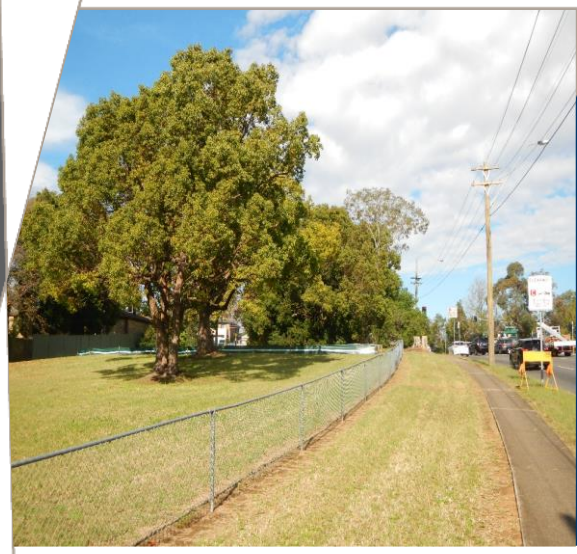
Ecological Impact Assessment

Pennant Hills Rd North Rocks Rd Intersection Road Upgrade

59917158-002-003



Prepared for
Roads and Maritime

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Shaping the Future

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Rev A	13 July 2017	Draft for Client Review	Dr Andrew Smith	Leanne Laughton
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1 Introduction and Aims

The NSW Roads and Maritime (Roads and Maritime) is seeking to upgrade the Pennant Hills Road / North Rocks Road intersection (the project). Roads and Maritime has engaged Cardno NSW/ACT Pty Ltd (Cardno) to prepare an Ecological Impact Assessment (EIA) to support a Review of Environmental Factors (REF) for the project.

1.1 Description of the Project

The proposed project comprises the following components:

Roads and Maritime Services NSW (Roads and Maritime) proposes to expand and widen the Pennant Hills Road and North Rocks Road Intersection under the NSW Government's Pinch Point Program (PPP).

The key improvements for the proposal are as follows:

> Pennant Hills Road North Approach
  - Additional through lane
  - Additional left turn slip road (signalised)
  - Third lane on the departure side forming three departure lanes
> North Rocks Road East Approach
  - Right turn lane
  - Shared left and through short lane
> Pennant Hills Road South Approach
  - Shared left and through lane
  - Third lane on the departure side
> North Rocks Road West Approach
  - Signalised left turn slip lane
> General
  - Signage, line marking
  - Street lighting
  - Relocating shared pedestrian and cycle path
  - Modifying stormwater drainage infrastructure.

1.2 Objectives of the Ecological Impact Assessment

The overall aim of the EIA is to assess the potential impacts of the project on biodiversity. Specifically, it would:

> Determine the presence of flora and fauna known or predicted to occur within the project area and adjacent areas;
> Determine if the project is likely to result in any significant impacts to flora and fauna, in particular threatened and/or migratory species, populations or ecological communities listed under State and/or Commonwealth legislation, and their associated habitats;
> Recommend measures to prevent, minimised and/or mitigate any potential impacts to protected flora and fauna; and
> Determine whether the residual impacts to flora and fauna are ecologically acceptable following implementation of mitigation measures.

1.3 Site Particulars

Locality	The project site is located in north-western Sydney a highly urbanised landscape in the Sydney region (**Figure 1-1**).
LGA	Parramatta
Address	Pennant Hills Road and North Rocks Road intersection.
Project Site Area	Approximately 2.16 ha
Current Land Use	The project site is currently existing road, road verger/foot path and a disused block of land.
Topography	The project site is located along the Pennant Hills ridgeline, which has a downward gradient from south to north.
Bioregion	Sydney Basin / Cumberland
Mitchell Landscape	Pennant Hills Ridges
Geology	Wianamatta Group (sandstone, siltstone and shale).

1.4 Legislative Requirements

The EIA addresses the following specific legislative planning requirements relating to flora and fauna:

> Potential impacts on threatened species, populations and ecological communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act), pursuant to section 5A of the NSW *Environmental Planning & Assessment Act 1979* (EP&A Act);

> Obligations to manage noxious weeds Schedule by City of Parramatta Council under the *NSW Noxious Weeds Act 1993*; and

> Potential impacts to nationally listed Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

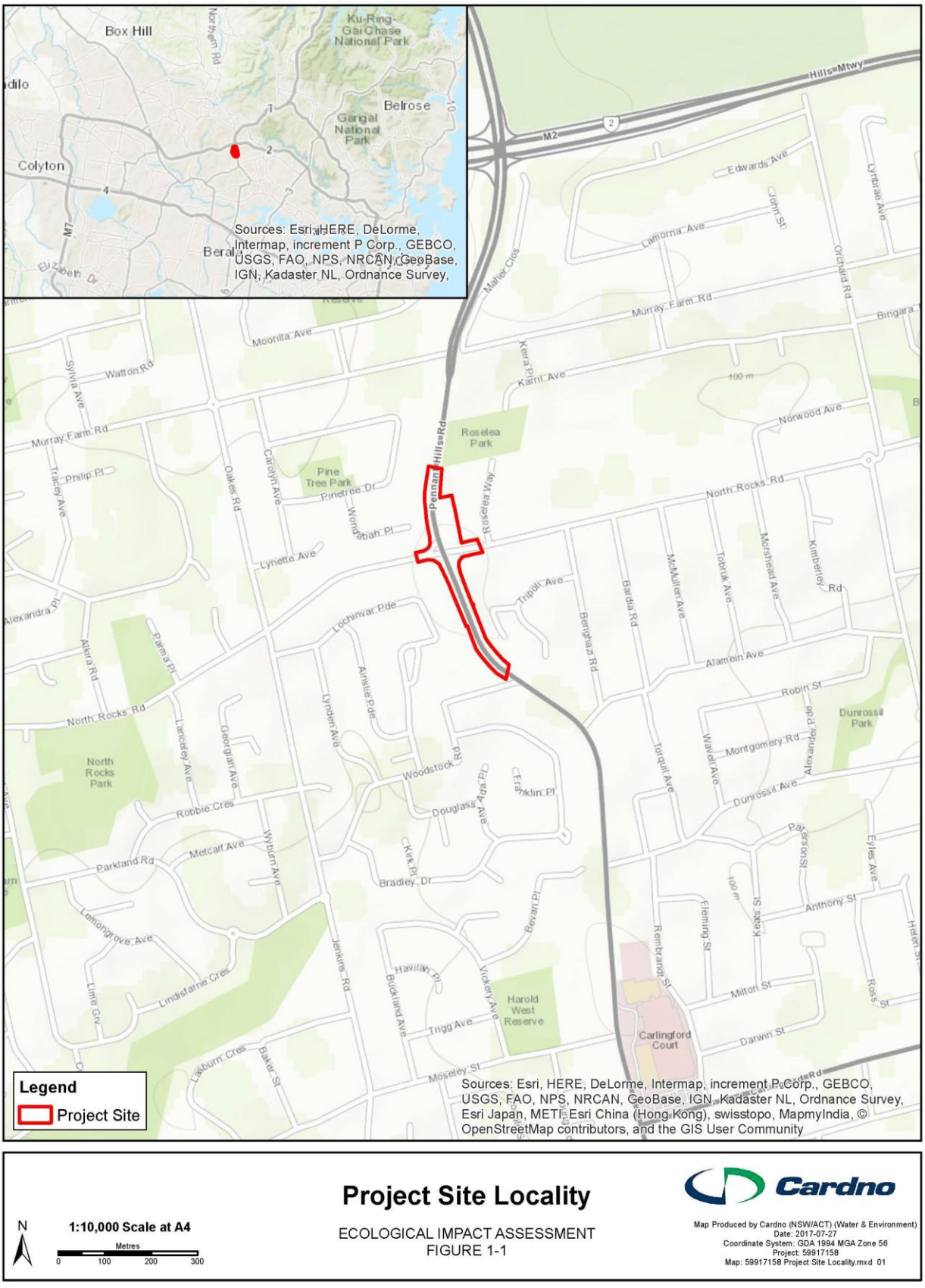

Figure 1-1 Project Site Locality.

2 Methods

2.1 Database Searches and Literature Review

A desktop review was undertaken to identify current records of threatened flora, fauna and ecological communities, migratory species, critical habitats and Key Threatening Processes (KTP) within five kilometres of the project site (locality). This included searches of online databases and a review of available spatial data and literature relevant to the project site, including:

> The NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database, which contains records of threatened species, populations and ecological communities, critical habitat and KTPs listed under the TSC Act (Reviewed: 29 June 2017);

> The Commonwealth Department of the Environment and Energy (DoEE) Protected Matters Search Tool (PMST) was used to identify MNES listed under the Commonwealth EPBC Act (Reviewed: 29 June 2017);

> Local vegetation mapping – *The Native Vegetation of the Sydney Metropolitan Area* (OEH 2016); and

> Habitat profiles for all threatened species, populations and ecological communities, and migratory species that are known to or have potential to occur within the locality.

Marine and other aquatic species were not considered in this assessment as the project site does not contain any marine habitat.

2.2 Field Survey

2.2.1 Flora and Fauna Surveys

A field survey of the flora and fauna was undertaken by a suitably qualified Cardno ecologist on 24 June 2017. The area surveyed included that within, and immediately adjacent to the project site. **Table 2-1** provides the conditions during the field survey.

Table 2-1 The conditions during the survey period.

Field Survey Dates	Temperature (°C)	Rainfall (mm)	Sunrise / Sunset	Moonrise / Moonset
24 June 2017	12.7–16.3	0.0	07:00 / 16:54	06:37 / 17:14

Sources: BoM (2017), Timebie (2017a; 2017b).

The flora survey identified and assessed the condition of vegetation within the project site. A random meander over the entire area was undertaken to identify all plant species (including weeds). The survey included targeted searches for threatened flora species identified as potentially occurring during the desktop review (**Section 2.1**).

A fauna survey was undertaken within the habitat available on the project site. The species groups and sampling methods are detailed in **Table 2-2**.

Table 2-2 Fauna surveys conducted within the project site.

Fauna Group	Survey Types	Methods and Survey Effort
Diurnal Birds	Area search	A two-hour survey was undertaken. Birds were identified from visual observations and call identification. A search for nests was also undertaken.
Herpetofauna	Habitat search	Opportunistic active searches for frogs and reptiles within suitable habitat (i.e. leaf litter, under rocks and long grass).
All	Opportunistic sightings	Opportunistic sightings of other fauna were recorded.

2.2.2 Habitat Assessment

The availability and quality of habitat within the project site was assessed with respect to the following factors:

> Structural and floral diversity;

> Diversity and extent of fauna habitat types;

> Habitat connectivity, including continuity with similar habitats within the project site, and adjacent areas via habitat corridors;

> Location and utilisation of key habitat features including tree hollows, water bodies, caves and crevices, rocky areas;

> Degree of disturbance and degradation evident from visual inspections; and

> Topographic features such as aspect and slope.

2.2.3 Secondary Indications and Incidental Observations

Opportunistic sightings and secondary indications of resident fauna were noted. Indicators included:

> Distinctive scats and detectable scents left by mammals;

> Collection of predator scats for potential prey species identification;

> Nests made by various guilds of birds;

> Whitewash, regurgitation pellets and prey remains from owls;

> Skeletal material of vertebrate fauna;

> Calls of fauna;

> Footprints left by mammals;

> Chewed She-oak (*Allocasuarina* spp.) cones indicative of feeding by the Glossy Black-Cockatoo (*Calyptorhynchus lathami*);

> Chewed fruit remains indicative of past feeding by frugivorous birds such as fruit-doves and Grey-headed Flying Foxes (*Pteropus poliocephalus*); and

> Any other signs of fauna activities.

2.2.4 Survey Limitations

Survey efficacy can be influenced by a range of factors. For this type of survey, such limitations are characteristic of snapshot surveys that do not account for temporal variation. Given the short period of time spent on site, the detection of certain species and ecological values may be affected by:

> Seasonal migration (particularly migratory birds);

> Seasonal flowering periods (some species are cryptic and are unlikely to be detected outside of the known flowering period);

> Seasonal availability of food, such as blossoms for some fauna;

> Weather conditions during the survey period (some species may go through cycles of activity related to specific weather conditions, for example some microchiropteran bats (micro-bats), reptiles and frogs can be inactive during cold weather); and

> Species lifecycle (cycles of activity related to breeding).

These potential limitations have been addressed by applying the precautionary principle in cases where the survey methodology may have given a false negative result (e.g. a species that could reasonably be expected to occur, based on previous records and available habitat, was not observed). All species have been assessed on the basis of the presence of suitable habitat and the likely significance of that habitat to support a viable local population.

3 Results

3.1 Desktop Searches

The results of database searches using the Atlas of NSW Wildlife indicated 48 threatened species have been recorded within five km of the project site, including two frog, 13 bird, 10 mammal and 23 flora species (**Table 3-1**). In addition, 27 threatened ecological communities (TECs) were known, or are predicted to occur, within five km of the project site (**Table 3-2**).

Table 3-1 Threatened species listed under the TSC Act and / or EPBC Act recorded within five km of the project site (Atlas of NSW Wildlife).

Family	Scientific Name	Common Name	TSC Act	EPBC Act	No. Records
Frogs					
Myobatrachidae	*Pseudophryne australis*	Red-crowned Toadlet	V	-	2
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E	V	3
Birds					
Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V	-	1
	Lophoictinia isura	Square-tailed Kite	V	-	1
Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-	20
Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	EP/V	-	37
Columbidae	*Ptilinopus superbus*	Superb Fruit-Dove	V	-	3
Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	1
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V	-	1
Petroicidae	*Petroica boodang*	Scarlet Robin	V	-	1
	Petroica phoenicea	Flame Robin	V	-	1
	Glossopsitta pusilla	Little Lorikeet	V	-	8
	Lathamus discolor	Swift Parrot	E	CE	9
Mammals					
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	1
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	5
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V	-	3
Pseudocheiridae	*Petauroides volans*	Greater Glider	-	V	2
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	42
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	3
	Miniopterus australis	Little Bentwing-bat	V	-	1
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	36
	Myotis macropus	Southern Myotis	V	-	1
	Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	2
Flora					
Convolvulaceae	*Wilsonia backhousei*	Narrow-leafed Wilsonia	V	-	2
Dilleniaceae	*Hibbertia superans*	-	E	-	44
Elaeocarpaceae	*Tetratheca glandulosa*	-	V	-	36
Ericaceae	*Epacris purpurascens* var. *purpurascens*	-	V	-	65
Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E	V	1
	Acacia clunies-rossiae	Kanangra Wattle	V	-	1
	Acacia pubescens	Downy Wattle	V	V	2
Grammitidaceae	*Grammitis stenophylla*	Narrow-leaf Finger Fern	E	-	2
Myrtaceae	*Callistemon linearifolius*	Netted Bottle Brush	V	-	1
	Darwinia biflora	-	V	V	47
	Darwinia peduncularis	-	V	-	1
	Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	2
	Eucalyptus scoparia	Wallangarra White Gum	E	V	1
	Leptospermum deanei	-	V	V	12
	Melaleuca biconvexa	Biconvex Paperbark	V	V	1
	Melaleuca deanei	Deane's Paperbark	V	V	6

Family	Scientific Name	Common Name	TSC Act	EPBC Act	No. Records
	Syzygium paniculatum	Magenta Lilly Pilly	E	V	5
	Triplarina imbricata	Creek Triplarina	E	E	4
Proteaceae	*Persoonia hirsuta*	Hairy Geebung	E	E	1
	Persoonia nutans	Nodding Geebung	E	E	1
Rhamnaceae	*Pomaderris prunifolia*	*P. prunifolia* in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	EP	-	3
Thymelaeaceae	*Pimelea curviflora* var. *curviflora*	-	V	V	6
	Pimelea spicata	Spiked Rice-flower	E	E	1

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable.

Table 3-2 Threatened ecological communities listed under the TSC Act and / or EPBC Act that are known, or are predicted, to occur within five km of the project site (Atlas of NSW Wildlife).

Ecological Community Name	TSC Act	EPBC Act	Presence
Agnes Banks Woodland in the Sydney Basin Bioregion – TSC Act *Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion* – EPBC Act	CE	E	Known
Blue Gum High Forest in the Sydney Basin Bioregion – TSC Act *Blue Gum High Forest of the Sydney Basin Bioregion* – EPBC Act	CE	CE	Known
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion – TSC Act *Southern Highlands Shale Forest and Woodland in the Sydney Basin Bioregion* – EPBC Act	E	CE	Known
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion – TSC Act *Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion* – EPBC Act	V	E	Known
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – TSC Act *Subtropical and temperate coastal saltmarsh* – EPBC Act	E	V	Known
Coastal Upland Swamp in the Sydney Basin Bioregion – TSC Act *Coastal Upland Swamps in the Sydney Basin Bioregion* – EPBC Act	E	E	Known
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion – TSC Act *Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion* – EPBC Act	E	CE	Known
Cumberland Plain Woodland in the Sydney Basin Bioregion – TSC Act *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* – EPBC Act	CE	CE	Known
Duffys Forest Ecological Community in the Sydney Basin Bioregion	E	-	Known
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion – TSC Act *Eastern Suburbs Banksia scrub of the Sydney region* – EPBC Act	E	E	Known
Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion	CE	-	Known
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – TSC Act *Littoral rainforests and coastal vine thickets of eastern Australia* – EPBC Act	E	CE	Known
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions – TSC Act *Lowland Rainforest of Subtropical Australia* – EPBC Act	E	CE	Known

Ecological Community Name	TSC Act	EPBC Act	Presence
Moist Shale Woodland in the Sydney Basin Bioregion – TSC Act *Western Sydney Dry Rainforest and Moist Woodland on Shale* – EPBC Act	E	CE	Known
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions – TSC Act *Temperate Highland Peat Swamps on Sandstone* – EPBC Act	E	E	Known
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	E	-	Known
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Shale Gravel Transition Forest in the Sydney Basin Bioregion – TSC Act *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* – EPBC Act	E	CE	Known
Shale Sandstone Transition Forest in the Sydney Basin Bioregion – TSC Act *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* – EPBC Act	CE	CE	Known
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	E	-	Known
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E	-	Known
Sydney Turpentine-Ironbark Forest – TSC Act *Turpentine-Ironbark Forest in the Sydney Basin Bioregion* – EPBC Act	E	CE	Known
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Western Sydney Dry Rainforest in the Sydney Basin Bioregion – TSC Act *Western Sydney Dry Rainforest and Moist Woodland on Shale* – EPBC Act	E	CE	Known

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable

The results of Commonwealth EPBC Protected Matters database search indicated that 42 threatened species and seven TECs are known, or have potential, to occur within five kilometres of the project site, including 10 bird, four frog, one reptile, one gastropod, eight mammal and 18 flora species (**Table 3-3**). In addition, 17 migratory species were known, or are predicted, to occur within five kilometres of the project site (**Table 3-4**).

Table 3-3 Threatened species and ecological communities listed under the TSC Act, FM Act and/or EPBC Act that are known, or have the potential, to occur within five km of the project site (PMST).

Scientific Name	Common Name	TSC Act / FM Act	EPBC Act	Type of Presence
Birds				
Anthochaera phrygia	Regent Honeyeater	CE	CE	Species or species habitat **known** to occur within area
Botaurus poiciloptilus	Australasian Bittern	E	E	Species or species habitat **known** to occur within area
Calidris ferruginea	Curlew Sandpiper	E	CE	Species or species habitat **known** to occur within area
Dasyornis brachypterus	Eastern Bristlebird	E	E	Species or species habitat **likely** to occur within area
Grantiella picta	Painted Honeyeater	V	V	Species or species habitat **may** to occur within area
Lathamus discolor	Swift Parrot	E	CE	Species or species habitat **known** to occur within area
Limosa lapponica baueri	Western Alaskan Bar-tailed	V	V	Species or species habitat **known** to occur within area
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	V	CE	Species or species habitat **may** to occur within area
Numenius madagascariensis	Eastern Curlew	-	CE	Species or species habitat **known** to occur within area

Scientific Name	Common Name	TSC Act / FM Act	EPBC Act	Type of Presence
Rostratula australis	Australian Painted Snipe	E	E	Species or species habitat **likely** to occur within area
Frogs				
Heleioporus australiacus	Giant Burrowing Frog	V	V	Species or species habitat **may** to occur within area
Litoria aurea	Green and Golden Bell Frog	E	V	Species or species habitat **known** to occur within area
Litoria littlejohni	Littlejohn's Tree Frog	V	V	Species or species habitat **may** to occur within area
Mixophyes balbus	Stuttering Frog	E	V	Species or species habitat **likely** to occur within area
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Species or species habitat **likely** to occur within area
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE mainland population)	V	E	Species or species habitat **known** to occur within area
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E	Species or species habitat **likely** to occur within area
Petauroides volans	Greater Glider	-	V	Species or species habitat **known** to occur within area
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Species or species habitat **may** to occur within area
Phascolarctos cinereus	Koala (combined populations of Qld, NSW and the ACT)	V	V	Species or species habitat **known** to occur within area
Pseudomys novaehollandiae	New Holland Mouse	-	V	Species or species habitat **may** to occur within area
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Foraging, feeding or related behaviour **known** to occur within area
Gastropod				
Pommerhelix duralensis	Dural Land Snail	E	E	Species or species habitat **known** to occur within area
Reptile				
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Species or species habitat **may** to occur within area
Flora				
Acacia bynoeana	Bynoe's Wattle	E	V	Species or species habitat **likely** to occur within area
Acacia pubescens	Downy Wattle	V	V	Species or species habitat **known** to occur within area
Allocasuarina glareicola	-	E	E	Species or species habitat **may** to occur within area
Asterolasia elegans	-	E	E	Species or species habitat **may** to occur within area
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Species or species habitat **may** to occur within area
Darwinia biflora	-	V	V	Species or species habitat **likely** to occur within area
Eucalyptus camfieldii	Camfield's Stringybark	V	V	Species or species habitat **likely** to occur within area
Genoplesium baueri	Yellow Gnat-orchid	E	E	Species or species habitat **known** to occur within area
Leptospermum deanei	Deane's Tea-tree	V	V	Species or species habitat **likely** to occur within area
Melaleuca biconvexa	Biconvex Paperbark	V	V	Species or species habitat **likely** to occur within area
Melaleuca deanei	Deane's Melaleuca	V	V	Species or species habitat **likely** to occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345)	Omeo Stork's-bill	E	E	Species or species habitat **may** to occur within area
Persoonia mollis subsp. *maxima*	-	E	E	Species or species habitat **may** to occur within area
Pimelea curviflora var. *curviflora*	-	V	V	Species or species habitat **known** to occur within area

Scientific Name	Common Name	TSC Act / FM Act	EPBC Act	Type of Presence
Pimelea spicata	Spiked Rice-flower	E	E	Species or species habitat **likely** to occur within area
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Species or species habitat **may** to occur within area
Syzygium paniculatum	Magenta Lilly Pilly	E	V	Species or species habitat **likely** to occur within area
Thesium australe	Austral Toadflax	V	V	Species or species habitat **may** to occur within area
Ecological Communities				
Blue Gum High Forest of the Sydney Basin Bioregion		CE	CE	Community **likely** to occur within area
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion		V/CE	E	Community **may** to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion		E	E	Community **likely** to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion		E	CE	Community **may** to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion		CE	CE	Community **likely** to occur within area
Turpentine-Ironbark Forest in the Sydney Basin Bioregion		E	CE	Community **likely** to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale		E/E	CE	Community **likely** to occur within area

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable

Table 3-4 Migratory species listed under the EPBC Act that are known, or have the potential, to occur within five km of the project site (PMST).

Scientific Name	Common Name	TSC Act	EPBC Act	Type of Presence
Migratory Marine Birds				
Apus pacificus	Fork-tailed Swift	-	C,J,K	Species or species habitat **likely** to occur within area
Migratory Terrestrial Species				
Cuculus optatus	Oriental Cuckoo	-	C,J,K	Species or species habitat **known** occur within area
Hirundapus caudacutus	White-throated Needletail	-	C,J,K	Species or species habitat **known** to occur within area
Monarcha melanopsis	Black-faced Monarch	-	Bonn	Species or species habitat **known** to occur within area
Monarcha trivirgatus	Spectacled Monarch	-	Bonn	Species or species habitat **known** to occur within area
Motacilla flava	Yellow Wagtail	-	C,J,K	Species or species habitat **likely** to occur within area
Myiagra cyanoleuca	Satin Flycatcher	-	Bonn	Species or species habitat **known** to occur within area
Rhipidura rufifrons	Rufous Fantail	-	Bonn	Species or species habitat **known** to occur within area
Migratory Wetlands Species				
Actitis hypoleucos	Common Sandpiper	-	Bonn, C,J,K	Species or species habitat **may** to occur within area
Calidris acuminata	Sharp-tailed Sandpiper	-	Bonn, C,J,K	Species or species habitat **may** to occur within area
Calidris ferruginea	Curlew Sandpiper	E	CE, Bonn, C,J,K	Species or species habitat **known** to occur within area
Calidris melanotos	Pectoral Sandpiper	-	Bonn, J,K	Species or species habitat **may** to occur within area
Gallinago hardwickii	Latham's Snipe	-	Bonn, J,K	Species or species habitat **may** to occur within area
Limosa lapponica	Bar-tailed Godwit	-	V/CE, Bonn, C,J,K	Species or species habitat **known** to occur within area
Numenius madagascariensis	Eastern Curlew	-	CE, Bonn, C,J,K	Species or species habitat **known** to occur within area
Pandion haliaetus	Osprey	V	Bonn	Species or species habitat **likely** to occur within area

Scientific Name	Common Name	TSC Act	EPBC Act	Type of Presence
Tringa nebularia	Common Greenshank	-	Bonn, C,J,K	Species or species habitat **likely** to occur within area

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable, Bonn = Convention on the Conservation of Migratory Species of Wild Animals, C = CAMBA (China–Australia Migratory Bird Agreement), J = JAMBA (Japan-Australia Migratory Bird Agreement), K = ROKAMBA (Republic of Korea–Australia Migratory Bird Agreement).

3.1 Field Surveys

3.1.1 Flora

No threatened flora species listed under the TSC Act and / or EPBC Act were observed within the project site during the field survey. The vegetation within project site occurs in highly disturbed / modified land that is predominantly cleared to accommodate the existing road, driveways, housing, and footpaths. The remaining vegetation occurred as mowed lawns and planted exotic/native street trees. Common introduced tree species observed within the project site include *Cupressus leylandii* (Leylands Cypress), *Cinnamomum camphora* (Camphor Laurel), *Jacaranda mimosifolia* (Jacaranda) and *Erythrina* x *sykesii* (Coral tree). Commonly observed native trees, many of which appeared planted, included *Ficus microcarpa* var. *hilli* (Fig Tree), *Corymbia maculata* (Spotted Gum), *Cupressus Angophora floribunda* (Rough-barked Apple), *Eucalyptus punctata* (Grey Gum), *Eucalyptus saligna* (Sydney Blue Gum) *and Lophostemon confertus* (Brush Box). Much of the understorey had been cleared and considered of mowed lawns and patches of weed, included *Lantana camara* (Lantana), *Asparagus aethiopicus* Asparagus Fern however, there was clear evidence of recent weed removal. Photographs of the vegetation within the project site are located in **Appendix A** and full list of flora species found is located in **Appendix B**: **Table 1B-1**.

3.1.1.1 Noxious Weeds

Many weed species were observed within the project site, which is typical of urban dominated habitat areas of the Sydney region. In particular, three species observed were declared noxious weeds under the *Noxious Weed Act 1993* (NW Act) within the Parramatta local control authority, namely:

> *Olea europaea* subsp. *cuspidata** (African Olive) - Regional Recommended Measure: *The plant or parts of the plant are not traded, carried, grown or released into the environment*;

> *Lantana camara* (Lantana) - Mandatory Measure: *Must not be imported into the State or sold*. This species is also a Weed of National Significance (WoNS); and

> *Asparagus aethiopicus* (Asparagus Fern) – Mandatory Measure: *Must not be imported into the State or sold*. This species is also a WoNS.

3.1.2 Fauna

No threatened fauna species listed under the TSC Act and / or EPBC Act were observed within the project site during the field survey. The most commonly observed fauna were birds. Bird species observed were those known to be common within the urban Sydney region and included the native Noisy Miner (*Manorina melanocephala*), Australian Raven (*Corvus coronoides*) and Rainbow Lorikeet (*Trichoglossus moluccanus*).

3.1.2.1 Fauna Habitat Features

The habitat features for threatened fauna within the project site were predominantly restricted to the planted native/exotic trees. Whilst no hollow-bearing trees were detected within the project site, the trees provide potential foraging and/or nesting habitat for many fauna species. However, the value of these habitat features is low due to their limited extent and highly disturbed condition. Eucalyptus species, other flowering plants, and fruiting trees have the potential to provide a seasonal foraging resource for nectar feeding birds and bats species. In addition, there were a number of *Cupressus macrocarpa* (Monterey Cypress) that are often used as drey site from the non-threatened native Ring-tailed Possum (*Pseudocheirus peregrinu*).

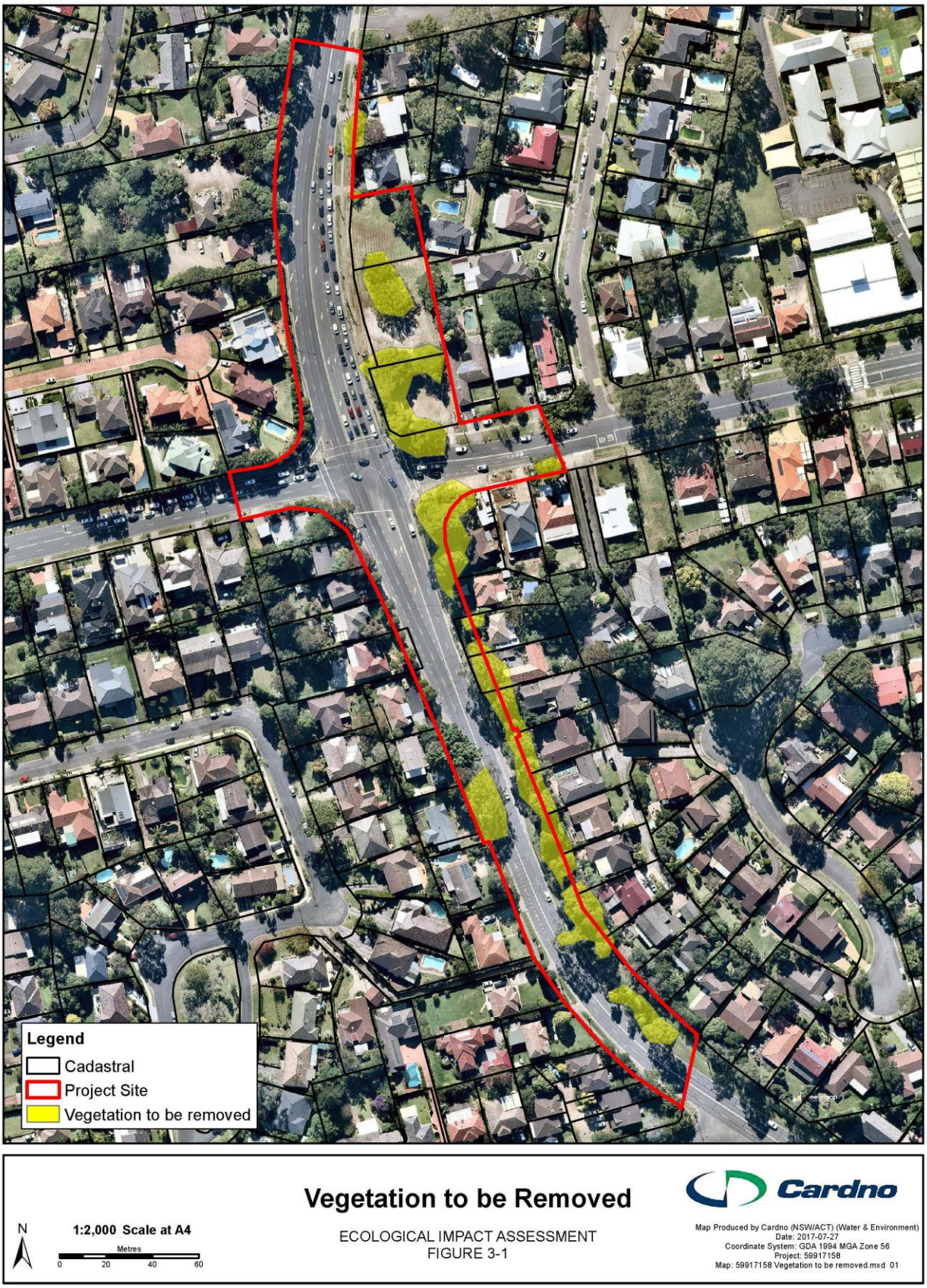

Figure 3-1 Vegetation to be Removed.

4 Threatened Species, Populations and Ecological Communities Assessment, and Migratory Species Assessment

Threatened species, populations and ecological communities, and migratory species (listed under the TSC Act and / or EPBC Act) that have been gazetted and are known, or have potential, to occur within a five kilomeres radius of the project site have been considered in this section. The likelihood of occurrence within the project site of each species and TEC was assessed using the criteria described in **Table 4-1** and the findings presented in **Table 4-2**. This assessment was undertaken based on previous records, the results of the field survey and species known habitat requirements. **Table 4-2** also provides an assessment of the potential impacts of the project on each species and TEC.

Table 4-1 Likelihood of occurrence criteria.

Likelihood Rating	Criteria
Known	The species was recorded within the project site during the field surveys.
High	It is likely that a species would inhabit or utilise habitat within the project site. Criteria for this category may include: > Species recently and/or regularly recorded in contiguous or nearby habitat. > High quality habitat or resources present within the project site. > Species is known or likely to maintain a resident population surrounding the project site. > Species is known or likely to visit during migration or in response to seasonal availability of resources present on site.
Moderate	Potential habitat for a species occurs within the project site. Criteria for this category may include: > Species previously recorded in contiguous habitat albeit not recently (>10 years). > Habitat present, but poor quality, depauperate or modified types and/or resources. > Species has potential to utilise habitat during migration or seasonal availability of resources. > Cryptic flora species with potential habitat within the project site that have not been targeted by surveys (for example, surveys were not undertaken with the flowering season.
Low	It is unlikely that the species inhabits the area, if it did, it would likely be a transient visitor. Criteria for this category may include: > The project site does not support the specific habitat types or resources required by the species. > The project site is beyond the current distribution of the species or is isolated from known populations. > Non cryptic flora species not observed during targeted surveys.
None/Absent	The habitat within the project site is unsuitable for the species.

Table 4-2 Assessment of likelihood of occurrence of threatened species, populations and communities, and migratory species assessment of potential impacts.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Gastropod						
Dural Land Snail (*Pommerhelix duralensis*)	E	E	PMST	The species is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species is known to occur as far north as St Albans, in East Kurrajong and then south along the footslopes of the Blue Mountains as far south as The Oaks. Southeast from St Albans, the species is found across The Hills Shire Local Government Area and south to Parramatta. The species is found within the Local Government Areas of Blue Mountains City, Penrith City, The Hills Shire, Wollondilly Shire, Hornsby Shire and Parramatta City. The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris. It favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris.	**Low**. No suitable shale-sandstone transitional landscapes habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Frogs						
Red-crowned Toadlet (*Pseudophryne australis*)	V	-	2	The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.	**Low**. No suitable aquatic habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Giant Burrowing Frog (*Heleioporus australiacus*)	V	V	PMST	The northern population is largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites.	**Low**. No suitable aquatic habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Green and Golden Bell Frog (*Litoria aurea*)	E	V	3 & PMST	Inhabits marshes, dams and stream-sides, particularly those containing Bullrushes (*Typha* spp.) or Spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	**Low**. No suitable aquatic habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Littlejohn's Tree Frog (*Litoria littlejohni*)	V	V	PMST	This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground.	**Low**. No suitable aquatic habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Stuttering Frog (*Mixophyes balbus*)	E	V	PMST	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	**Low**. No suitable aquatic habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Reptiles						
Broad-headed Snake (*Hoplocephalus bungaroides*)	E	V	PMST	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. 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.	**Low**. No suitable exposed cliff edges occurred within the project site. Therefore, this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Birds						

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Little Eagle (*Hieraaetus morphnoides*)	V	-	1	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	**Low-Moderate**. This species is highly mobile and is known from the locality. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. The habitat within the project site is sub-optimal for this species as it is high disturbed. If this species was detected within the project site, it would most likely be moving through the area to more suitable habitat. Therefore, the project is unlikely to have any substantial impact on this species.
Square-tailed Kite (*Lophoictinia isura*)	V	-	1	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	**Low-Moderate**. This species is highly mobile and is known from the locality. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. The habitat within the project site is sub-optimal for this species as it is high disturbed. If this species was detected within the project site, it would most likely be moving through the area to more suitable habitat. Therefore, the project is unlikely to have any substantial impact on this species.
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	V	-	20	The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath.	**Low-Moderate**. This species is highly mobile and is known from the locality. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. The habitat within the project site is sub-optimal for this species as it is high disturbed. If this species was detected within the project site, it would most likely be moving through the area to more suitable habitat. Therefore, the project is unlikely to have any substantial impact on this species.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas (*Callocephalon fimbriatum*)	EP/V	-	37	Occurs within a variety of forest and woodland types. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage, but appears to favour well timbered country through which it habitually flies as it moves about.	**Low-Moderate**. This species is highly mobile and is known from the locality. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. The habitat within the project site is considered to be sub-optimal for this species was it is limited in extent and highly modified. If this species was detected within the project site, it would most likely be moving through the area to more suitable habitat. Therefore, the proposal project is unlikely to have an impact on this species.
Superb Fruit-Dove (*Ptilinopus superbus*)	V	-	3	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.	**Low**. No suitable rainforest or similar closed forests habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Eastern Bristlebird (*Dasyornis brachypterus*)	E	E	PMST	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	**Low**. This species is not known to occur on a regular basis within the inner Sydney region. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Regent Honeyeater (*Anthochaera phrygia*)	CE	CE	1 & PMST	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	**Low**. This species is not known to occur on a regular basis within the inner Sydney region. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Painted Honeyeater (*Grantiella picta*)	V	V	PMST	The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema.*	**Low**. This species is not known to occur on a regular basis within the inner Sydney region. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Varied Sittella (*Daphoenositta chrysoptera*)	V	-	1	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	**Low**. No suitable woodland, forest or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Scarlet Robin (*Petroica boodang*)	V	-	1	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.	**Low**. No suitable woodland, forest or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Flame Robin (*Petroica phoenicea*)	V	-	1	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.	**Low**. No suitable woodland, forest or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Little Lorikeet (*Glossopsitta pusilla*)	V	-	8	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.	**Low**. This species is not known to occur on a regular basis within the inner Sydney region. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Swift Parrot (*Lathamus discolor*)	E	CE	9 & PMST	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*.	**Low**. This species is not known to occur on a regular basis within the inner Sydney region. Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Western Alaskan Bar-tailed (*Limosa lapponica baueri*)	V	V, Bonn, C,J,K	PMST	The species breed in north-east Siberia and western Alaska. The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas. *L. l. baueri* have shorted bills and longer wings, and are more common in NSW than *L. l. menbieri*.	**Low**. No suitable intertidal flats or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Northern Siberian Bar-tailed Godwit (*Limosa lapponica menzbieri*)	V	CE, Bonn, C,J,K	PMST	The species breed in northern Siberia. The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas. *L. l. menbieri* have long bills and shorter wings, and are less common in NSW than *L. l. baueri*.	**Low**. No suitable intertidal flats or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Eastern Curlew (*Numenius madagascariensis*)	-	CE, Bonn, C,J,K	PMST	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. The birds are also found in saltworks and sewage farms. The numbers of Eastern Curlew recorded during one study were correlated with wetland areas.	**Low**. No suitable intertidal mudflats in estuaries and bays, lakes and lagoons or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Curlew Sandpiper (*Calidris ferruginea*)	E	CE, C, J, K	PMST	This species has a widespread distribution in NSW east of the Great Divide, particularly in coastal regions. The Curlew Sandpiper inhabits intertidal mudflats in estuaries and bays, lakes and lagoons.	**Low**. No suitable intertidal flats or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Australian Painted Snipe (*Rostratula australis*)	E	E	PMST	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	**Low**. No suitable aquatic habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Australasian Bittern (*Botaurus poiciloptilus*)	E	E	PMST	In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.)	**Low**. No suitable aquatic habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Mammals						

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Spotted-tailed Quoll (*Dasyurus maculatus*)	V	E	1	Spotted-tailed quolls live in various environments including forests, woodlands, coastal heathlands and rainforests. They are sometimes seen in open country, or on grazed areas and rocky outcrops. They are mainly solitary animals, and will make their dens in rock shelters, small caves, hollow logs and tree hollows. They use these dens for shelter and to raise young. These animals are highly mobile. They can move up to several kilometres in a night and may have quite large territories. Within their territories, they will have latrine areas where they defecate. These are often in exposed areas, such as on rocky outcrops.	**Low**. This species is known to avoid highly modified urban landscapes. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Southern Brown Bandicoot (eastern)	E	E	PMST	The species occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night.	**Low**. No suitable rocky escarpments or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Greater Glider (*Petauroides volans*)	-	V	2 & PMST	The Greater Glider feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range. Occupy a relatively small home range with an average size of 1 to 3 ha.	**Low**. This species is known to avoid highly modified urban landscapes. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Brush-tailed Rock-wallaby	E	V	PMST	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at nigh.	**Low**. No suitable rocky escarpments or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within project site, it is considered unlikely to be impacted by the proposed project.
Koala (combined populations of Qld, NSW and the ACT)	V	V	PMST	The species inhabits 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 browse species	**Low**. No suitable Koala feed tree species occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
New Holland Mouse	-	V	PMST	The species is known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals. Distribution is patchy in time and space, with peaks in abundance during early to mid-stages of vegetation succession typically induced by fire.	**Low**. No suitable heathy understorey or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Grey-headed Flying-fox (*Pteropus poliocephalus*)	V	V	42	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. 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. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	**High**. This species is highly mobile and is known to have a camp in close proximity to the project site (Gordon). Therefore, it is considered that this species has the potential to occur within the project site.	**Unlikely**. As the project will have a small impact on the vegetation, the impact to this species would likely be negligible. Furthermore, if this species was detected within the project site, it would most likely be moving through the area to more suitable habitat. Therefore, the project is unlikely to have any substantial impact on this species.
Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)	V	-	5	There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.
Eastern Freetail-bat (*Mormopterus norfolkensis*)	V	-	3	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost maily in tree hollows but will also roost under bark or in man-made structures.	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Large-eared Pied Bat (*Chalinolobus dwyeri*)	V	V	PMST	This species is found in well-timbered areas containing gullies. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)	V	-	3	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.
Little Bentwing-bat (*Miniopterus australis*)	V	-	1	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas.	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.
Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)	V	-	36	The Eastern Bentwing-bat hunt in forested areas, catching moths and other flying insects above the tree tops. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Southern Myotis (*Myotis macropus*)	V	-	1	The Souther Myotis is usually found near bodies of water, including estuaries, lakes, reservoirs, rivers and large streams, often in close proximity to their roost site. Although usually recorded foraging over wet areas, it also utilises a variety of wooded habitats adjacent to such areas including rainforest, wet and dry sclerophyll forest, woodland, and swamp forest. Roosts in small colonies of between 15 and several hundred individuals in caves, mines and disused railway tunnels.	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.
Greater Broad-nosed Bat (*Scoteanax rueppellii*)	V	-	2	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	**Low-moderate.** Suitable foraging habitat occurs within the project site. Therefore, this species has the potential to occur within project site.	**Unlikely.** No suitable roosting habitat occurs within the project for this species and the foraging habitat is sup-optimal. Therefore, this species is unlikely to be impacted by the project.
Flora						
Acacia bynoeana (Bynoe's Wattle)	E	V	1 & PMST	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Acacia clunies-rossiae (Kanangra Wattle)	V	-	1	Grows in dry sclerophyll forest on skeletal soils on rocky slopes, or on alluvium along creeks.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Acacia pubescens (Downy Wattle)	V	V	2 & PMST	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Allocasuarina glareicola	E	E	PMST	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla and Melaleuca decor*a. Common associated understorey species include *Melaleuca nodosa*, *Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongata, Acacia brownei, Themeda australis* and *Xanthorrhoea minor.*	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Asterolasia elegans	E	E	PMST	Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (*Syncarpia golmulifera* subsp. *glomulifera*), Smooth-barked Apple (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Forest Oak (*Allocasuarina torulosa*) and Christmas Bush (*Ceratopetalum gummiferum*).	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Callistemon linearifolius (Netted Bottle Brush)	V	-	1	Grows in dry sclerophyll forest on the coast and adjacent ranges.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Cryptostylis hunteriana (Leafless Tongue-orchid)	V	V	PMST	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Darwinia biflora	V	V	47 & PMST	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include *Eucalyptus haemastoma*, *Corymbia gummifera* and/or *E. squamosa*. The vegetation structure is usually woodland, open forest or scrub-heath.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Darwinia peduncularis	V	-	1	Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Epacris purpurascens var. *purpurascens*	V	-	65	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Eucalyptus camfieldii (Camfield's Stringybark)	V	V	PMST	Camfield's Stringybark occurs mostly in small scattered stands in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. It grows in shallow sandy soils overlying Hawkesbury sandstone. Most sites are subject to great seasonal variations in soil moisture. Associated species frequently include stunted specimens of Narrow-leaved Stringbark (*Eucalyptus oblonga*), Brown Stringybark (*E. capitellata*), Scribbly Gum (*E. haemastoma*), *Angophora costata*, *Corymbia gummifera*, *A. hispida*, *E. sieberi*, *Allocasuarina distyla*, *Leptospermum trinervium* and *Banksia oblongifolia*.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Eucalyptus nicholii (Narrow-leaved Black Peppermint)	V	V	2	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. The Narrow-leaved Peppermint occurs in grassy or sclerophyll woodland, in association with other eucalypts that grow in the region, including New England Blackbutt (*E. andrewsii*) and many of the stringybarks, such as Broad-leaved Stringybark (*E. caliginosa*).	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Eucalyptus scoparia (Wallangarra White Gum)	E	V	1	Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes. At lower elevations can occur in less rocky soils in damp situations.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Genoplesium baueri (Yellow Gnat-orchid)	E	E	PMST	Grows in dry sclerophyll forest and moss gardens over sandstone.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Grammitis stenophylla (Narrow-leaf Finger Fern)	E	-	2	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Hibbertia superans	E	-	44	Flowering time is July to December. The species occurs on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Leptospermum deanei (Deane's Tea-tree)	V	V	12 & PMST	Occurs in Hornsby, Warringah, Ku-ring-gai and Ryde LGAs. Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in Riparian Scrub - e.g. *Tristaniopsis laurina, Baechea myrtifolia*; Woodland - e.g. *Eucalyptus haemstoma*; and Open Forest - e.g. *Angophora costata, Leptospermum trinervium, Banksia ericifolia*.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Melaleuca biconvexa (Biconvex Paperbark)	V	V	1 & PMST	The Biconvex Paperbark occurs in damp areas, often near watercourses, on alluvium soils over shale (Terrigal formation). The species may form a dense stand in a narrow strip adjacent to a watercourse.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Melaleuca deanei (Deane's Melaleuca)	V	V	6 & PMST	The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Pelargonium sp. Striatellum (G.W.Carr 10345) (Omeo Stork's-bill)	E	E	PMST	It 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. It sometimes colonises exposed lake beds during dry periods.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Persoonia hirsuta (Hairy Geebung)	E	E	1	*Persoonia hirsuta* has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Persoonia mollis subsp. *maxima*	E	E	PMST	Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences. Associated species: Smooth Barked Apple *Angophora costata*, Sydney Peppermint *Eucalyptus piperita*, Red Bloodwood *Corymbia gummifera*, Turpentine *Syncarpia glomulifera*, Coachwood *Ceratopetalum apetalum* and Black Wattle *Callicoma serratifolia*.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Persoonia nutans (Nodding Geebung)	E	E	1	Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Pimelea curviflora var. *curviflora*	V	V	6 & PMST	Confined to the coastal area of the Sydney and Illawarra regions. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowalnd Grassy Woodland habitat at Albion Park on the Illawarra coastal plain.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Pimelea spicata (Spiked Rice-flower)	E	E	1 & PMST	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark. The co-occurring species in the Cumberland Plain sites are grey box (*Eucalyptus moluccana*), forest red gum (*E. tereticornis*) and narrow-leaved ironbark (*E. crebra*). Blackthorn (*Bursaria spinosa*) is often present at sites (and may be important in protection from grazing) and kangaroo grass (*Themeda australis*) is usually present in the groundcover (also indicative of a less intense grazing history).	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Pomaderris prunifolia (*P. prunifolia* in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas)	EP	-	3	Known from only three sites within the listed local government areas, at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown. At Rydalmere it occurs along a road reserve near a creek, among grass species on sandstone. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River / Castlereagh Ironbark Forest on shale soils.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Pterostylis saxicola (Sydney Plains Greenhood)	E	E	PMST	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where Pterostylis saxicola occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Syzygium paniculatum (Magenta Lilly Pilly)	E	V	5 & PMST	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Tetratheca glandulosa	V	-	36	Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Thesium australe (Austral Toadflax)	V	V	PMST	Although originally described from material collected in the SW Sydney area, populations have not been seen in a long time. It may persist in some areas in the broader region. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*).	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Triplarina imbricata (Creek Triplarina)	E	E	4	Occurs along watercourses in low open forest with Water Gum (*Tristaniopsis laurina*) or in montane bogs, often with *Baekea amissa*.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Wilsonia backhousei (Narrow-leafed Wilsonia)	V	-	2	This is a species of the margins of salt marshes and lakes.	**Low**. This species was not detected during the field survey and the habitat is highly disturbed/modified. Therefore, this species has a low chance of occurring within project site	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Ecological Communities						

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Agnes Banks Woodland in the Sydney Basin Bioregion – TSC Act *Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion* – EPBC Act	CE	E	Known	A low woodland community with Scribbly Gum (*Eucalyptus sclerophylla*), Narrow-leaved Apple (*Angophora bakeri*) and Old Man Banksia (*Banksia serrata*) as the dominant canopy trees. Diverse understorey shrubs include Wallum Banksia (*Banksia aemula*), *Banksia oblongifolia*, Coneseed (*Cononspermum taxifolium*), Wedding Bush (*Ricinocarpos pinifolius*), Showy Parrot Pea (*Dillwynia sericea*) and Nodding Geebung (*Persoonia nutans*). Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Blue Gum High Forest in the Sydney Basin Bioregion – TSC Act *Blue Gum High Forest of the Sydney Basin Bioregion* – EPBC Act	CE	CE	Known & PMST	A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum (*Eucalyptus saligna*) and Blackbutt (*E. pilularis*). Forest Oak (*Allocasuarina torulosa*) and Sydney Red Gum (*Angophora costata*) also occur. Species adapted to moist habitat such as Lilly Pilly (*Acmena smithii*), Sandpaper Fig (*Ficus coronata*), Rainbow Fern (*Calochleana dubia*) and Common Maidenhair (*Adiantum aethiopicum*) may also occur. Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion – TSC Act *Southern Highlands Shale Forest and Woodland in the Sydney Basin Bioregion* – EPBC Act	E	CE	Known	Characteristic tree species of this ecological community are Mountain Blue Gum (*Eucalyptus deanei*), Monkey Gum (*E. cypellocarpa*) and Turpentine (*Syncarpia glomulifera*). Other tree species include Sydney Red Gum (*Angophora costata*), Rough-barked Apple (*A. floribunda*), Mountain Mahogany (*E. notabilis*), Sydney Peppermint (*E. piperita*) and Grey Gum (*E. punctata*). Tree species composition varies between sites depending on geographical location and local conditions (e.g. topography, rainfall exposure).	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion – TSC Act *Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion* – EPBC Act	V	E	Known & PMST	Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is dominated by *Eucalyptus parramattensis* subsp. *parramattensis*, *Angophora bakeri* and *E. sclerophylla*. A small tree stratum of Melaleuca decora is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as *Banksia spinulosa* var. *spinulosa*, *Melaleuca nodosa*, *Hakea sericea* and *H. dactloides* (multi-stemmed form). The ground stratum consists of a diverse range of forbs including *Themeda australis*, *Entolasia stricta, Cyathochaeta diandra*, *Dianella revolute* subsp. *revolute*, *Stylidium graminifolium*, *Platysace ericoides*, *Laxmannia gracilis* and *Aristida warburgii*.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – TSC Act *Subtropical and temperate coastal saltmarsh* – EPBC Act	E	V	Known	Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include *Baumea juncea*, Sea Rush (*Juncus krausii* subsp.*australiensis*), Samphire (*Sarcocornia quinqueflora* subsp. *quinqueflora*), Marine Couch (*Sporobolus virginicus*), Streaked Arrowgrass (*Triglochin striata*), Knobby Club-rush (*Ficinia nodosa*), Creeping Brookweed (*Samolus repens*), Swamp Weed (*Selliera radicans*), Seablite (*Suaeda australis*) and Prickly Couch (*Zoysia macrantha*). Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pans.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Coastal Upland Swamp in the Sydney Basin Bioregion – TSC Act *Coastal Upland Swamps in the Sydney Basin Bioregion* – EPBC Act	E	E	Known & PMST	The Coastal Upland Swamp in the Sydney Basin Bioregion includes open graminiod heath, sedgeland and tall scrub associated with periodically waterlogged soils on the Hawkesbury sandstone plateaux. The Coastal Upland Swamp is generally associated with soils that are acidic and vary from yellow or grey mineral sandy loams with a shallow organic horizon to highly organic spongy black peat soils with pallid subsoils. The vegetation of the Coastal Upland Swamp may include tall open scrubs, tall closed scrubs, closed heaths, open graminoid heaths, sedgelands and fernlands. Larger examples may include a complex of these structural forms. The flora comprising the upland swamp is diverse there are 73 plant species listed as characterising the ecological community. The total species list is much greater and is likely to exceed 200 species of vascular plants.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion – TSC Act *Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion* – EPBC Act	E	CE	Known & PMST	Ranges from open forest to low woodland, with a canopy dominated by Broad-leaved Ironbark (*Eucalyptus fibrosa*) and Paperbark (*Melaleuca decora*). The canopy may also include other eucalypts such as Woolybutt (*E. longifolia*). The dense shrubby understorey consists of Prickly-leaved Paperbark (*Melaleuca nodosa*) and Peach Heath (*Lissanthe strigosa*), with a range of 'pea' flower shrubs, such as *Dillwynia tenuifolia*, Hairy Bush-pea (*Pultenaea villosa*) and Gorse Bitter Pea (*Daviesia ulicifolia*) (can be locally abundant). The sparse ground layer contains a range of grasses and herbs. Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Cumberland Plain Woodland in the Sydney Basin Bioregion – TSC Act *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* – EPBC Act	CE	CE	Known	The dominant canopy trees of Cumberland Plain Woodland are Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), with Narrow-leaved Ironbark (*E. crebra*), Spotted Gum (*Corymbia maculata*) and Thin-leaved Stringybark (*E. eugenioides*) occurring less frequently. The shrub layer is dominated by Blackthorn (*Bursaria spinosa*), and it is common to find abundant grasses such as Kangaroo Grass (*Themeda australis*) and Weeping Meadow Grass (*Microlaena stipoides* var.*stipoides*). Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Duffys Forest Ecological Community in the Sydney Basin Bioregion	E	-	Known	Open-forest or woodland community dominated by Red Bloodwood *Corymbia gummifera*, Black Ash *Eucalyptus sieberi*, Smooth-barked Apple *Angophora costata*, and frequently a stringybark *E. capitellata* or *E. oblonga*. Other understorey species include Myrtle Wattle *Acacia myrtifolia*, Hairpin Banksia *Banksia spinulosa*, Rusty Velet-bush *Lasiopetalum ferrugineum*, Crinkle Bush *Lomatia silaifolia*, Broad-leaf Geebung *Persoonia levis*, Apple–berry *Billardiera scandens*, Wiry Panic *Entolasia stricta*, Twisted Mat-rush *Lomandra obliqua, Micrantheum ericoides* and *Xanthorrhoea media*.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion – TSC Act *Eastern Suburbs Banksia scrub of the Sydney region* – EPBC Act	E	E	Known	Predominantly a sclerophyllous heath or scrub community although, depending on site topography and hydrology, some remnants contain small patches of woodland, low forest or limited wetter areas. Common species include *Banksia aemula, B. ericifolia, B. serrata, Eriostemon australasius, Lepidosperma laterale, Leptospermum laevigatum, Monotoca elliptica and Xanthorrhoea resinifera.*	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion	CE	-	Known	A scrub community dominated by Coastal Banksia *Banksia integrifolia* subsp. *integrifolia*. Other canopy species include Broad-leaved Apple *Angophora subvelutina*. The shrubby understorey is diverse and includes species that usually occur in sandstone areas, such as Wedding Bush *Ricinocarpus pinifolius*, Riceflower *Pimelea linifolia* subsp. *linifolia* and Daphne Heath *Brachyloma daphnoides*. Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 m elevation on level areas. They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime: Those that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – TSC Act *Littoral rainforests and coastal vine thickets of eastern Australia* – EPBC Act	E	CE	Known	Littoral Rainforest is generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as *Angophora costata, Banksia integrifolia*, *Eucalyptus botryoides* and *Eucalyptus tereticornis* occur in many stands. There is considerable floristic variation between stands and in particular areas, localised variants may be recognised.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions – TSC Act *Lowland Rainforest of Subtropical Australia* – EPBC Act	E	CE	Known	Typically, the trees form three major strata: emergents, canopy and sub-canopy which, combined with variations in crown shapes and sizes results in an irregular canopy appearance. The trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. In disturbed stands of this community the canopy cover may be broken, or the canopy may be smothered by exotic vines.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Moist Shale Woodland in the Sydney Basin Bioregion – TSC Act *Western Sydney Dry Rainforest and Moist Woodland on Shale* – EPBC Act	E	CE	Known	Similar to Cumberland Plain Woodland. It differs in having a shrub understorey that contains plants from moist habitats. Dominant canopy trees include Forest Red Gum *Eucalyptus tereticornis*, Grey Box *E. moluccana*, Narrow-leaved Ironbark *E. crebra* and Spotted Gum *Corymbia maculata*. Small trees, such as Hickory Wattle *Acacia implexa* and Sydney Green Wattle *A. parramattensis subsp. parramattensis* are also common. The shrub layer includes *Breynia oblongifolia*, Hairy Clerodendrum *Clerodendrum tomentosum* and Indian Weed *Siegesbeckia orientalis* subsp. *orientalis*. Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions – TSC Act *Temperate Highland Peat Swamps on Sandstone* – EPBC Act	E	E	Known	The community typically has an open to very sparse layer of shrubs, 1-5 m tall, (*eg. Baeckea gunniana, B. utilis, Callistemon pityoides, Leptospermum juniperinum, L. lanigerum, L. myrtifolium, L. obovatum, L. polygalifolium*). Species of *Epacris* (eg. E. *breviflora, E. microphylla, E. paludosa*) and *Hakea microcarpa* are also common shrubs. In some peatlands and swamps, particularly those with a history of disturbance to vegetation, soils or hydrology, the shrub layer comprises dense thickets of *Leptospermum* species. In other peatlands and swamps with a history of grazing by domestic livestock, the shrub layer may be very sparse or absent.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	E	-	Known	General structural form is open-forest but may now exist as woodland or remnant trees. The tree canopy layer is characterised by Spotted Gum *Corymbia maculata* and Grey Ironbark *Eucalyptus paniculata* and is associated with Smooth-barked Apple *Angophora costata*, Red Bloodwood *Corymbia maculata*, Broad-leaved White Mahogany *E. umbra*, Grey Gum *E. punctata*, Turpentine *Syncarpia glomulifera*, Bangalay *E. botryoides*, and Rough-barked Apple *Angophora floribunda*.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known	As the name suggests, this EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (Forest Red Gum), *E. amplifolia* (Cabbage Gum), *Angophora floribunda* (Rough-barked Apple) and A. subvelutina (Broad-leaved Apple). *Eucalyptus baueriana* (Blue Box), *E. botryoides* (Bangalay) and *E. elata* (River Peppermint) may be common south from Sydney, *E. ovata* (Swamp Gum) occurs on the far south coast, *E. saligna* (Sydney Blue Gum) and *E. grandis* (Flooded Gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including *Melaleuca decora, M. styphelioides* (Prickly-leaved Teatree), *Backhousia myrtifolia* (Grey Myrtle), *Melia azaderach* (White Cedar), *Casuarina cunninghamiana* (River Oak) and *C. glauca* (Swamp Oak).	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Shale Gravel Transition Forest in the Sydney Basin Bioregion – TSC Act *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* – EPBC Act	E	CE	Known	This EEC has an open forest structure with a canopy dominated by Broad-leaved Ironbark *Eucalyptus fibrosa*, with Grey Box *E. moluccana* and Forest Red Gum *E. tereticornis* occurring less frequently. Paperbark *Melaleuca decora* is common in the small tree layer. A sparse shrub layer is usually present which includes Blackthorn Bursaria spinosa, *Daviesia ulicifolia* and Peach Heath *Lissanthe strigosa*. Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Shale Sandstone Transition Forest in the Sydney Basin Bioregion – TSC Act *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* – EPBC Act	CE	CE	Known & PMST	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. The main tree species include Forest Red Gum (*Eucalyptus tereticornis*), Grey Gum (*E. punctata*), stringybarks (*E. globoidea*, *E. eugenioides*) and ironbarks (*E. fibrosa* and *E. crebra*). Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Cumberland Plain Woodland. Shale Sandstone Transition Forest in the Sydney Basin Bioregion contains many more species than described for the canopy (above) and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	E	-	Known	Southern Sydney sheltered forest on transitional sandstone soils is an open forest dominated by eucalypts with scattered subcanopy trees, a diverse shrub layer and a well-developed groundcover of ferns, forbs, grasses and graminoids. The dominant trees includes *Angophora costata*, *Eucalyptus piperita* and occasionally *Eucalyptus pilularis*, particularly around Helensburgh. *Corymbia gummifera* occurs frequently within the community, although generally at lower abundance than the other eucalypts. Features that distinguish Southern Sydney sheltered forest on transitional sandstone soils from vegetation more typical of sandstone gullies in the eastern Sydney basin include the occurrences of *Eucalyptus pilularis, Acacia binervata*, *Elaeocarpus reticulatus, Pittosporum undulatum* and its relatively dense groundcover of ferns, grasses, rushes, lilies and forbs.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese trees) and *Melaleuca* spp. (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and *Melaleuca ericifolia* is the only abundant tree in this community south of Bermag.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known	This swamp community has an open to dense tree layer of eucalypts and paperbarks although some remnants now only have scattered trees as a result of partial clearing. The trees may exceed 25 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality where the tree stratum is low and dense. For example, stands dominated by *Melaleuca ericifolia* typically do not exceed 8 m in height. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent. The most widespread and abundant dominant trees including *Eucalyptus robusta* (swamp mahogany), *Melaleuca quinquenervia* (paperbark) and, south from Sydney, *Eucalyptus botryoides* (Bangalay) and *Eucalyptus longifolia* (Woollybutt). Other trees may be scattered throughout at low abundance or may be locally common at few sites, including *Callistemon salignus* (Sweet Willow Bottlebrush), *Casuarina glauca* (Swamp Oak) and *Eucalyptus resinifera* subsp. *hemilampra* (Red Mahogany), *Livistona australis* (Cabbage Palm) and *Lophostemon suaveolens* (Swamp Turpentine).	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E	-	Known	A complex of vegetation types largely restricted to freshwater swamps in coastal areas. These also vary considerably due to fluctuating water levels and seasonal conditions. Characteristic species include sedges and aquatic plants such as *Baumea* species, *Eleocharis sphacelata, Gahnia*species, *Ludwigia peploides* subsp. *montevidensis* and *Persicaria* species. Areas of open water may occur where drainage conditions have been altered and there may also be patches of emergent trees and shrubs.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Sydney Turpentine-Ironbark Forest – TSC Act *Turpentine-Ironbark Forest in the Sydney Basin Bioregion* – EPBC Act	E	CE	Known & PMST	Open forest, with dominant canopy trees including Turpentine *Syncarpia glomulifera*, Grey Gum *Eucalyptus punctata*, Grey Ironbark *E. paniculata* and Thin-leaved Stringybark *E. eugenoides*. In areas of high rainfall (over 1050 mm per annum) Sydney Blue Gum *E. saligna*is more dominant. The shrub stratum is usually sparse and may contain mesic species such as Sweet Pittosporum *Pittosporum undulatum* and Elderberry Panax *Polyscias sambucifolia*. Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known	*Themeda australis* is the dominant species in the Themeda Grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregion ecological commmunity. *Themeda australis* is an extremely widespread species, but in this community it may have a distinctive appearance, being prostrate and having glaucous leaves. These features are retained in cultivation and the form is believed to be genetically distinct. *Banksia integrifolia* subsp. *integrifolia*, *Westringia fruticosa* and *Acacia sophorae* occurs as an emergent shrub or as a dense cover where they have recruited over grasslands. Smaller shrubs occur often as prostrate to dwarf forms, most frequently *Pimelea linifolia, Hibbertia vestita, Pultenaea maritima* and *Westringia fruticosa*.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Western Sydney Dry Rainforest in the Sydney Basin Bioregion – TSC Act *Western Sydney Dry Rainforest and Moist Woodland on Shale* – EPBC Act	E	CE	Known & PMST	A dry vine scrub community of the Cumberland Plain, western Sydney. Canopy trees include Prickly Paperbark (*Melaleuca styphelioides*), Hickory Wattle (*Acacia implexa*) and Native Quince (*Alectryon subcinereus*). There are many rainforest species in the shrub layer, such as Mock Olive (*Notolaea longifolia*), Hairy Clerodendrum (*Clerodendrum tomentosum*) and Yellow Pittosporum (*Pittosporum revolutum*). The shrub layer combines with vines, such as Gum Vine (*Aphanopetalum resinosum*), Wonga Vine (*Pandorea pandorana*) and Slender Grape (*Cayratia clematidea*) to form dense thickets in sheltered locations. Contains many more species and other references should be consulted to identify these.	**Absent**. The vegetation within the project site is not commensurate with this ecological community. Therefore, this ecological community does not occur on the project site.	**None**. Due to its absence on site, there would be no impacts to this community due to the project.
Migratory Species						
Fork-tailed Swift (*Apus pacificus*)	-	C,J,K	PMST	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas.	**Low-moderate**. This species has the potential to fly over the project site during migration. Therefore, this species has the potential to occur within the project site.	**Unlikely**. If present, this species would likely only be transiting through the project site, and would be unlikely to experience any substantial impacts due to the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Oriental Cuckoo (*Cuculus optatus*)	-	C,J,K	PMST	Non-breeding habitat only: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. The species frequently occurs at edges or ecotones between habitat types. Riparian forest is favoured habitat in the Kimberley region.	**Low-moderate**. This species has the potential to fly over the project site during migration. Therefore, this species has the potential to occur within the project site.	**Unlikely**. If present, this species would likely only be transiting through the project site, and would be unlikely to experience any substantial impacts due to the project.
White-throated Needletail (*Hirundapus caudacutus*)	-	C,J,K	PMST	Non-breeding habitat only: Found across a range of habitats, more often over wooded areas, where it is almost exclusively aerial. Large tracts of native vegetation, particularly forest, may be a key habitat requirement for the species. Found to roost in tree hollows in tall trees on ridge-tops, on bark or rock faces. Appears to have traditional roost sites.	**Low-moderate**. This species has the potential to fly over the project site during migration. Therefore, this species has the potential to occur within the project site.	**Unlikely**. If present, this species would likely only be transiting through the project site, and would be unlikely to experience any substantial impacts due to the project.
Black-faced Monarch (*Monarcha melanopsis*)	-	Bonn	PMST	Wet forest specialist, found mainly in rainforest and wet sclerophyll forest, especially in sheltered gullies and slopes with a dense understorey of ferns and/or shrubs.	**Low**. No suitable rainforest or similar closed forests habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Spectacled Monarch (*Monarcha trivirgatus*)	-	Bonn	PMST	Dense vegetation, mainly in rainforest but also in moist forest or wet sclerophyll and occasionally in other dense vegetation such as mangroves, drier forest and woodlands.	**Low**. No suitable rainforest or similar closed forests habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Yellow Wagtail (*Motacilla flava*)	-	C,J,K	PMST	Non-breeding habitat only: mostly wellwatered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation.	**Low**. No suitable aquatic or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Satin Flycatcher (*Myiagra cyanoleuca*)	-	Bonn	PMST	Eucalypt forest and woodlands, at high elevations when breeding. They are particularly common in tall wet sclerophyll forest, often in gullies or along water courses. In woodlands they prefer open, grassy woodland types. During migration, habitat preferences expand, with the species recorded in most wooded habitats except rainforests. Wintering birds in northern Qld will use rainforest - gallery forests interfaces, and birds have been recorded wintering in mangroves and paperbark swamps.	**Low**. No suitable gullies or along water or similar closed forests habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Rufous Fantail (*Rhipidura rufifrons*)	-	Bonn	PMST	Moist, dense habitats, including mangroves, rainforest, riparian forests and thickets, and wet eucalypt forests with a dense understorey. When on passage a wider range of habitats are used including dry eucalypt forests and woodlands and Brigalow shrublands.	**Low**. No suitable moist/dense or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Common Sandpiper (*Actitis hypoleucos*)	-	Bonn, C,J,K	PMST	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags.	**Low**. No wetlands or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Sharp-tailed Sandpiper (*Calidris acuminata*)	-	Bonn, C,J,K	PMST	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland.	**Low**. No intertidal or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Curlew Sandpiper (*Calidris ferruginea*)	E	CE, Bonn, C,J,K	PMST	This species has a widespread distribution in NSW east of the Great Divide, particularly in coastal regions. The Curlew Sandpiper inhabits intertidal mudflats in estuaries and bays, lakes and lagoons.	**Low**. No suitable intertidal flats or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Species / Population / Ecological Community Name	TSC Act / FM Act	EPBC Act	Records within 5km	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Pectoral Sandpiper (*Calidris melanotos*)	-	Bonn, J,K	PMST	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	**Low**. No wetlands or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Latham's Snipe (*Gallinago hardwickii*)	-	Bonn, J,K	PMST	Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Low**. No aquatic or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.
Bar-tailed Godwit (*Limosa lapponica*)	-	V/CE, Bonn, C,J,K	PMST	As above.	As above.	As above.
Eastern Curlew (*Numenius madagascariensis*)	-	CE, Bonn, C,J,K	PMST	As above.	As above.	As above.
Osprey (*Pandion haliaetus*)	V	Bonn	PMST	Favours coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.		
Common Greenshank (*Tringa nebularia*)	-	Bonn, C,J,K	PMST	The Common Greenshank occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms.	**Low**. No intertidal or similar habitat occurred within the project site. Therefore, it is considered that this species has a low chance of occurring within the project site.	**Unlikely**. As this species has a low chance of occurring within the project site, it is unlikely to be impacted by the project.

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable, Bonn = Convention on the Conservation of Migratory Species of Wild Animals, C = CAMBA (China-Australia Migratory Bird Agreement), J = JAMBA (Japan-Australia Migratory Bird Agreement), K = ROKAMBA (Republic of Korea-Australia Migratory Bird Agreement).

5 Matters of National Environmental Significance

An EPBC Act Protected Matters Search was undertaken within the DoEE on-line database (Accessed: 29 June 2017) to identify MNES which are known or have the potential to occur within a five kilometre radius of the project site (**Appendix A**). These data, combined with the results of the field survey and other local knowledge and records, were utilised to assess whether the type of activity proposed within the project site would have, or is likely to have, a significant impact upon a MNES.

The identified MNES and site-specific responses are listed below.

World Heritage Properties

The project site is not part of or near any World Heritage Properties listed under the EPBC Act. Therefore, the project will not impact on any World Heritage Properties.

National Heritage Places

The project site is not part of or near any National Heritage Places listed under the EPBC Act. Therefore, the project will not impact on any National Heritage Places.

Wetlands of International Importance

The project site is not part of or near any Wetland of International Importance listed under the EPBC Act. Therefore, the project will not impact on any Wetland of International Importance.

The Great Barrier Reef Marine Park

The project site is not part of or near (more than 500 kilometres) the Great Barrier Reef Marine Park. Therefore, the project will not impact on the Great Barrier Reef Marine Park.

Commonwealth Marine Area

The project site is not part of or near a Commonwealth Marine Area. Therefore, the project will not impact on any listed Commonwealth Marine Area.

Listed Threatened Ecological Communities

Based on the desktop search, seven threatened ecological communities (TECs) listed under the EPBC Act potentially occur within five km of the project site. A field assessment of the vegetation within the project found that it was highly modified and disturbed. Most of the trees within the project are planed native/exotic street trees (**Section 3.1.1**), which do not meet the any of the potential occurring TECs descriptions (**Table 4-2**). Therefore, the project will not have an impact on any TEC listed under the EPBC Act.

Listed Threatened Species

In total, 44 threatened species listed under the EPBC Act, or their habitat, were known to occur, or have potential to occur within five km of the project site. The assessment of the listed threatened flora, fauna and habitat within the project site found most species were unlikely to occur due to their preferred habitat being absent and the poor quality habitat within the project site (**Table 4-2**). Two aerial mammal species were found to have 'Low-moderate' potential to occur within the project site:

> Large-eared Pied Bat (*Chalinolobus dwyeri*) listed as vulnerable under the EPBC Act; and

> Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as vulnerable under the EPBC Act.

There is potential foraging habitat within the vegetated area for the Large-eared Pied Bat within the project site. The species is found mainly in areas with extensive cliffs and caves. As no hollowing-bearing trees will be impacted as part of the project and the species is not generally known to occur in the Sydney region, the project is unlikely to have a significant impact on this species.

A Grey-headed Flying-fox camp occurs approximately six kilometres south-west and 10.5 kilometres east at Parramatta Park and Stony Creek, Gordon, respectively. Also, the tree vegetation within the project site has the potential to provide a seasonal foraging resource as the species is known to commute up to 50 kilometres when foraging (DECC 2009). However, the loss of a small amount of vegetation (~0.6 ha) is likely

to have minimal impact on the foraging capacity of the species as a large amount of the vegetation will be retained within the project site.

Listed Migratory Species

In total, 17 migratory species listed under the EPBC Act have been recorded, or have potential habitat within, five kilometres of the project site. Due to the small amount of habitat (for these species) that would be disturbed, the project is unlikely to substantially modify, destroy or isolate important habitat, result in the establishment of a harmful invasive species or seriously disrupt the lifecycle or migration of an ecologically significant proportion of the population of a migratory species (**Table 4-2**).

Summary

Based this assessment, the project is unlikely to have any significant impact on a MNES listed under the EPBC Act. Further assessments under the provisions of the EPBC Act are not considered beyond this point.

6 Predicted Impacts

6.1 Vegetation

The project will result in the removal of approximately 0.48 ha of vegetation. The vegetation within the project site was predominantly a highly modified landscape consisting mainly of planted flora species. As the vegetation within the project site was been so highly modified, it is difficult to accurately determine which vegetation communities' original inhabited the project site. Based on the native species present, the vegetation within the project is considered to not be commensurate with any of the potentially occurred TECs (**Table 4-2**).

6.2 Threatened Species

No threatened species listed under the TSC Act and EPBC Act were observed during the field survey. The assessment of previous records and habitat requirements of the potentially occurring threatened species found that most were unlikely to occur due to the lack of suitable habitat (**Table 4-2**). Therefore, the project is unlikely to have a significant impact on any threatened species listed under the TSC Act, and EPBC Act.

6.3 Fauna Habitat and Wildlife Corridors

The terrestrial habitat for threatened fauna species is limited as the project site is highly modified. The native trees within the project site have the potential to provide suitable foraging habitat for a number of threatened species including Grey-headed Flying-fox and Eastern Bent-winged Bat. However, the amount of habitat proposed to be removal is small in comparison to the amount of habitat that will be retained within the project site and the surrounding area. Therefore, the project is unlikely to impact on terrestrial habitat that would be significantly important to the long-term survival of any listed threatened fauna species.

As project site occurs in a highly modified urban landscape and the native vegetation within the project site is no directly connected with any larger patch of vegetation, it would unlikely serve as a meaningful wildlife corridor.

6.4 Critical Habitat

At present, there are four critical habitats declared under Section 53–55 of the TSC Act:

> *Gould's Petrel* - critical habitat declaration;

> *Little penguin population in Sydney's North Harbour* - critical habitat declaration;

> *Mitchell's Rainforest Snail in Stotts Island Nature Reserve* - critical habitat declaration; and

> *Wollemi Pine* - critical habitat declaration.

Of the above listed critical habitats, the *Little penguin population in Sydney's North Harbour* - critical habitat is located within approximately 22 kilometres of the project site. However, as the project site is not located in close proximity to the critical habitat, the project would not be expected to have any direct or indirect effect on this or any other declared critical habitat.

6.5 Key Threatening Processes

Key Threatening Processes (KTPs) are listed under the TSC Act, FM Act and EPBC Act. Of these, six KTPs have the potential to occur as a result of the project, these being:

> Clearing of native woodland vegetation;

> Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*) (TSC Act);

> Infection of native plants by *Phytophthora cinnamomi* (TSC Act);

> Introduction and establishment of Exotic Rust Fungi of the order *Pucciniales* pathogenic on plants of the family Myrtaceae (TSC Act);

> Anthropogenic climate change (TSC Act); and

> Invasion of native plant communities by exotic perennial grasses (TSC Act).

"Clearing of Native Vegetation"

The project will require the removal a small number of native trees and as such is likely to incrementally contribute to the KTP "Clearing of Native woodland vegetation" but on a very small scale. In addition, the mitigation measures provided in **Section 7.2.1** of this report (specifically that suitable compensatory replanting would occur) would mean the project would unlikely significantly contribute to this process.

"Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*)"

As the project site occurs in an area with an established population of Noisy Miners, it is unlikely to further contribute to this KTP.

"Infection of native plants by *Phytophthora cinnamomi*"

The proposal has the potential to contribute to this KTP due to an increased occurrence of vehicles, plant and personnel on the project site during and following construction. These vectors could carry and spread the fungus. Appropriate mitigation measures involving vehicles, plant and personnel within the project site will provide an opportunity to ameliorate this KTP. Provided the mitigation measures provided in **Section 7.2.1** of this report are implemented, the project is unlikely to significantly contribute to this process.

"**Introduction and establishment of Exotic Rust Fungi of the order *Pucciniales* pathogenic on plants of the family Myrtaceae"**

The project may increase the level of stress and lower the resistance of some members of the Myrtaceae family from alterations of their habitat. Exotic Rust Fungi may be introduced into the project site by increased movement of plant, vehicles and personnel across the project site. It is expected that anti-contamination procedures be implemented for plant, vehicles and personnel to minimise the chance of infection. Provided the mitigation measures provided in **Section 7.2.1** of this report are implemented, the project is unlikely to significantly contribute to this process.

"Anthropogenic Climate Change"

The project will contribute to the KTP "Anthropogenic Climate Change" in the form of vegetation clearing and greenhouse gas emissions generated by the project. However, the contribution of the project to this KTP is considered to be negligible due to the small amount of vegetation to be cleared.

"Invasion of native plant communities by exotic perennial grasses"

The project has the potential to directly contribute to the KTP "Invasion of native plant communities by exotic perennial grasses" by removing vegetation and disturbing soil in a landscape where exotic perennial grasses are prevalent. However, much of the project site already contains exotic perennial grasses. Provided the mitigation measures provided in **Section 7.2.1** of this report are adhered to, the project is unlikely to significantly contribute to this process.

7 Recommendations for Avoidance and Mitigation

Recommended impact avoidance and mitigation measures that should be incorporated into the project design are described in **Sections 7.1** and **Section 7.2** below. These recommendations will avoid and mitigate impacts to flora, fauna and their habitat in the project and adjacent areas. In general, the RTA Biodiversity Guidelines need to be followed (RTA 2011).

7.1 Avoidance

> Utilising previously cleared / disturbed areas in preference to relatively undisturbed areas with native vegetation;

> Install project boundary fencing to protect adjacent areas and ensure activities and ancillary facilities are restricted to the project footprint; and

> Implement a stop-works procedure if threatened species are encountered during construction.

7.2 Mitigation

7.2.1 General

> All machinery should be cleaned of foreign soil and vegetative matter prior to entering the project site to avoid the spread of *Phytophthora cinnamomi* pathogenic fungus (Myrtle Rust) and dispersal of seeds of non-native plants;

> Strict weed management, monitoring and control practices should be implemented in accordance with DPI to minimise the spread of exotic species into natural areas within the project site. In particular, the following plant species should be targeted:

- *Olea europaea* subsp*. cuspidata* (African Olive) - *The plant or parts of the plant are not traded, carried, grown or released into the environment;*
- *Lantana camara* (Lantana) - *Must not be imported into the State or sold*; and
- *Asparagus* aethiopicus (Asparagus Fern*) - Must not be imported into the State or sold.*

> Strict erosion and sediment control measures should be implemented, monitored and maintained to prevent impacts on adjacent areas, particularly following vegetation clearing and grubbing and prior to unfavourable weather events;

> Implement dust control measures where necessary to protect adjacent retained vegetation and water quality in adjacent waterways and water bodies; and

> Stockpiling of materials should occur within previously disturbed areas and not within driplines or retained vegetation.

7.2.2 Tree removal

> All dead wood and limbs greater than 100 millimetres should be retained on site with patches of native vegetation were possible to provide habitat features for fauna species;

> All tree trimming is to be in accordance with the *Australian Standard AS4373 Pruning of amenity trees;*

> All construction and development works near retained trees must abide by the *Australian Standard AS 4970-2009 Protection of trees on development sites*;

> Tree to be removed/retained should be clearly marked and in accordance within the Arboricultural Impact Assessment (Green 2017) prior to clearing works; and

> Pre-clearing and clearing procedure outlined in the RTA Biodiversity Guidelines need to be followed.

8 Conclusion

Cardno was engaged by the NSW Roads and Maritime Service to prepare an Ecological Impact Assessment of the upgrade the intersection between Pennant Hills Road and North Rocks Road. The proposed project will impact on approximately 0.48 ha of a highly modified landscape. Whilst a small number native trees occurred within the project area, these were considered to not form part of any potentially occurring listed TSCs.

The field surveys of the subject site did not detect any threatened species listed under the TSC Act or EPBC Act. Numerous non-threatened native bird species were detected during the field survey which were common for the Sydney's urban areas.

Whilst no habitat tree were detected, there is the potential for fauna to moving into the project and build nest/drey. Provided that a suitably qualified ecologist undertaken a pre-clearance check and supervises the felling of all trees with potential fauna nest/drey/hollows to reduce the chances of harming any fauna occupants, no threatened species is likely to be significantly impacted by the proposed project.

An assessment of the likelihood of occurrence and impact found that no threatened species, population or ecological community listed under the TSC Act and/or EPBC Act is likely to be significantly impacted by the proposed project. In addition, no Commonwealth Matter of National Environmental Significance is likely to be impacted by the proposed project.

In conclusion, the proposed project may result in a small amount habitat been impacted within the project site. However, provided the recommendations in this report are implemented, the proposed project is unlikely to remove, modify, fragment or isolate any area of habitat important to the long-term survival of the addressed threatened flora and fauna species, population or ecological communities in the locality.

9 References

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Intersection Road Upgrade

APPENDIX A

PHOTOS OF THE PROJECT SITE

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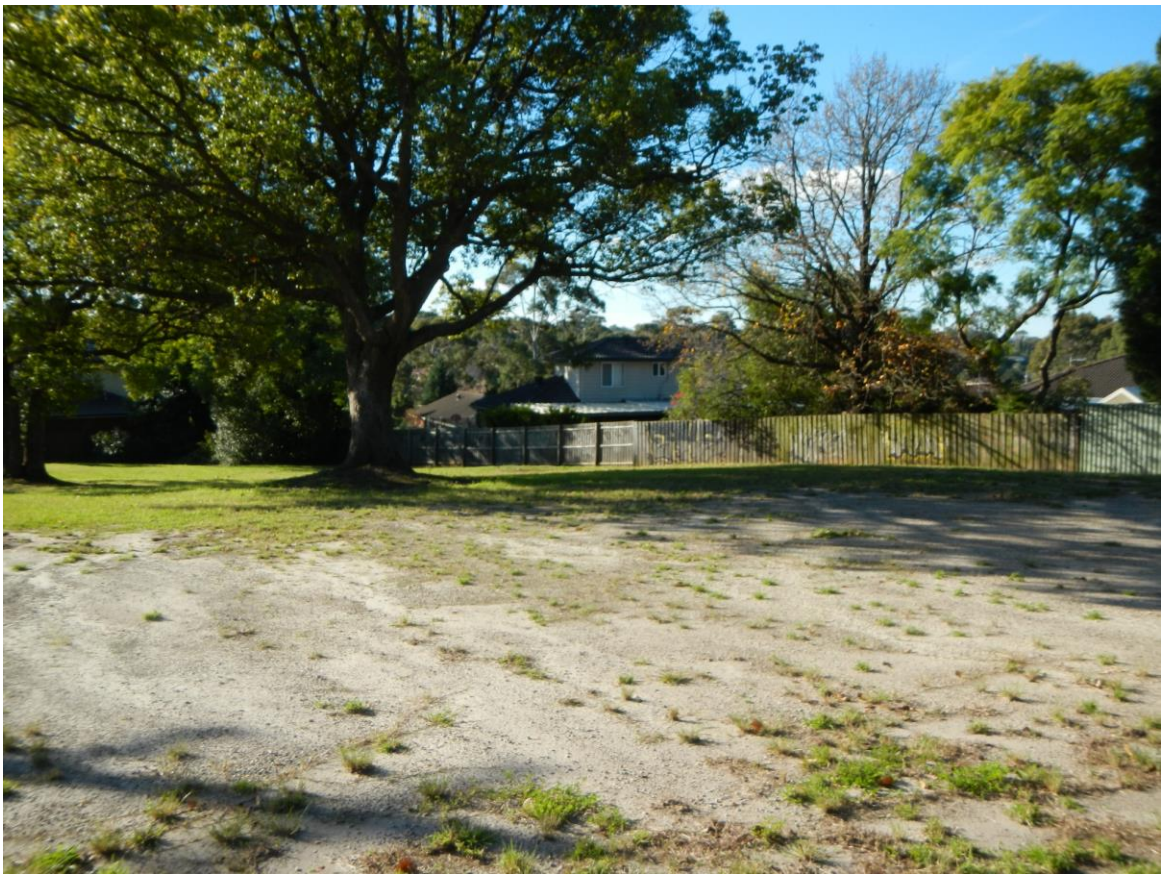

Plate 1A-1. Mowed Lawns within the project site.

Plate 1A-2. More mowed Lawns within the project site.

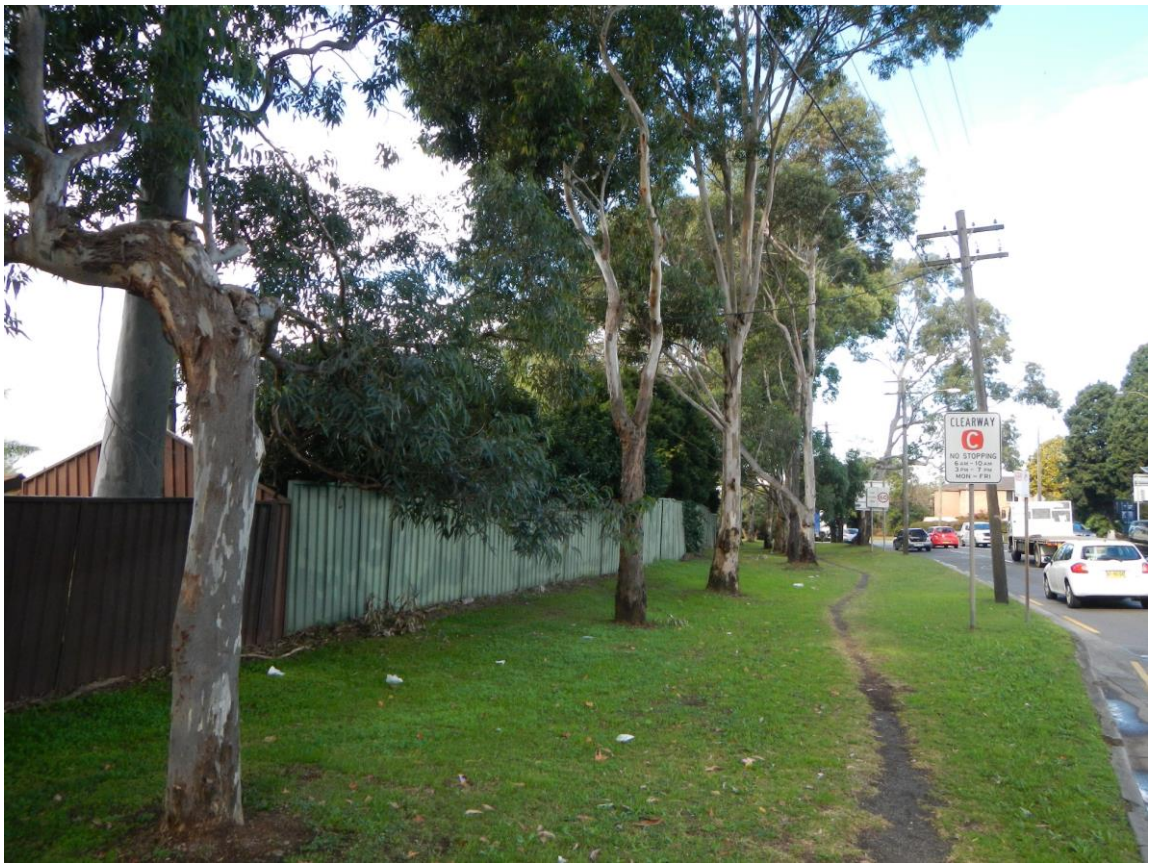

Plate 1A-3. Planted native street trees with a mowed lawn understory

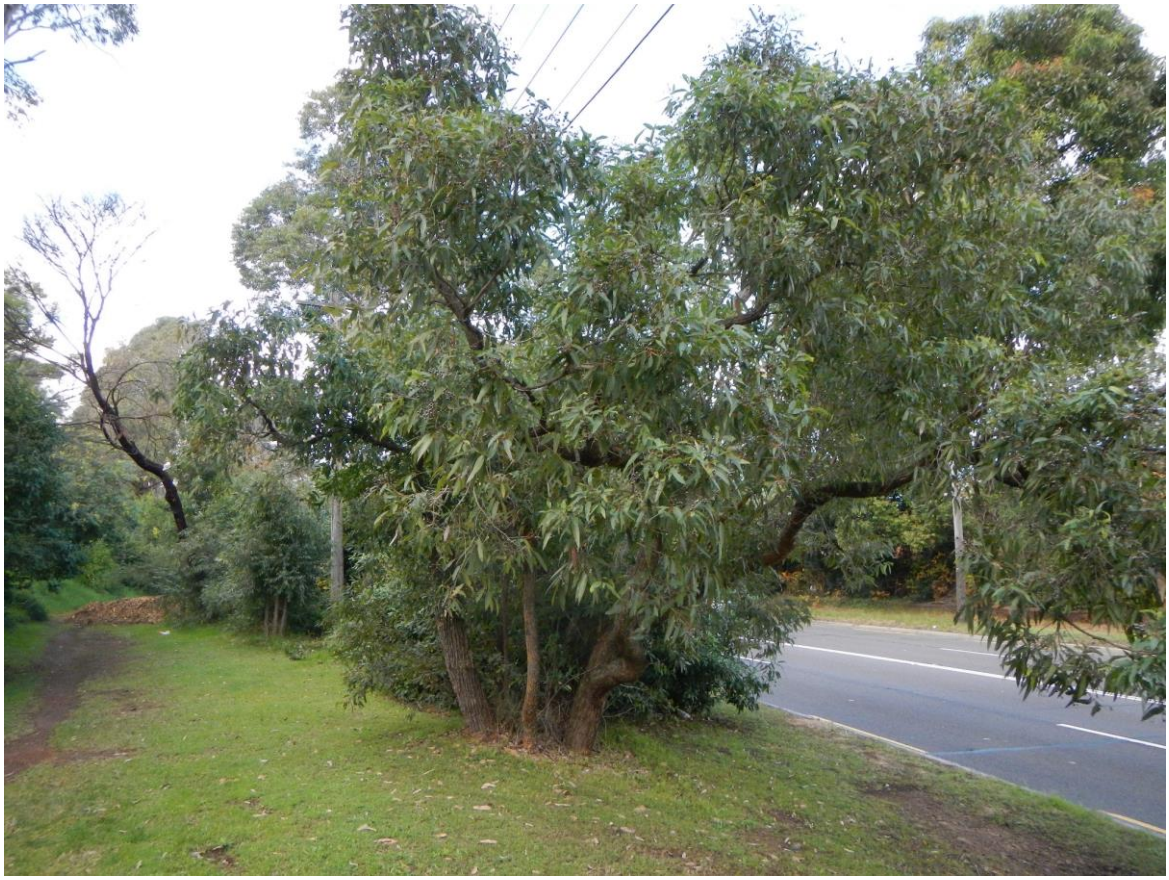

Plate 1A-4. Planted native street trees with a weedy understory

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APPENDIX B

FLORA AND FAUNA DATA

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Table 1B-1. Flora species observed within the project site.

Family	Scientific Name	Common Names	NW Act	TSC Act	EPBC Act	WoNS
Trees						
Arecaceae	*Archontophoenix cunninghamiana*	Bangalow Palm	-	-	-	-
Bignoniaceae	*Jacaranda mimosifolia**	Jacaranda	-	-	-	-
Casuarinaceae	*Casuarina cunninghamiana* subsp. *cunninghamiana*	River Oak	-	-	-	-
Cupressaceae	*Cupressus leylandii*	Leylandii Cypress	-	-	-	-
Fabaceae (Faboideae)	*Erythrina* x *sykesii**	Coral tree	-	-	-	-
Fagaceae	*Quercus* sp.* (Cultivar)	Oak	-	-	-	-
Lauraceae	*Cinnamomum camphora**	Camphor Laurel	-	-	-	-
Moraceae	*Ficus microcarpa var. hilli*	Fig	-	-	-	-
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	-	-	-	-
	Corymbia maculata	Spotted Gum	-	-	-	-
	Eucalyptus microcorys	Tallowwood	-	-	-	-
	Eucalyptus pilularis	Blackbutt	-	-	-	-
	Eucalyptus punctata	Grey Gum	-	-	-	-
	Eucalyptus saligna	Sydney Blue Gum	-	-	-	-
	Lophostemon confertus	Brush Box	-	-	-	-
Oleaceae	*Olea europaea* subsp. *cuspidata**	African Olive	RRM	-	-	-
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	-			
Ulmaceae	*Ulmus* sp.*	Elm	-	-	-	-
Shrubs						
Araceae	*Monstera deliciosa**	Fruit Salad Plant	-	-	-	-
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant	-	-	-	-
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet	-	-	-	-
	*Ligustrum sinense**	Small-leaved Privet	-	-	-	-
Verbenaceae	*Lantana camara**	Lantana	MM	-	-	Yes
Ground Cover						
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern	MM	-	-	Yes
Asteraceae	*Taraxacum officinale**	Dandelion	-	-	-	-
Oxalidaceae	*Oxalis* sp.	-	-	-	-	-
Plantaginaceae	*Plantago lanceolata**	Ribwort	-	-	-	-
Poaceae	*Chloris gayana**	Rhodes Grass	-	-	-	-
	*Stenotaphrum secundatum**	Buffalo Grass	-	-	-	-
Vines						
Araliaceae	*Hedera helix**	English Ivy	-	-	-	-
Oleaceae	*Jasminum polyanthum**	Jasmine	-	-	-	-

Note: * = Introduced species, MM = Mandatory Measure, RRM = Regional Recommended Measures,

Table 1B-2. Fauna species observed within the project site.

Family	Scientific Name	Common Names	TSC Act	EPBC Act
Birds				
Artamidae	*Cracticus torquatus*	Grey Butcherbird	-	-
Columbidae	*Columba livia**	Rock Dove	-	-
Corvidae	*Corvus coronoides*	Australian Raven	-	-
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	-	-
Meliphagidae	*Manorina melanocephala*	Noisy Miner	-	-
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	-	-
Sturnidae	*Sturnus tristis**	Common Myna	-	-

Note: * = Introduced species

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APPENDIX C

PMST RESULTS

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