

Byles Creek Acquisition Strategy

Ecological Assessment

DFP Planning

23 July 2020

Final



Report No. 19227RP1

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

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Glossary

Term / Abbreviation	Definition
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
Biosecurity Act	NSW <i>Biosecurity Act 2015</i>
CEEC	Critically Endangered Ecological Community
DA	Development Application
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
GIS	Geographic Information System
HLEP 2013	<i>Hornsby Local Environmental Plan 2013</i>
LGA	Local Government Area
NSW	New South Wales
PCT	Plant Community Type
RE1 zoned land not currently owned by Council	The parcels of land within the study area that that are zoned RE1 but are not currently owned by Council, as shown in Figure 1
Study area	The RE1 zoned land that is subject to the ecological assessment, as shown in Figure 1

1. Introduction

Cumberland Ecology has been commissioned by DFP Planning on behalf of Hornsby Shire Council to provide an ecological assessment of land located within the Byles Creek Corridor, located within Pennant Hills and Beecroft, New South Wales (NSW). DFP Planning have been engaged to prepare an acquisition strategy for part of the Byles Creek Corridor.

1.1. Purpose

The purpose of this document is to provide an assessment of the ecological characteristics and values of the study area to inform the acquisition strategy being prepared by DFP Planning. **Figure 1** shows the broader context of the corridor location. The detailed ecological assessment has been undertaken within a portion of this corridor, within an area referred to as the 'study area'. The study area, which is also shown in **Figure 1**, comprises all RE1 zoned land, including land currently owned by Council and land yet to be owned by Council. The parcels of this RE1 zoned land that are not currently owned by Council are referred to collectively as the 'RE1 zoned land not currently owned by Council'.

Specifically, this report will:

- Describe the methods used in the assessment;
- Summarise the findings of a desktop assessment and site inspection;
- Provide discussion on:
 - Whether the extent of the current corridor as reflected by the existing RE1 zoning is appropriate;
 - Whether there is merit in expanding the corridor beyond current RE1 zoned land;
 - Whether the ecological values and characteristics of the corridor have conservation significance; and
 - Whether there are opportunities for restoration of the corridor and the scope of work that might be entailed to increase the ecological value of land along the corridor, if warranted.

1.2. Background

1.2.1. Location

The study area is located within Beecroft and Pennant Hills, in the Hornsby Local Government Area (LGA). The study area extends east from the main northern railway line and terminates at the eastern extent of the made section of Malton Road, Beecroft. This is a length of approximately 1.5 km. Byles Creek continues east of the study area and connects with Devlins Creek in the vicinity of Malton Road, North Epping. **Table 1** lists the properties located within the study area and their ownership. Lots marked by an asterisk (*) indicate that only part of the lot is included within the study area. The extent of the private/Crown-owned land, being the RE1 zoned land not currently owned by Council, and the Council-owned land within the study area is shown in **Figure 1**.

Table 1 Properties within the study area

Address	Lot/DP	Ownership
142 Sutherland Road, Beecroft	34/229831*	Private
142X Sutherland Road, Beecroft	33/229831	Council
140X Sutherland Road, Beecroft	15/237044	Council
130X Sutherland Road, Beecroft	204/806307	Council
140X Sutherland Road, Beecroft	3/530227	Council
140X Sutherland Road, Beecroft	14/562351	Council
140X Sutherland Road, Beecroft	6/229639	Council
10X Park Avenue, Beecroft	80/1150971	Council
8B Park Avenue, Beecroft	3/540850	Council Not all of Lot 3 is zoned RE1. The battle axe handle is zoned R2.
6X Park Avenue, Beecroft	23/614741	Council
4 Park Avenue, Beecroft	3/17876*	Private
142 Sutherland Road, Beecroft	34/229831*	Private
2 Park Avenue, Beecroft	Y/421498*	Private
20 Tristania Way, Pennant Hills	25/261485	Council
Road Reserve (Garrett Road)	-	Private/Crown
8 Garrett Road, Beecroft	40/596659	Council
11A Malton Road, Beecroft	5/4551*	Private
15 Malton Road, Beecroft	6/4551*	Private
17A Malton Road, Beecroft	7/4551*	Private
17A Malton Road, Beecroft	1/115475	Private
17A Malton Road, Beecroft	8/4551*	Private
17B Malton Road, Beecroft	9/4551*	Private
23 Malton Road, Beecroft	A/360633*	Private
1X Adder Street Beecroft	700/1124042	Council
1X Adder Street Beecroft	3/628007	Council
27A Malton Road, Beecroft	2/868018*	Private
31 Malton Road, Beecroft	112/1083093*	Private
14X Garrett Road, Beecroft	3/593755	Council
Road Reserve (Adder Street)	-	Private/Crown
14X Garrett Road, Beecroft	1/134742	Council
14X Garrett Road, Beecroft	702/1124042	Council
35B Malton Road, Beecroft	107/775899*	Private

Address	Lot/DP	Ownership
37X Malton Road, Beecroft	704/1124042	Council
35D Malton Road, Beecroft	105/775899*	Private
41 Malton Road, Beecroft	1/171774	Private
41 Malton Road, Beecroft	5/7933*	Private
43B Malton Road, Beecroft	5/716031*	Private
43C Malton Road, Beecroft	601/793873*	Private
43X Malton Road, Beecroft	706/1124042	Council
43X Malton Road, Beecroft	3/705724	Council
43X Malton Road, Beecroft	708/1124042	Council
43X Malton Road, Beecroft	698/650162	Council
43X Malton Road, Beecroft	52/235561	Council Not all of Lot 52 is zoned RE1. The battle axe handle is zoned R2.
Road Reserve (unnamed)	-	Private/Crown
43X Malton Road, Beecroft	142/236067	Council
43X Malton Road, Beecroft	4/789069	Council
43X Malton Road, Beecroft	3/703067	Council
43X Malton Road, Beecroft	1/883724	Council
79-87 Malton Road, Beecroft	2/847605*	Private
89-97 Malton Road, Beecroft	27/735002	Council
99-105 Malton Road, Beecroft	4/601847	Council

* Only part of the lot is located within the study area

1.2.2. Zoning

The study area has been focused on land zoned as RE1 Public Recreation under the *Hornsby Local Environmental Plan 2013* (HLEP 2013). The objectives of the RE1 zone are to:

- Enable land to be used for public open space or recreational purposes.
- Provide a range of recreational settings and activities and compatible land uses.
- Protect and enhance the natural environment for recreational purposes.
- Protect and maintain areas of bushland that have ecological value.

The study area is predominantly surrounded by R2 Low Density Residential land, as well as other areas of RE1 Public Recreation. An extensive area of E1 National Parks and Nature Reserves, comprising Lane Cove National Park is located to the east of the study area.

The entirety of the study area is mapped as 'terrestrial biodiversity' under the HLEP 2013, which extends into some of the adjacent R2 Low Density Residential zoned lands. Clause 6.4 of the HLEP 2013 applies to land on the Terrestrial Biodiversity Map. The objective of this clause is to maintain terrestrial biodiversity by:

- Protecting native fauna and flora;
- Protecting the ecological processes necessary for their continued existence; and
- Encouraging the conservation and recovery of native fauna and flora species and their habitats.

2. Methodology

2.1. Literature Review

A review of ecological literature relevant to the study area was undertaken as part of this ecological assessment to evaluate the flora and fauna values associated with the study area. Key documents reviewed for this ecological assessment include:

- Vegetation mapping reports and data:
 - Smith and Smith (2008): native Vegetation Communities of Hornsby Shire – 2008 Update;
 - OEH (2016): The Native Vegetation of the Sydney Metropolitan Area; and
 - Eco Logical Australia (2017) : Hornsby Vegetation Map Update 2017.
- Ecological assessments associated with relevant development applications (DAs):
 - ACS Environmental (2017): Biodiversity Impact Assessment for Proposed Development of Lot 2 in DP 703067 at No. 65D Malton Road, Beecroft;
 - GIS Environmental Consultants (2018): Flora & Fauna Assessment Report for a Section 8.2 Review of DA Determination for a New Dwelling at 65D Malton Road, Beecroft;
 - ACS Environmental (2015): Biodiversity Impact Assessment for Proposed Development of Lot 2 (DP 883724) No. 77 Malton Road, Beecroft;
 - Smith (2016): Ecological Assessment of Proposed Residential Development at 77 Malton Road, Beecroft;
 - Smith (2015): Ecological Assessment of Proposed Subdivision at 79-87 Malton Road, Beecroft.

Additional documentation associated with relevant DAs was also reviewed and is considered within this assessment. A number of ecological assessments of DAs in areas immediately surrounding the study area were also consulted.

The information collected during the literature review guided the site inspection undertaken for this ecological assessment, and provided additional information on vegetation communities and the potential occurrence of threatened species.

2.2. Database Analysis

Database analysis was conducted for the locality of the study area using the BioNet Atlas (EES 2019) and the EPBC Protected Matters Search Tool (DoEE 2019). The locality is defined as the area within a 5 km buffer from the centre of the study area. The BioNet Atlas search facility was used to generate records of threatened flora and fauna species and populations listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) within the locality of the study area. The abundance, distribution and age of records generated within the search areas provided supplementary information for the assessment of occurrence of those threatened species within the study area.

The Protected Matters Search Tool generated a list of potentially occurring EPBC Act listed entities within the locality of the study area.

2.3. Site Inspection

A site inspection was carried out on 28 November 2019 by three ecologists from Cumberland Ecology. The site inspection included vegetation mapping inspection and habitat assessment. Further details of these survey methods are detailed below.

2.3.1. Vegetation Mapping Inspection

Several vegetation mapping studies have been undertaken across the study area and surrounds, including broad scale mapping of the Sydney Metropolitan area by OEH (2016), and broad scale mapping of the Hornsby LGA by Smith and Smith (2008), which was subsequently updated by Eco Logical Australia (2017). Inspection of vegetation mapping of plant communities within the study area was undertaken by random meander searches. The vegetation communities occurring within the study area were considered to most closely-align with the OEH (2016) mapping. Where vegetation community boundaries were found to differ from this mapping, records to changes to boundaries were made using a hand-held Global Positioning System and/or mark-up of aerial photographs. The resultant information was synthesised using Geographical Information Systems (GIS) to create a spatial database that was used to produce a vegetation map of the study area.

2.3.2. Habitat Assessment

The nature and extent of fauna habitats in the study area were assessed. This included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, bush rock and wetland areas such as creeks and soaks. An assessment of the structural complexity of vegetation, the age structure of the vegetation and the nature and extent of human disturbance within the study area was also undertaken and considered. Tree hollows were used as a general indication of habitat quality for arboreal fauna and hollow-dwelling birds and bats. During the habitat assessment opportunistic sightings of diurnal fauna were also recorded.

2.4. Limitations

The site inspection survey was conducted during one site visit in November 2019. As the site inspection was limited to vegetation mapping inspection and assessing habitats within the study area, there are a number of limitations to the site inspection, as detailed below.

Inspection of vegetation mapping did not include detailed ground-truthing, which was outside the scope of this assessment. Therefore this assessment relied on review of previous vegetation mapping studies undertaken by OEH (2016), Smith and Smith (2008) and Eco Logical Australia (2017) in conjunction with observations made during the site inspection.

Growing conditions in the vicinity of the study area had been suitable to enable adequate production of features to enable identification to be made of most plants to species level at the time of the survey. However, it is unlikely that all species present have been recorded.

Limited fauna surveys were undertaken for this assessment, which mainly relied on database analysis of species recorded within a 5 km radius of the centre of the study area, and fauna habitat assessment. The data produced by the database analysis and fauna habitat assessment is intended to be indicative of the types of species that could occur within the study area.

Due to terrain constraints and presence of private properties, not all areas of the study area were subject to the site inspection. Observations were therefore made from adjoining land at some locations.

Vascular flora and vertebrate fauna of the locality are well known based upon a sizeable database of past records and various published reports. Therefore, it is considered that the data obtained from database assessment and surveys of the RE1 zoned land not currently owned by Council furnished an appropriate level of information to support this assessment.

3. Results

3.1. Introduction

The majority of the study area comprises intact native forest vegetation. Weed invasions typically occur adjacent to residential dwellings, informal access tracks and drainage lines. Sewerage infrastructure was observed at a number of locations on the southern side of Byles Creek, along with a small section of wall along the creek. A powerline easement runs along the northern boundary of the study area.

3.2. Vegetation Communities

Previous mapping of the study area by OEH (2016) identified a number of vegetation communities, including Coastal Enriched Sandstone Moist Forest, Coastal Enriched Sandstone Dry Rainforest, Coastal Warm Temperate Rainforest, Blue Gum High Forest and Urban Exotic/Native. The first four of these communities listed above are naturally occurring vegetation communities, while the Urban Exotic/Native community is a descriptive name for vegetation which consists predominately of urban plantings (with both exotic and native species) and cannot be assigned to any naturally occurring vegetation communities known to occur in the locality.

Broad-scale mapping schemes rely heavily on interpretation of aerial photography and accuracy varies. Within the GIS layer for the OEH (2016) mapping all polygons comprising native vegetation within the study area are noted as not having been ground-truthed. Most areas of native vegetation are noted as having a medium to high confidence of accuracy; however both areas of Coastal Enriched Sandstone Dry Rainforest are noted as having a low confidence with unexplained aerial photograph patterns.

Although detailed vegetation mapping was not undertaken, it was noted during the site inspection that the mapped areas of Coastal Warm Temperate Rainforest have greater affinities with Coastal Enriched Sandstone Moist Forest. As such, the amended vegetation mapping removes the polygons of Coastal Warm Temperate Rainforest mapped by OEH (2016). The amended vegetation mapping of the study area is provided in **Figure 2**, and the extent of these communities within the study area and RE1 zoned land not currently owned by Council is summarised in **Table 2**. Only one vegetation community conforms to a threatened ecological community, being Blue Gum High Forest, which is listed as a Critically Endangered Ecological Community (CEEC) under both the BC Act and EPBC Act. Details of the vegetation communities recorded within the study area are provided below, including identification of Plant Community Types (PCTs).

Table 2 Vegetation communities within the study area

Vegetation Community	Smith and Smith (2008) / Eco Logical Australia (2017) Equivalent Community	BC Act Status	EPBC Act Status	Study Area (ha)	RE1 zoned land not currently owned by Council (ha)
Coastal Enriched Sandstone Moist Forest	Blackbutt Gully Forest	-	-	20.45	6.31
Coastal Enriched Sandstone Dry Forest	Peppermint-Angophora Forest	-	-	0.20	-
Blue Gum High Forest	Blue Gum Shale Forest	CEEC	CEEC	0.79	-
Urban Exotic/Native	-	-	-	0.07	0.06
Total				21.52	6.37

3.2.1. Coastal Enriched Sandstone Moist Forest

BC Act Status: Not listed

EPBC Act Status: Not listed

PCT: 1841 - Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region

OEH (2016) describes this vegetation community as follows:

*Coastal Enriched Sandstone Moist Forest is a tall open eucalypt forest with a distinctive mesic shrub and small tree layer. The canopy may be dominated by various combinations of eucalypts although smooth-barked apple (*Angophora costata*) is invariably present. On the north shore and inner harbours turpentine (*Syncarpia glomulifera*), blackbutt (*Eucalyptus pilularis*) and Sydney blue gum (*Eucalyptus saligna*) are dominant trees while on the Warringah and Pittwater escarpments bangalay (*Eucalyptus botryoides*) and mahoganies (*Eucalyptus umbra/scias*) are more prevalent. Elsewhere, Sydney peppermint (*Eucalyptus piperita*) may dominate. A tall stand of forest oak (*Allocasuarina torulosa*) is often present below the eucalypt canopy. Tall small trees tend to be rainforest plants such as coachwood (*Ceratopetalum apetalum*), blueberry ash (*Elaeocarpus reticulatus*) and occasionally cabbage tree palms (*Livistona australis*). The forest floor is covered by a sparse to dense cover of ferns and twiners.*

This community occurs extensively within the study area and RE1 zoned land not currently owned by Council . The dominant canopy species include *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine) and *Angophora costata* (Smooth-barked Apple). A small tree layer is common throughout and includes *Ceratopetalum gummiferum* (Christmas Bush), *Pittosporum undulatum* (Sweet Pittosporum), *Elaeocarpus reticulatus* (Blueberry Ash) and *Callicoma serratifolia* (Black Wattle). Shrubs include *Breynia oblongifolia* (Coffee Bush), *Zieria pilosa* (Pilose-leaved Zieria), *Persoonia pinifolia* (Pine-leaved Geebung), *Notelaea longifolia* (Large Mock-olive), *Epacris pulchella* (Wallum Heath), *Acmena smithii* (Lilly Pilly) and *Polyscias sambucifolia* (Elderberry Panax). The ground layer included dense areas of *Pteridium esculentum* (Bracken) and *Calochlaena dubia* (Rainbow Fern), with other ground layer species sparsely distributed throughout, including *Lomandra longifolia* (Spiny-headed Mat-rush), *Lomandra obliqua*, *Oplismenus aemulus*, *Entolasia stricta* (Wiry Panic) and *Viola hederacea* (Ivy-leaved Violet). A suite of vines were recorded including *Clematis aristata* (Old Man's Beard), *Cissus hypoglauca* (Giant Water Vine), *Smilax glycyphylla* (Sweet Sarsparilla) and *Pandorea pandorana* (Wonga Vine). A number of weed species were observed within this community, typically at the interface to residential dwellings or along the creek line.

An example of this community within the study area is shown in **Photograph 1**.

This community is associated with Blackbutt Gully Forest (Community L) as described by Smith and Smith (2008) and Blackbutt Gully Forest (Community L1/L1r) as identified by Eco Logical Australia (2017). This community has been identified as a locally significant community within the Hornsby LGA. Smith and Smith (2008) indicate that this is common community in Hornsby LGA, however, it is uncommon and poorly conserved outside the LGA.

Photograph 1 Coastal Enriched Sandstone Moist Forest



3.2.2. Coastal Enriched Sandstone Dry Forest

BC Act Status: Not listed

EPBC Act Status: Not listed

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

OEH (2016) describes this vegetation community as follows:

Coastal Enriched Sandstone Dry Forest is commonly encountered on the upper slopes and dry gullies of Sydney urban areas. It is a tall open eucalypt forest with an understorey of dry sclerophyll shrubs with ferns and forbs amongst the ground cover. The commonly recorded eucalypts are smooth-barked apple (Angophora costata), red bloodwood (Corymbia gummifera) and Sydney peppermint (Eucalyptus piperita). Blackbutt (Eucalyptus pilularis) is common on gully slopes of the north shore and Hacking River valley while broad-leaved white mahogany (Eucalyptus umbra) replaces this species along the Warringah and Pittwater escarpments. A sparse layer of small trees such as Allocasuarina littoralis and old-man banksia (Banksia serrata) is common above a variety of wattles, tea-trees, gee bungs and grass trees. In long unburnt areas sweet pittosporum (Pittosporum undulatum) may be prevalent. It is widespread on the Hornsby plateau in areas that receive greater than 1000 millimetres of mean annual rainfall and are at elevations less than 200 metres above sea level. It extends north of the Sydney area into the hinterland of the Central Coast.

This community occurs at the eastern extent of the study area, with none occurring within the RE1 zoned land not currently owned by Council. The dominant canopy species include *Angophora costata* (Smooth-barked Apple), *Eucalyptus piperita* (Sydney Peppermint) and *Eucalyptus pilularis* (Blackbutt). The small tree layer includes *Allocasuarina torulosa* (Forest Oak) and *Ceratopetalum gummiferum* (Christmas Bush). Shrubs are common and include *Leptospermum trinervium* (Slender Tea-tree), *Persoonia pinifolia* (Pine-leaved Geebung), *Banksia serrata* (Old-man Banksia), *Persoonia levis* (Broad-leaved Geebung), *Epacris pulchella* (Wallum Heath), *Grevillea sericea* (Pink Spider Flower) and *Leucopogon juniperinus* (Prickly Beard-heath). Ground layers species recorded within this community include *Oplismenus aemulus*, *Lomandra longifolia* (Spiny-headed Mat-rush), *Opercularia aspera* (Coarse Stinkweed) and *Lepidosperma laterale* (Variable Sword-sedge). Vines occurring in this community include *Smilax glycyphylla* (Sweet Sarsparilla) and *Cassytha pubescens* (Downy Dodder-laurel).

An example of this community located immediately east of the study area is shown in **Photograph 2**.

This community is associated with Peppermint-Angophora Forest (Community A) as described by Smith and Smith (2008) and Peppermint-Angophora Forest (Community A/Ar) as identified by Eco Logical Australia (2017). Smith and Smith (2008) indicate that this is the most common community in Hornsby LGA and is well represented in local conservation reserves.

Photograph 2 Coastal Enriched Sandstone Dry Forest



3.2.3. Blue Gum High Forest

BC Act Status: CEEC

EPBC Act Status: CEEC

PCT: 1237 - Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion

OEH (2016) describes this vegetation community as follows:

Blue Gum High Forest is a tall wet sclerophyll forest found on fertile shale soils in the high rainfall districts of Sydney's north shore. It is dominated by Sydney blue gum (Eucalyptus saligna), blackbutt (Eucalyptus pilularis) and turpentine (Syncarpia glomulifera) with a number of other eucalypts occurring patchily. A sparse to open cover of small trees is found at most sites and includes a variety of sclerophyllous and mesophyllous species. The ground layer is variable in both composition and cover. It may be ferny, grassy or herbaceous depending on topographic situation and disturbance history. At some sites vines and climbers are prolific.

This community occurs at the western extent of the study area, with none occurring within the RE1 zoned land not currently owned by Council. No surveys were undertaken within this vegetation community within the study area. Both areas of this community within the study area are noted by OEH (2016) as having a high confidence of accuracy.

This community is associated with Blue Gum Shale Forest (Community BG1) as described by Smith and Smith (2008) and Blue Gum Shale Forest (Community BG1/BG1r) as identified by Eco Logical Australia (2017). Smith and Smith (2008) indicate that the remnants of this community are fragmented, surrounded by urban development and badly degraded by weed invasion with very little of the community represented in conservation reserves.

3.2.4. Urban Exotic Native

BC Act Status: Not listed

EPBC Act Status: Not listed

PCT: N/A

OEH (2016) does not provide a description for this vegetation community. This community is typically comprised of a suite of planted native and exotic species which are not consistent with any naturally occurring native vegetation community. The community generally occurs as garden plantings of trees and shrubs, often above a cleared or lawn understorey. A small area of this community occurs in the south west of the study area, with none occurring within the RE1 zoned land not currently owned by Council. No surveys were undertaken within this vegetation community within the study area.

3.2.5. Threatened Ecological Communities

One vegetation community within the study area, Blue Gum High Forest, is listed as a CEEC under both the BC Act and EPBC Act. Blue Gum High Forest occupies approximately 0.79 ha of the study area, all of which occurs on land currently owned by Council. The extent of Blue Gum High Forest is shown in **Figure 2**.

Blue Gum High Forest is dominated by a tall canopy of eucalypts that may exceed 30 m in height. Its understorey is typically multi-layered with a midstorey of mesophyllous shrubs and small trees and a diverse ground layer of herbs, ferns and some grasses (NSW Scientific Committee 2016). Blue Gum High Forest has a very highly restricted geographic distribution and its current extent amounts to less than 5% of the original distribution (NSW Scientific Committee 2016). The current distribution of Blue Gum High Forest comprises a series of small remnant patches, the largest of which is less than 20 ha (NSW Scientific Committee 2016).

3.3. Flora

3.3.1. General Species

Flora species recorded within the study area were predominantly native. Native flora species recorded within the study area are highly indicative of the native vegetation communities mapped within the study area. A list of flora species recorded within the study area is provided in **Appendix A**. This is not an exhaustive list of native species, and therefore a suite of other flora species are expected to occur within the study area.

3.3.2. Threatened Species

A number of threatened flora species have been recorded within the locality of the study area, as detailed within **Table 3**. The location of these species are shown in **Figure 3**. The BioNet Atlas (EES 2019) does not hold any records of threatened flora species within the study area.

Smith (2016) identified the presence of *Leptospermum deanei* x *Leptospermum trinervium* hybrid plants at 77 Malton Road, Beecroft. *Leptospermum deanei* is listed as Vulnerable under both the BC Act and EPBC Act. Smith (2016) concluded that the hybrids did not conform to the listed species, however they contain genetic material from the threatened species and may be important reservoirs of that material. The individuals of the *Leptospermum deanei* x *Leptospermum trinervium* hybrid plants are located within Council-owned land, that was dedicated to Council as part of a DA.

Table 3 Threatened flora recorded within the locality of the study area

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Recorded in Study Area?
<i>Acacia clunies-rossiae</i>	Kanangra Wattle	V	-	1	No
<i>Acacia pubescens</i>	Downy Wattle	V	V	3	No
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V	-	1	No
<i>Darwinia biflora</i>		V	V	141	No
<i>Darwinia peduncularis</i>		V	-	1	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Recorded in Study Area?
<i>Dillwynia tenuifolia</i>		V	-	1	No
<i>Dillwynia tenuifolia</i>	<i>Dillwynia tenuifolia</i> Sieber ex D.C. in the Baulkham Hills local government area	EP	-	1	No
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V	-	51	No
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	3	No
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	E	V	1	No
<i>Galium australe</i>	Tangled Bedstraw	E	-	4	No
<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	E	-	2	No
<i>Hibbertia spanantha</i>	Julian's Hibbertia	CE	CE	1	No
<i>Hibbertia superans</i>		E	-	2	No
<i>Lasiopetalum joyceae</i>		V	V	2	No
<i>Leptospermum deanei</i>		V	V	9	No*
<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	14	No
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	5	No
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	-	6	No
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	9	No
<i>Tetradlea glandulosa</i>		V	-	73	No

BC Act Status / EPBC Act Status: V = Vulnerable; E = Endangered, CE = Critically Endangered, EP = Endangered Population

* *Leptospermum deanei* x *Leptospermum trinervium* hybrid plants recorded by Smith (2016)

3.3.3. Exotic Species

A small number of exotic species were recorded within the study area during the site inspection. These species typically occurred at the periphery of the study area, adjacent to residential dwellings, along informal access tracks and along the drainage lines.

Of the exotic species recorded during the site inspection, two are listed as State Priority Weeds under the NSW *Biosecurity Act 2015* (Biosecurity Act) and Weed of National Significance (WoNS), as detailed within **Table 4**. State Priority Weeds are required to be managed as detailed in the Greater Sydney Regional Strategic Weed Management Plan to comply with the General Biosecurity Duty that all land owners/managers and persons who deal with weeds are required to fulfil under the Biosecurity Act. The Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2019) also lists other Weeds of Regional Concern. Six Weeds of Regional Concern were recorded during the site inspection, and are also detailed within **Table 4**.

The Biosecurity Act provides powers to Local Control Authorities to take action in relation to these weeds in particular circumstances, for example where a weed threatens a high value asset and prevention, elimination or reduction of the risk is feasible and reasonable (LLS: Greater Sydney 2019).

Table 4 Priority Weeds, Weeds of Regional Concern and WoNS

Scientific Name	Common Name	Biosecurity Act Status	WoNS?
<i>Ageratina riparia</i>	Mistflower	Other Weeds of Regional Concern	-
<i>Asparagus aethiopicus</i>	Asparagus Fern	State Priority Weed (Asset Protection)	Yes
<i>Eragrostis curvula</i>	African Lovegrass	Other Weeds of Regional Concern	-
<i>Hedychium gardnerianum</i>	Ginger Lily	Other Weeds of Regional Concern	-
<i>Lantana camara</i>	Lantana	State Priority Weed (Asset Protection)	Yes
<i>Ligustrum lucidum</i>	Large-leaved Privet	Other Weeds of Regional Concern	-
<i>Ligustrum sinense</i>	Small-leaved Privet	Other Weeds of Regional Concern	-
<i>Ochna serrulata</i>	Mickey Mouse Plant	Other Weeds of Regional Concern	-

3.4. Fauna

3.4.1. Fauna Habitat

The study area contains extensive areas of intact forest vegetation. The habitat features are numerous and provide potential foraging, shelter and breeding opportunities for a suite of fauna species. Key habitat features within the study area include:

- Riparian environments suitable for fauna species dependent on these habitats such as amphibians and reptiles;
- Terrestrial habitat features such as ground and shrub layer vegetation, leaf litter, coarse woody debris and rocky outcrops suitable as shelter for small terrestrial fauna species;
- Hollow-bearing trees and stags suitable as shelter and breeding habitat for a range of hollow-dependent fauna; and
- Blossom-producing trees and shrubs suitable as forage for a range of nectarivores.

3.4.1.1. Riparian Environments

The surface drainage system of Byles Creek and its tributaries is located within the study area. These form first, second and third order streams. These drainage lines do not have permanent flowing water, however a number of temporary pools were observed within the study area (see **Photograph 3**). The drainage lines within the study area provide suitable foraging and breeding habitat for a number of fauna species, including amphibians, birds, mammals and reptiles. Temporary pools of water would provide a valuable drinking water source in hot and dry periods.

Photograph 3 Riparian environment within the study area



3.4.1.2. Terrestrial Habitat Features

Features such as rocky outcrops of sandstone (see **Photograph 4**), fallen logs (see **Photograph 5**), debris and leaf litter provide shelter for many of the small to medium sized terrestrial fauna species known from the locality of the study area. The structural integrity of forest habitats including the presence of rocky outcrops and coarse woody debris is a key factor in determining habitat suitability for a range of forest-dependent fauna. In addition to providing habitat for terrestrial fauna, fallen logs and shrub vegetation provide foraging perches and calling locations for small woodland birds. Rocky sandstone outcrops within the study area provide shelter and breeding habitat for many reptiles and ground-dwelling mammals.

Photograph 4 Rocky outcropping within the study area



Photograph 5 Fallen logs within the study area



3.4.1.3. Hollow-bearing Trees and Stags

Tree hollows are an essential resource for a number of fauna species that rely on them for refuge and nesting (Newton 1994, Gibbons and Lindenmayer 2002, Heinsohn et al. 2003, Cockle et al. 2010) and they have been shown to be a key limiting resource for hollow-dependent fauna (Brawn and Balda 1988, Lindenmayer et al. 1990, Newton 1994, Gibbons and Lindenmayer 2002, Gibbons et al. 2002, Heinsohn et al. 2003, Cameron 2006). The mature living trees and stags within the study area provide a number of small to large-sized hollows for fauna species dependant on this resource. Many large-sized hollows were observed within living *Angophora costata* (Smooth-barked Apple) trees. The tree hollows and stags within the study area provide shelter, roosting and nesting habitat for a number of arboreal fauna species, including microchiropteran bats (microbats), gliders, diurnal birds, owls and some reptiles. An example of a hollow-bearing tree within the study area is shown in **Photograph 6**.

Photograph 6 Hollow-bearing tree within the study area



3.4.1.4. Blossom-producing Trees and Shrubs

The vegetation across the study area would provide suitable foraging habitat for a range of nectivorous birds and arboreal mammals during blossom periods. It is expected that a number of nectar-dependent species would be attracted to the study area and wider locality during the blossoming period of dominant trees and shrubs. In addition to providing direct resources to birds and arboreal mammals, the blossom-producing trees

and shrubs would also attract insects. Microbats known from the locality are insectivorous and would feed on moths, beetles and other insects.

3.4.2. General Species

Numerous vertebrate fauna species are known to occur within the locality. A list of fauna species opportunistically recorded within the study area is provided in **Appendix B**. Whilst the study area is located adjacent to residential dwellings which can give rise to urban-aggressive native species, it is likely that a wider range of fauna species would utilise the habitat due to the connectivity to Lane Cove National Park.

3.4.3. Threatened Species

A number of threatened fauna species have been recorded within the locality of the study area, as detailed within **Table 5**. The location of these species are shown in **Figure 4**. The BioNet Atlas (EES 2019) holds records for the Red-crowned Toadlet (*Pseudophryne australis*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), Powerful Owl (*Ninox strenua*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) within the study area. A number of other threatened fauna species have been recorded in the habitats immediately adjacent to the study area, including Square-tailed Kite (*Lophoictinia isura*) and Large Bent-winged Bat (*Miniopterus orianae oceanensis*). A number of these species have been recorded as part of flora and fauna assessments supporting DAs in the vicinity of the study area. The habitat within the study area is suitable for a number of threatened fauna species known from the locality.

Table 5 Threatened flora recorded within the locality of the study area

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Recorded in Study Area?
Amphibians					
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	2	
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	6	
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	-	17	Yes
Birds					
<i>Apus pacificus</i>	Fork-tailed Swift	-	M	5	
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	-	8	
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-	61	Yes
	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	EP	-	57	Yes
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V	-	3	
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	3	
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	11	

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Recorded in Study Area?
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	M	2	
<i>Hieraetus morphnoides</i>	Little Eagle	V	-	6	
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M	31	
<i>Lathamus discolor</i>	Swift Parrot	E	CE	5	
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	3	
<i>Ninox connivens</i>	Barking Owl	V	-	5	
<i>Ninox strenua</i>	Powerful Owl	V	-	257	Yes
<i>Petroica boodang</i>	Scarlet Robin	V	-	4	
<i>Petroica phoenicea</i>	Flame Robin	V	-	1	
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V	-	3	
Gastropods					
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	9	
Mammals					
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	2	
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	2	
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	4	
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-	13	
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-	10	
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-	80	
<i>Myotis macropus</i>	Southern Myotis	V	-	3	
<i>Petauroides volans</i>	Greater Glider	-	V	1	
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-	1	
<i>Phascolarctos cinereus</i>	Koala	V	V	8	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	151	Yes
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	-	10	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	8	

BC Act Status / EPBC Act Status: V = Vulnerable; E = Endangered, CE = Critically Endangered, EP = Endangered Population, M = Migratory

3.4.4. Exotic Species

Flora and fauna assessments undertaken by ACS Environmental (2015, 2017) and GIS Environmental Consultants (2018) within properties in the immediate vicinity of the study area have identified a number of exotic fauna species being present, including:

- Black Rat (*Rattus rattus*);
- European Red Fox (*Vulpes vulpes*); and
- Feral Cat (*Felis catus*).

4. Discussion

4.1. Current Corridor Extent

Wildlife corridors are generally areas of habitat that connect reserves or blocks of disjunct habitat. Wildlife corridors allow wildlife to disperse and provide for gene flow between populations or subpopulations (Primack 1993). Wildlife corridors are of varying relevance to fauna, and are of greatest relevance to ground dwelling species that are less mobile than aerial species. Highly mobile birds and microbats can fly between patches of habitat, over human developments and clearings.

The forest vegetation within the study area is directly connected to Lane Cove National Park, which covers an extensive area of land to the east of the study area. Whilst not directly connected to a reserve system to the west, the study area links to scattered habitat within Pennant Hills that provides stepping-stone habitat between Cumberland State Forest to the west and Berowra Valley National Park to the north west. On a local-scale, the study area provides a movement corridor along a drainage line, Byles Creek. The contiguous vegetation along the study area also facilitates seed dispersal and pollination. Acquisition of the RE1 zoned land not currently owned by Council, would provide additional protection of a local bushland reserve that has connectivity to the regionally significant conservation land within Lane Cove National Park.

The entirety of the study area is zoned as RE1 Public Recreation. The objectives of this zone are to enable land to be used for public open space or recreational purposes, to provide a range of recreational settings and activities and compatible land uses, to protect and enhance the natural environment for recreational purposes, and to protect and maintain areas of bushland that have ecological value. The current extent of this RE1 zoning is considered appropriate due to the biodiversity values present and current integrity and functionality of the corridor.

Fifteen of the lots are identified within the study area are identified on the 'Land Reservation Acquisition Map' of the HLEP 2013 as "Local Open Space". These lots are therefore subject to the provisions of Clause 5.1 and 5.1A of HLEP 2013.

The majority of the corridor, including RE1 zoned land yet to be acquired by Council, is also identified as 'Biodiversity' on the Terrestrial Biodiversity Map of the HLEP 2013, which provides an additional level of consideration for proposed development within these areas. These areas are subject to Clause 6.4 of the HLEP 2013 the objectives of which are maintain terrestrial biodiversity by protecting native fauna and flora, protecting the ecological processes necessary for their continues existence, and encouraging the conservation and recovery of native fauna and flora and their habitats.

It is considered that the extent of the corridor which is zoned RE1 is sufficient in terms of satisfying the objectives of the HLEP 2013 provisions relating to terrestrial biodiversity.

The corridor is currently being informally used recreationally, as evidenced by the presence of an informal access track, and biodiversity values continue to persist throughout. Continuation of such activity could be assisted by the implementation of management actions.

4.2. Merit for Corridor Expansion

The currently zoned RE1 land within the study area is representative of the intact vegetation remaining along the creek line. To the south east of the study area there are two additional lots (Lot 91 DP 235018 and Lot 48 DP 29471) which form part of Lane Cove National Park and are separated by a road reserve. These lots and the road reserve are currently zoned RE1 and are therefore afforded some level of protection through the HLEP 2013 and Hornsby Development Control Plan 2013. To the north east of the study area, there is also an area of vegetated land that provides connectivity between the study area and Lane Cove National Park. This vegetated land is referred to as Pennant Hills Park and comprises Crown Land under Council Care/Control or Trustee and is also currently zoned RE1.

Expansion of the corridor beyond the currently proposed extent is limited by the existing land uses surrounding the corridor. The majority of lots surrounding the study area include residential dwellings and therefore there is limited opportunity to extend the corridor into these lots. Furthermore, given that the land associated with these dwellings has been highly modified, the biodiversity value of the land is somewhat diminished. The current extent of the corridor is therefore considered to appropriately capture the areas of highest biodiversity value and function of the corridor.

4.3. Conservation Significance of Biodiversity Values

The key biodiversity values within the study area include the following:

- Presence of a small area of Blue Gum High Forest. This vegetation community is listed as a CEEC under both the BC Act and EPBC Act.
- Presence of threatened fauna species and associated habitat. Four threatened fauna species have been recorded within the study area, including the Red-crowned Toadlet, Gang-gang Cockatoo, Powerful Owl and Grey-headed Flying-fox. The habitats within the study area also provide suitable habitat for a range of species known to occur within the locality of the study area, including the Square-tailed Kite and Large Bentwing-bat.
- Connectivity to the national park reserve system. The study area connects directly to Lane Cove National Park to the east and via other intact native vegetation to the north. In addition to these connections, the vegetation and associated habitat connects to stepping-stone habitat which in turn provides movement corridors to Cumberland State Forest in the west and Berowra Valley National Park to the north west.

In addition to these key biodiversity values, the study area also contains the following values:

- Intact native vegetation, the majority of which has been identified as being locally significant within the Hornsby LGA.
- Presence of a range of fauna habitat features, including riparian environments, rocky outcropping, fallen logs, hollow-bearing trees and blossom-producing trees and shrubs.
- Presence of land within riparian corridor widths recommended in the *Guidelines for riparian corridors on waterfront land* (DPI 2012), which specifies 10 m, 20 m and 30 m vegetated riparian zones either side of

first, second and third order streams, respectively. The creek line appears to generally be in good condition with undegraded banks and only limited pollution. Temporary pools of water appear to persist along the corridor.

4.4. Opportunities for Restoration

Whilst the study area predominantly comprises native forest vegetation, there are a number of opportunities for ecological restoration to be undertaken. This could include:

- **Weed management.** Weed species were typically occur adjacent to residential dwellings, informal access tracks and drainage lines. Ongoing weed management would be required to control problematic weeds, as weed incursions in these areas are likely to persist. Weed management should target species listed as Priority Weeds under the Biosecurity Act and WoNS, followed by weeds of regional concern under the *Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022* (LLS: Greater Sydney 2019) and other environmental weeds and garden escapes.
- **Feral animal management.** Studies undertaken on land immediately adjacent to the study area have identified a number exotic fauna species, which would utilise the habitats within the study area. Control methods could be applied to one these species, the European Red Fox (*Vulpes vulpes*). Control of this species is typically undertaken via the use of 1080 poisons. To increase the effectiveness of control measures it is recommended that control is undertaken in consultation with the Greater Sydney Local Land Services to facilitate a coordinated approach across the landscape.
- **Rubbish removal.** Due to proximity to residential dwellings, and the presence of an informal access track, there is some low level rubbish incursion within the study area. Installation of stormwater pollutant traps will also contribute to the management of rubbish within the study area.
- **Signage.** Community awareness of biodiversity values can be increased through the installation of signage at access points within the study area. This can include signage relating to the presence of a restoration area, signage relating to the habitat of particular threatened species (e.g. the Powerful Owl), or signage to outline fines relating to illegal rubbish dumping.
- **Installation of nest boxes.** Although a number of hollow-bearing trees occur throughout the study area, installation of nest boxes would create additional nesting habitat for a range of native fauna. It is recommended that nest boxes of varying sizes are used to target difference species (e.g. bats and possums).
- **Fire management.** A long term strategy for management of native vegetation within the study area could include the use of fire management. Given the location of the corridor within an urban environment, there may be a need to undertake hazard reduction burning, which could be undertaken in a manner to also provide an ecological benefit. The *Best Practice Guidelines for Blue Gum High Forest* (DECC (NSW) 2008) include fire management, to manage weeds and promote native flora species regeneration.
- **Compliance checks and remedial actions:** Compliance checks to be undertaken to determine the requirement for restoration of areas affected by encroachment and illegal clearing.

Should a hiking track be formalised within the study area, there would be an increase need for the implementation of the above management measures due to ongoing pressure from such a land use.

5. Conclusion

This ecological assessment considered the biodiversity values within a tract of land within Pennant Hills and Beecroft that is zoned as RE1 Public Recreation under the Hornby LEP. Council owns approximately 70% of the land within the study area. The purpose of this study is to inform an updated acquisition strategy for the remaining RE1 land within the study area to facilitate the conservation of the Byles Creek corridor, and to determine whether the extent of the current corridor is appropriate, having regard to the ecological values of the study area.

Specifically this assessment considered the following:

1. Whether the extent of the current corridor as reflected by the existing RE1 zoning is appropriate;
2. Whether there is merit in expanding the corridor beyond current RE1 zoned land;
3. Whether the ecological values and characteristics of the corridor have conservation significance; and
4. Whether there are opportunities for restoration of the corridor and the scope of work that might be entailed to increase the ecological value of land along the corridor, if warranted.

The loss of vegetation, habitat and connectivity within the corridor would reduce the integrity and functionality of the corridor. Given the presence of a number of biodiversity values and that Council currently owns 70% of the study area, it is recommended to maintain the extent of the corridor within the study area. Some level protection is currently afforded to the biodiversity corridors through the HLEP 2013 and Hornsby Development Control Plan 2013. The current extent of the corridor is therefore considered to appropriately capture the areas of highest biodiversity value and function of the corridor.

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APPENDIX A :

Flora Species List



*	Scientific Name	Common Name
	<i>Acacia linifolia</i>	White Wattle
	<i>Acmena smithii</i>	Lilly Pilly
*	<i>Ageratina riparia</i>	Mistflower
	<i>Allocasuarina littoralis</i>	Black She-Oak
	<i>Allocasuarina torulosa</i>	Forest Oak
	<i>Allocasuarina torulosa</i>	Forest Oak
	<i>Angophora costata</i>	Sydney Red Gum
*	<i>Asparagus aethiopicus</i>	Asparagus Fern
	<i>Banksia serrata</i>	Old-man Banksia
	<i>Banksia serrata</i>	Old-man Banksia
	<i>Banksia spinulosa</i>	Hairpin Banksia
	<i>Billardiera scandens</i>	Hairy Apple Berry
	<i>Blechnum indicum</i>	Swamp Water Fern
	<i>Brachychiton acerifolius</i>	Illawarra Flame Tree
	<i>Breynia oblongifolia</i>	Coffee Bush
	<i>Callicoma serratifolia</i>	Black Wattle
	<i>Calochlaena dubia</i>	Rainbow Fern
	<i>Cassytha pubescens</i>	Downy Dodder-laurel
	<i>Ceratopetalum gummiferum</i>	Christmas Bush
	<i>Cissus antarctica</i>	Water Vine
	<i>Cissus hypoglauca</i>	Giant Water Vine
	<i>Clematis aristata</i>	Old Man's Beard
	<i>Dianella caerulea</i> var. <i>producta</i>	
	<i>Elaeocarpus reticulatus</i>	Blueberry Ash
	<i>Entolasia marginata</i>	Bordered Panic
	<i>Entolasia stricta</i>	Wiry Panic
	<i>Epacris pulchella</i>	Wallum Heath
*	<i>Eragrostis curvula</i>	African Lovegrass
	<i>Eucalyptus pilularis</i>	Blackbutt
	<i>Eucalyptus piperita</i>	Sydney Peppermint
	<i>Gahnia</i> spp.	
	<i>Glochidion ferdinandi</i>	Cheese Tree
	<i>Grevillea sericea</i>	Pink Spider Flower
	<i>Hardenbergia violacea</i>	False Sarsaparilla
*	<i>Hedychium gardnerianum</i>	Ginger Lily

*	Scientific Name	Common Name
	<i>Homalanthus populifolius</i>	
	<i>Kennedia rubicunda</i>	Dusky Coral Pea
	<i>Kunzea ambigua</i>	Tick Bush
*	<i>Lantana camara</i>	Lantana
	<i>Lepidosperma laterale</i>	Variable Sword-sedge
	<i>Leptospermum trinervium</i>	Slender Tea-tree
	<i>Leucopogon juniperinus</i>	Prickly Beard-heath
*	<i>Ligustrum lucidum</i>	Large-leaved Privet
*	<i>Ligustrum sinense</i>	Small-leaved Privet
	<i>Lindsaea microphylla</i>	Lacy Wedge Fern
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush
	<i>Lomandra obliqua</i>	
	<i>Lomatia silaifolia</i>	Crinkle Bush
	<i>Notelaea longifolia</i>	Large Mock-olive
*	<i>Ochna serrulata</i>	Mickey Mouse Plant
	<i>Opercularia aspera</i>	Coarse Stinkweed
	<i>Oplismenus aemulus</i>	
	<i>Pandorea pandorana</i>	Wonga Vine
	<i>Parsonsia straminea</i>	Common Silkpod
	<i>Persoonia levis</i>	Broad-leaved Geebung
	<i>Persoonia pinifolia</i>	Pine-leaved Geebung
	<i>Pittosporum undulatum</i>	Sweet Pittosporum
	<i>Polyscias sambucifolia</i>	Elderberry Panax
	<i>Pteridium esculentum</i>	Bracken
	<i>Smilax glycyphylla</i>	Sweet Sarsparilla
	<i>Sticherus flabellatus</i>	Umbrella Fern
	<i>Stylidium</i> spp.	
	<i>Syncarpia glomulifera</i>	Turpentine
	<i>Viola hederacea</i>	Ivy-leaved Violet
	<i>Xanthorrhoea arborea</i>	
	<i>Xanthosia pilosa</i>	Woolly Xanthosia
	<i>Zieria pilosa</i>	Pilose-leaved Zieria

* Denotes exotic species

APPENDIX B :

Fauna Species List




Scientific Name	Common Name
Amphibians	
<i>Crinia signifera</i>	Common Eastern Froglet
Birds	
<i>Acanthiza pusilla</i>	Brown Thornbill
<i>Alectura lathamii</i>	Australian Brush-turkey
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
<i>Corvus coronoides</i>	Australian Raven
<i>Cracticus torquatus</i>	Grey Butcherbird
<i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Eopsaltria australis</i>	Eastern Yellow Robin
<i>Gerygone olivacea</i>	White-throated Gerygone
<i>Manorina melanocephala</i>	Noisy Miner
<i>Pachycephala rufiventris</i>	Rufous Whistler
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Platycercus elegans</i>	Crimson Rosella
<i>Psophodes olivaceus</i>	Eastern Whipbird
<i>Sericornis frontalis</i>	White-browed Scrubwren
<i>Strepera graculina</i>	Pied Currawong
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
<i>Zosterops lateralis</i>	Silvereye
Reptiles	
<i>Eulamprus quoyii</i>	Eastern Water-skink
<i>Intellagama lesueurii</i>	Eastern Water Dragon
<i>Lampropholis delicata</i>	Dark-flecked Garden Sunskink


FIGURES







Legend


 Study Area

 RE1 zoned land not currently owned by Council

Vegetation Communities (OEH 2016)

 S_WSF02: Coastal Enriched Sandstone Moist Forest

 S_DSF04: Coastal Enriched Sandstone Dry Forest

 S_WSF01: Blue Gum High Forest


 Urban_E/N: Urban Exotic/Native

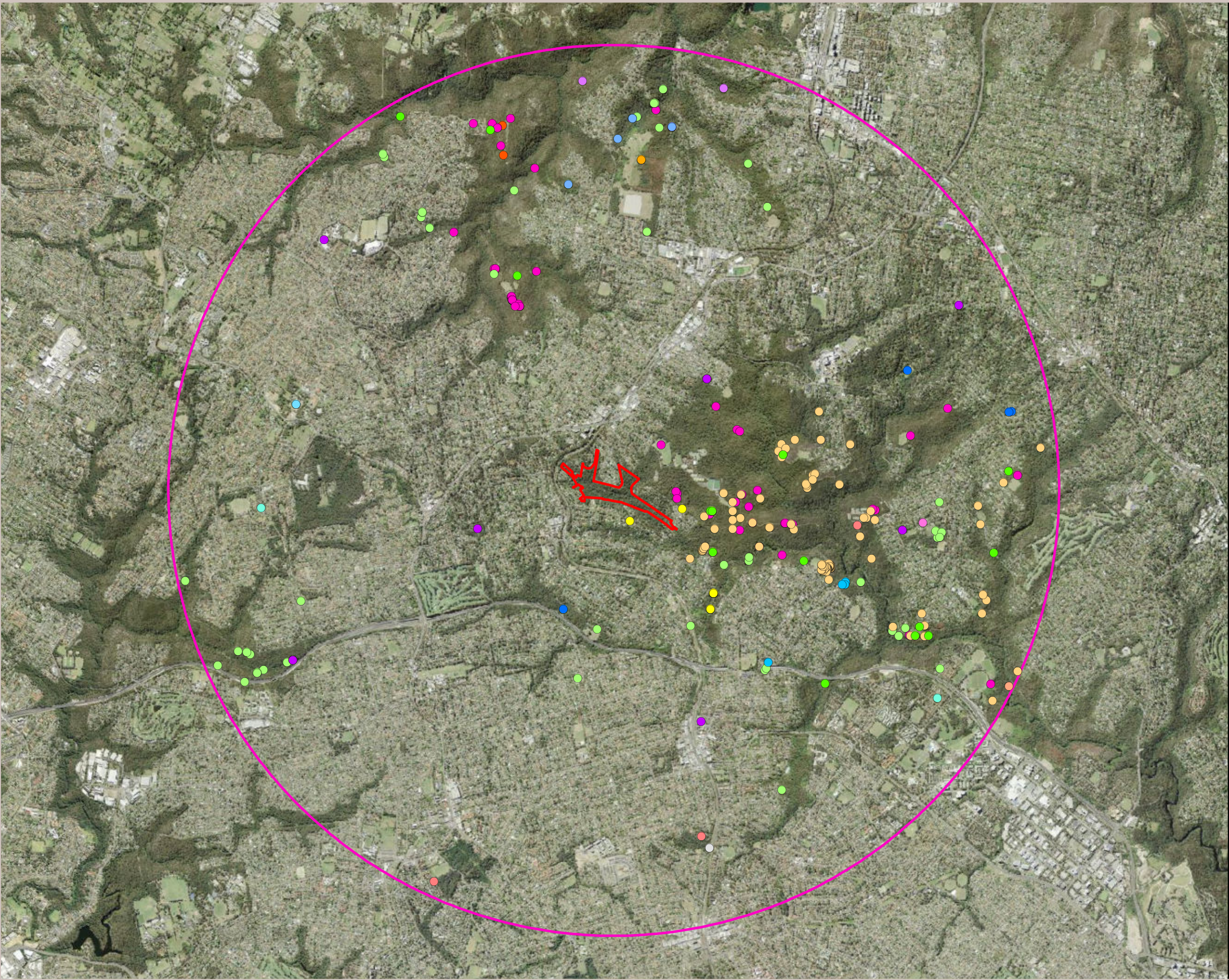
Image Source:
Image © NearMap 2019
Dated: 22/10/2019

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

Coordinate System: MGA Zone 56 (GDA 94)



Figure 2. Vegetation mapping of the study area



Legend

- Study Area
- Locality 5 km

Threatened Flora

- Acacia clunies-rossiae
- Acacia pubescens
- Callistemon linearifolius
- Darwinia biflora
- Darwinia peduncularis
- Dillwynia tenuifolia
- Epacris purpurascens var. purpurascens
- Eucalyptus nicholii
- Eucalyptus scoparia
- Galium australe
- Grammitis stenophylla
- Hibbertia spanantha
- Hibbertia superans
- Lasiopetalum joyceae
- Leptospermum deanei
- Melaleuca deanei
- Pimelea curviflora var. curviflora
- Rhodamnia rubescens
- Syzygium paniculatum
- Tetratheca glandulosa

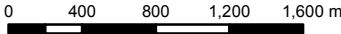
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Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'
Hornsby LGA

Coordinate System: MGA Zone 56 (GDA 94)



Figure 3. Threatened flora species within the locality



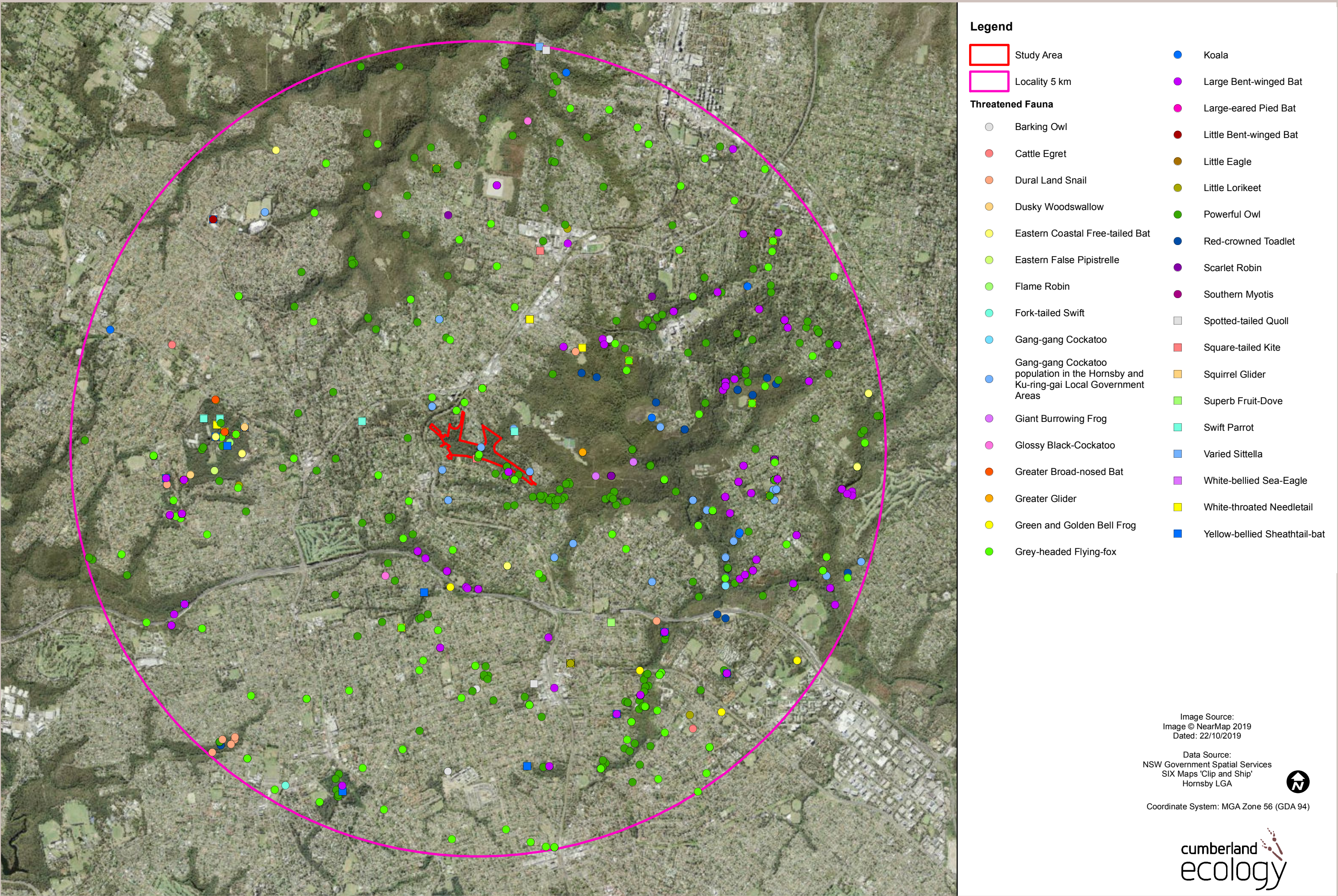


Figure 4. Threatened fauna species within the locality