fertile forest. Roosting is predominately in arch caves	Unlikely. No records from the locality and no preferred habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							with dome roofs, but has been observed in disused mines shafts, overhangs, and disused Fairy Martin nests.	
Mammalia	Vespertilionidae	*Miniopterus australis*	Little Bentwing-bat	V		1	Moist eucalypt forest, rainforest or dense coastal Banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Unlikely. Only one record from the locality and only a small area of highly disturbed habitat available.
Mammalia	Vespertilionidae	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V		68	Forages above the canopy and eats mostly moths. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	Potential. High number of records from the locality and small area of suitable foraging habitat available. Species would likely only utilise site periodically as part of a broader foraging range.
Mammalia	Vespertilionidae	*Myotis macropus*	Southern Myotis	V		9	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small	Unlikely. Low number of records from the locality and no suitable foraging habitat is present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							fish by raking their feet across the water surface.	
Mammalia	Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V		1	Found mainly in the gullies and river systems that drain the Great Dividing Range. Usually roosts in tree hollows and buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects.	Unlikely. Only one record from the locality and only a small area of highly disturbed habitat available.
Reptilia	Elapidae	*Hoplocephalus bungaroides*	Broad-headed Snake	E	V	Species or species habitat likely to occur within area.	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500m of escarpments in summer.	Unlikely. No records from the locality and no suitable habitat is present.
Reptilia	Varanidae	*Varanus rosenbergi*	Rosenberg's Goanna	V		1	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat	Unlikely. Only one record from the locality and no suitable habitat present.

Table C.1 Threatened fauna likelihood of occurrence within the subject site

Class	Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							component.	

Appendix D

Assessments of Significance

D.1 *Syzygium paniculatum* (Magenta Lilly Pilly)

(a) In the case of a threatened species, whether the action proposed 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 proposed development within the subject site is unlikely to have an adverse effect on the life cycle of this species such that a viable local population would be placed at risk of extinction. The subject site does not contain the species' natural habitat as rainforest or sandy areas are not present. Furthermore, the individual occurring has been planted as it exists within landscaped gardens

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable.

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(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.

d) In relation to the habitat of a threatened species, population or ecological community:

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

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed development will not remove any of the species natural habitat as none is present within the subject site.

The proposed development is unlikely to fragment or isolate habitat for this species, as no natural habitat will be removed.

The habitat to be removed as a result of the proposed development is not important to the long-term survival of these species in the locality. The individual present has been planted and no natural habitat is present within the subject site.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat for these species has currently been identified by the Director-General of the OEH.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threat abatement plans have been prepared for any of these species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed development would constitute the key threatening process (KTP) of "Clearing of native vegetation"; however the native vegetation to be removed does not consist of the species' natural habitat'. Therefore, this KTP is unlikely to have a significant impact on these species in the locality.

Conclusion

The proposed development will remove a small area of vegetation that does not provide natural habitat for the species. The subject site does not contain suitable characteristics for this species to occur naturally as it is not within rainforest or sand dunes. The individual to be removed has been planted and does not occur naturally within the subject site. Therefore, the proposed development is unlikely to have a significant impact on these species.

D.2 Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

(a) In the case of a threatened species, whether the action proposed 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 proposed development within the subject site is unlikely to have an adverse effect on the life cycle of this species such that a viable local population would be placed at risk of extinction. The only suitable roosting habitat for this species is located in the roof of an existing building within the southern edge of the subject site. Although this species is known to roost in man-made structures, this is not its preferred roosting habitat.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable.

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(iii) 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

(iv) 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.

d) In relation to the habitat of a threatened species, population or ecological community:

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

(v) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(vi) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed development will remove approximately 0.135 ha of suitable foraging habitat and 20 m^2 of potential roosting habitat for this species.

The proposed development is unlikely to fragment or isolate habitat for this species, but will remove a small area of potential roosting and foraging habitat. Although potential habitat will be removed, the species is highly mobile and able to access fragmented habitats.

The habitat to be removed as a result of the proposed development is not important to the long-term survival of these species. The potential roosting habitat to be removed is not the species preferred roosting habitat and the potential foraging habitat is likely only utilised as part of a broader foraging range. Additionally, more suitable habitat for this species is located to the east of the subject site and will be retained.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat for these species has currently been identified by the Director-General of the OEH.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threat abatement plans have been prepared for any of these species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed development would constitute the key threatening process (KTP) of "Clearing of native vegetation". The vegetation to be removed constitutes a small area of potential habitat for these species and more suitable habitat directly east of the subject site within Gore Creek will be retained. Therefore, this KTP is unlikely to have a significant impact on these species in the locality.

Conclusion

The proposed development will remove a small area of non-preferred roosting habitat and potential foraging habitat for this species. Although a small area of potential habitat will be removed, this habitat is unlikely to be important for the long-term survival of a local population as more suitable habitat directly east of the subject site will be retained. Therefore, the proposed development is unlikely to have a significant impact on these species.

D.3 Grey-headed Flying-fox

(a) In the case of a threatened species, whether the action proposed 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 is a highly mobile species and utilises resources from across a wide area and if a population did utilise resources on the subject site periodically, it would not be dependent on this for their survival. The removal of relatively small area of potential foraging habitat within the subject site will not place a viable local population at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(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.

d) In relation to the habitat of a threatened species, population or ecological community:

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

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed development will remove approximately 0.135 ha of suitable foraging habitat for this species.

The proposed development is unlikely to fragment or isolate habitat for this species, but will encroach on potential habitat. Furthermore, the Grey-headed Flying-fox is highly mobile and able to access fragmented habitats.

The habitat to be removed as a result of the proposed development is not important to the long-term survival of these species. The habitat to be removed likely only constitutes potential foraging habitat for these species as no camp is present within the subject site. Additionally, this species is not likely dependent on the foraging habitat to be removed for its long-term survival as it is relatively small in size and would likely only be utilised by the species periodically as part of a much broader foraging range.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat for this species has currently been identified by the Director-General of the OEH.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threat abatement plans have been prepared for any of these species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed development would constitute the key threatening process (KTP) of "Clearing of native vegetation". As the vegetation to be removed constitutes a small area of potential foraging habitat that the species is unlikely to be dependent on for its long-term survival, this KTP is unlikely to have a significant impact on this species in the locality.

Conclusion

The proposed development will remove a small area of potential foraging habitat for the Grey-headed Flying-fox. This habitat is likely only utilised periodically as part of a much broader foraging range and is unlikely to be important to the species long-term survival in the locality. Therefore, the proposed development is unlikely to have a significant impact on this species.