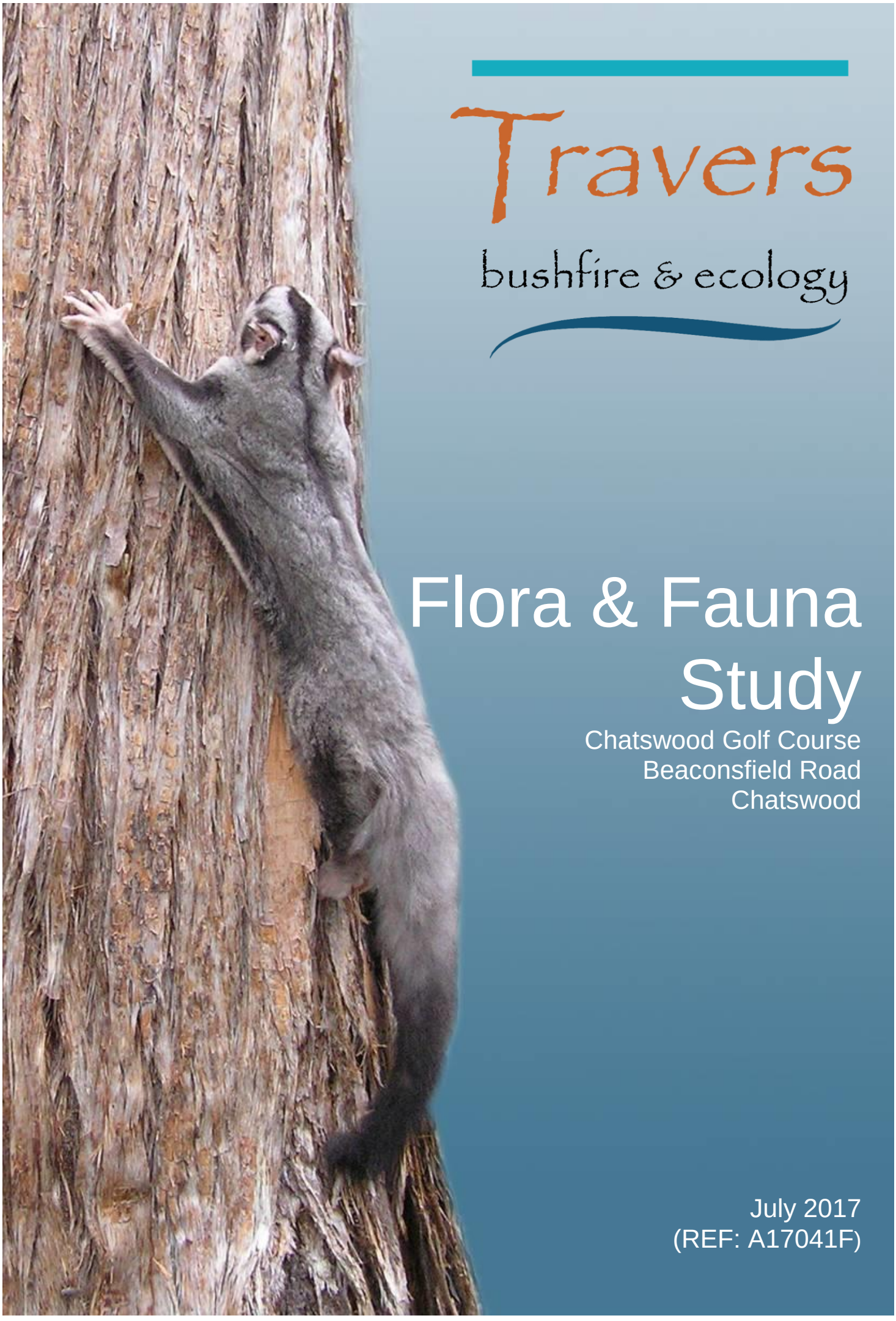

Travers

bushfire & ecology

Flora & Fauna Study

Chatswood Golf Course
Beaconsfield Road
Chatswood

July 2017
(REF: A17041F)

Flora & Fauna Study

Part Lot 163 DP 752067
Part Lot 1 DP 651667
Part Lot 1 DP 1124646
Part Lot 22 DP 626634
Chatswood Golf Course, Beaconsfield Road
Chatswood

JULY 2017

Report Authors:	Michael Sheather-Reid B. Nat. Res. (Hons.) – General Manager (Senior Ecologist)
	Robert Sansom B. Sc. (Hons.) - Botanist
Plans prepared:	Kelly Tucker B.Sc., Dip SIS
Approved by:	Michael Sheather-Reid / John Travers
Date:	11/07/17
File:	A17041F

Disclaimer:

This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person including the client then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be interpreted without reference to the entire report.

Survey effort has been reduced to provide an indication of the insitu vegetation and fauna habitat present. The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy. Consequently, the location of all mapped features is to be confirmed by a registered surveyor.

ABN 64 083 086 677
PO Box 7138
Kariong NSW 2250

38A The Avenue
Mt Penang Parklands
Central Coast Highway
Kariong NSW 2250

t: 02 4340 5331
e: info@traversecology.com.au
www.traversecology.com.au

Table of Contents

Figures

Tables

Appendices

List of abbreviations

APZ	asset protection zone
BPA	bushfire protection assessment
CLUMP	conservation land use management plan
DCP	Development Control Plan
DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)
DOEE	Commonwealth Department of Environment and Energy
EEC	endangered ecological community
EPA	Environmental Protection Agency
EP&A Act	*Environmental Planning and Assessment Act*
EPBC Act	*Environment Protection and Biodiversity Conservation Act*
ESMP	ecological site management plan
FF	flora and fauna assessment
FM Act	*Fisheries Management Act*
FMP	fuel management plan
HTA	habitat tree assessment
IPA	inner protection area
LEP	Local Environment Plan
LGA	local government area
NES	national environmental significance
NPWS	NSW National Parks and Wildlife Service
NSW DPI	NSW Department of Industry and Investment
OEH	Office of Environment and Heritage (Part of the NSW Department of Premier and Cabinet)
OPA	outer protection area
PBP	*Planning for bushfire protection 2006*
POM	plan of management
RF Act	*Rural Fires Act*
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SEARs	*Secretary's Environmental Assessment Requirements*
SEPP 44	*State Environmental Protection Policy No 44 – Koala Habitat Protection*
SEWPAC	Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)
SIS	species impact statement
SULE	safe useful life expectancy
TPO	tree preservation order
TPZ	tree preservation zone
TRRP	tree retention and removal plan
TSC Act	*Threatened Species Conservation Act*
VMP	vegetation management plan

Flora & Fauna Study

Travers bushfire & ecology has been engaged to undertake an ecological compatibility study within the north-eastern and south western corners of Lot 163 DP 752067, Part Lot 1 DP 651667, Part Lot 1 DP 1124646 and Part Lot 22 DP 626634, Beaconsfield Road, Chatswood, in the Willoughby local government area (LGA). These part lots are being investigated for suitability for a proposed seniors living development, a new golf clubhouse with ancillary facilities and a temporary clubhouse / green keepers shed in the south-western corner. The proposed developments and surrounds for a distance of 20 metres will hereafter be referred to as the 'subject site'.

1.0 Proposed development

The proposal is to construct a seniors living development consisting of Independent Living Units (ILUs) with parking, a new clubhouse, a temporary clubhouse and associated ancillary facilities.

The site is currently zoned RE2- Private Recreation. The objectives of the Private Recreation Zone are:

- To enable land to be used for private open space or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.
- To protect and enhance the natural environment for recreational purposes.
- To minimise the potential for adverse effects from new development on the amenity of the locality

This flora and fauna study will also consider impacts on these values.

2.0 Survey

Botanical survey of the proposed seniors living development area was undertaken on the 13th of March 2017 over a time frame of approximately 2.5 hrs. Botanical survey of the proposed temporary clubhouse (later to be converted to a green keepers shed) in the south-western corner was undertaken on 27 March 2017 over a time frame of 2 hrs.

Botanical survey included a random meander in accordance with *Cropper* (1993) to gain a full species list of the plants within the site. The random meander was also utilised to obtain an overview of the locations and extents of vegetation communities within and in proximity to the subject site.

A review of the NSW *Atlas of NSW Wildlife / Bionet* (OEH 2017) and the Commonwealth *Protected Matters Search Tool* (DOEE, 2017) were undertaken within 10km of the subject site prior to the site visit to compile a combined list of threatened species that may have potential to occur within the locality.

The subject site was assessed for flora and fauna habitat attributes with regard to the potential for threatened species, populations or ecological communities to occur. Where a species had suitable habitat within the subject site then relevant targeted searches were undertaken as suited.

As most of the subject site has been landscaped, and comprises of a very high proportion of exotic, landscaping or cultivar species not all specimens have been fully identified or have been identified to genus level only. All local naturally occurring or endemic species were identified to species level.

The subject site is located at the western end of Beaconsfield Road in Chatswood. The seniors living and new clubhouse site is located in and around the current clubhouse and some adjacent Landscaped Gardens to the north-east for approximately 175 metres and south-east for a distance of approximately 130 metres as shown in Figure 2. The temporary clubhouse (later to be converted to a green keepers facility) site is located in the south-western corner of Lot 163 DP752067 as shown in Figure 3. The flora study area includes assessed vegetation approximately 15-20m beyond the proposed development to observe remnant native vegetation in order to describe or advise what vegetation previously occurred within the locality. See Figures 2 and 3 which show the vegetation communities, study area and subject site.

3.0 Site description

Table 1 provides a summary of the planning, cadastral, topographical, and disturbance details of the subject site.

Table 1 – Site features

Location	Chatswood Golf Course, Beaconsfield Road, Chatswood
Size	The study area is approximately 3 ha - ILUs & new clubhouse – 2.3ha, - temp clubhouse / greenkeepers building – 0.6ha
Local government area	Willoughby
Grid reference GDA-56	330010E 6258340N
Elevation	Approximately 20-40m AHD
Topography	Situated on a moderately steep North-east, East and South-easterly aspect. Topography has been modified to form at least two rock terraces each between 4-8 metres high.
Geology and Soils	Geology: Upper Slopes – Wiannamatta Group Shales. Lower Slopes – Hawkesbury Sandstone Soils: Upper Slopes - Glenorie Soil Landscape – Soils shallow to moderately deep on undulating to rolling hills. Lower Slopes – Gymea Soil Landscape – Slopes 10 – 25% with Sandstone rock outcrops with wide benches
Catchment and drainage	Drainage via overland flow into constructed ditches and piped infrastructure. Ultimate discharge is likely to be into Lane Cove River.
Vegetation	Landscaped Gardens – some areas are poorly managed.
Existing land use	Curtilage and car parking for the existing Golf Clubhouse
Clearing	>98% of the original canopy vegetation has been cleared and replaced by landscaped gardens

Figure 1 – Proposed ILU and New Club House

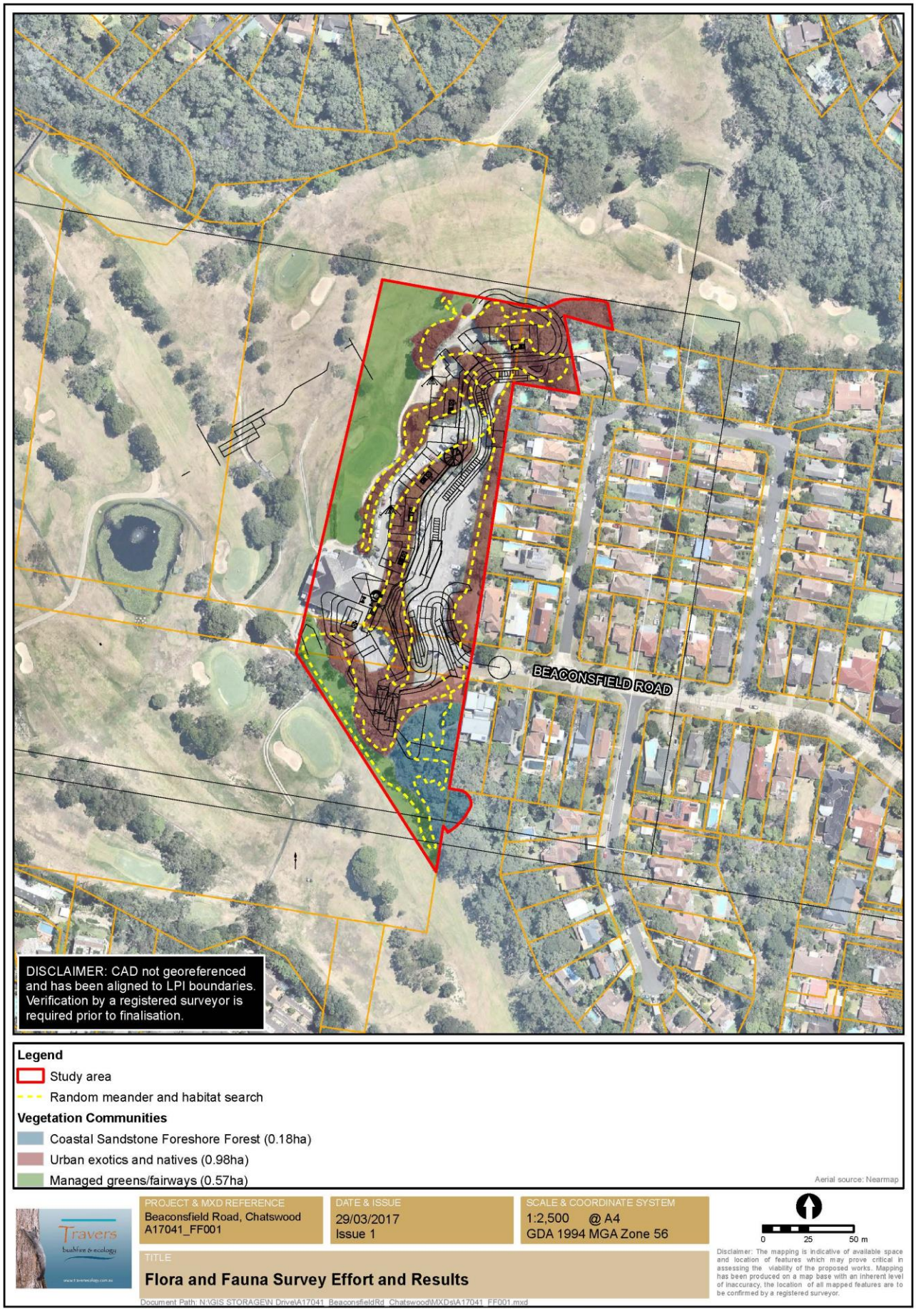

Figure 2 – Survey effort and results – proposed ILUs & New Clubhouse

Figure 3 – Survey effort and results – proposed Temporary Clubhouse / Green-keepers Building

4.0 Flora

4.1 Vegetation communities

Field verification of the study area found the following vegetation communities:

- Urban Exotics and Natives
- Coastal Sandstone Foreshores Forest
- Managed Greens and Fairways

Urban Exotics and natives

The Native Vegetation of the Sydney Metropolitan Catchment Area (NPWS 2013) have mapped the Vegetation within the northern 80% of the ILU and new Clubhouse site as well as the proposed temporary clubhouse/green keepers building as 'Urban Exotic and Natives'. This vegetation community is defined within NPWS (2013) as: "*greater than 0.1 hectares in size for which urban land use covered more than 70 per cent of the polygon and there was evidence of both exotic and native species in the upper or lower strata*. *Typically these areas include backyard trees, street trees, gardens, median strips and other small-scale features that are small isolated stands*".

This vegetation community occurs in areas surrounding the car parking areas currently associated with the existing golf clubhouse (see Figure 2) and along the fringes of the fairways in the south-western corner at the site of the proposed temporary clubhouse / greenkeepers building (see Figure 3). This vegetation occurs on sandstone benches and on vacant land along the eastern boundary of the subject site and along the western and southern boundaries of the south-western corner of Lot 163 DP752067. Very few remnant native trees remain but are represented by sparsely scattered endemic species which in most cases are represented by only one or two individuals. The majority of the wide variety of plant species (more than 62%) within this plant community are exotic, cultivar or common landscaping species. Thirteen (13) of these species (such as Climbing Asparagus, Asparagus Fern, Montpellier Broom, Senna, Chilean Cestrum, Lantana, Madiera Vine, Mother-of-Millions, Mickey Mouse Plant, Broad-leaf Privet, Small-leaf Privet, Morning Glory and Tussock Paspalum) are also listed as Noxious Weeds within the Willoughby LGA.

Canopy – The height of the canopy layer is variable between 10 and 24 metres and has a projected foliage cover between 15-35%. The canopy is comprised of mostly exotic species such as *Acer negundo* (Box Elder), *Eriobotrya japonica* (Loquat), *Erythrina crista-galli* (Cockspur Coral Tree), *Erythrina x sykesii* (Coral Tree) *Fraxinus sp., Wisteria sinensis* (Chinese Wisteria), *Lagerstroemia indica* (Crepe Myrtle), *Liquidambar styraciflua* (Sweetgum), *Phoenix canariensis* (Canary Island Date Palm), *Pinus patula* (Patula Pine) and *Schinus sp.* (Pepper Tree).

A number of Non-endemic Australian species have also been planted, such as *Archontophoenix cunninghamiana* (Bangalow Palm), *Acmena smithii* (Lillypilly), *Brachychiton acerifolius* (Illawarra Flame Tree), *Corymbia ficifolia* (Pink W.A. Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus scoparia* (Wallangarra White Gum), *Grevillea robusta* (Silky Oak) and *Lophostemon confertus* (Brush Box).

There are a few specimens of endemic native species present but these species are represented by only a few isolated individuals. Endemic species present were *Eucalyptus piperita* (Sydney Peppermint), *Angophora costata* (Smooth-barked Apple), *Pittosporum undulatum* (Sweet Pittosporum) *Allocasuarina littoralis* (Black She-oak) and *Glochidion ferdinandii* (Cheese Tree).

Shrub-layer – The mid-storey was between 2 and 7 metres in height with a variable Projected Foliage Cover (PFC) between 10 and 40%. This layer was found to contain a large variety of mostly exotic species such as *Camellia japonica* (Camellia), *Camellia sasanqua* (Sasanqua Camellia), *Cotoneaster pannosus* (Cotoneaster), *Ligustrum lucidum* (Broad-leaved Privet), *Ligustrum sinensis* (Small-leaved Privet), *Magnolia* sp. (Magnolia Bush), *Murraya* sp., *Nerium oleander* (Oleander), *Ochna serrulata* (Mickey Mouse Plant), *Photinia glabra* (Japanese Photinia), *Plumeria obtusa* (Frangipani) and *Senna pendula* var. *glabrata* (Senna).

Ground-layer – The ground-layer was to 1.2 metres high with a highly variable PFC between 10 and 75%. The ground layer was dominated by a large variety of exotic, cultivar or landscaping species such as *Asparagus aethiopicus* (Asparagus Fern), *Agapanthus praecox* (Agapanthus), *Bryophyllum delagoense* (Mother of Millions), *Crassula ovata* (Jade Plant), *Digitaria ciliaris* (Summer Grass), *Ehrharta erecta* (Panic Veldtgrass), *Erechtites valerianifolia* (Brazilian Fireweed), *Modiola caroliniana* (Red-flowered Mallow), *Paspalum dilatatum* (Paspalum), *Paspalum quadrifarium* (Tussock Paspalum), *Protasparagus plumosus* (Climbing Asparagus) and *Watsonia bulbillifera* (Wild Watsonia). There was less than 10% cover by native species present in the ground layer.

Classification: This vegetation community corresponds to the Urban Exotics and Natives as defined and mapped within '*The Native Vegetation of the Sydney Metropolitan Area'* (NPWS 2013, Volume 1). The sparse remnant native species present indicate that in the past this vegetation was likely to have been Map Unit S_DSF06 Coastal Sandstone Foreshores Forest as described in NPWS (2013).

Photo 1 – Looking south from the lower car park – Clubhouse on the Right

Photo 2 – Looking north from the upper car park – note the dominance of exotics in all layers

Photo 3 – Looking south towards the existing greenkeepers shed – note the dominance of exotics

Coastal Sandstone Foreshores Forest

This vegetation community occurs in the southern portion of the subject site and extends south-east from a point approximately 45 metres from the golf clubhouse. This vegetation community consists of remnant native vegetation with exotic species within the shrub and ground layers.

Canopy – The height of the canopy layer is variable between 14 and 22 metres and has a projected foliage cover between 30-35%. Common canopy species were Angophora costata (Smooth-barked Apple), Eucalyptus piperita (Sydney Peppermint), Glochidion ferdinandii (Cheese Tree), Pittosporum undulatum (Sweet Pittosporum), Allocasuarina littoralis (Black She-oak),

Shrub layer - was between 2 and 5 metres high with 35% projected Foliage Cover (PFC). Common species present were *Breynia oblongifolia* (Coffee Bush), *Lantana camara* (Lantana), *Dodonaea triquetra* (Hop Bush), *Notolaea longifolia* (Mock Olive), *Acacia longifolia* (Sydney Golden Wattle), *Pittosporum revolutum* (Yellow Pittosporum) and *Polyscias sambucifolia* (Elderberry Panax).

Ground layer – The ground layer consists of a mixture of native and exotic species to 1.2 metres tall with a variable 20 – 35% PFC. Common native species were *Entolasia stricta* (Wiry Panic), *Imperata cylindrica* (Blady Grass), *Microlaena stipoides* (Weeping Rice Grass), *Lepidosperma laterale* (Variable Sword Sedge), *Pratia purpurascens* (Whiteroot), *Commelina cyanea* (Scurvy Weed), *Dianella caerulea* (Flax Lily), *Lomandra longifolia* (Spiky-headed Mat-rush) and *Oplismenus aemulus* (Basket Grass).

Disturbance: This vegetation community has been invaded by a large number of exotic species within the shrub and ground layers. Common exotic species include *Cestrum parqui* (Chilean Cestrum), *Genista monspessulana* (Montpellier Broom), *Lantana camara* (Lantana), *Ochna serrulata* (Mickey Mouse Plant), *Senna pendula* (Senna), *Asparagus aethiopicus* (Asparagus Fern), *Digitaria ciliaris* (Summer Grass), *Ehrharta erecta* (Panic Veldtgrass) and *Paspalum quadrifarium* (Tussock Paspalum).

Classification: This vegetation community corresponds to Map Unit S_DSF06 Coastal Sandstone Foreshores Forest as described and mapped within '*The Native Vegetation of the Sydney Metropolitan Area'* (NPWS 2013, Volume 2).

Photo 4 – Coastal Sandstone Foreshores forest - in background of photo

Managed Greens and Fairways

This vegetation community consists of well-maintained lawns composed of regularly mown, mostly exotic grasses with a few scattered trees to the sides.

Canopy – represented by a few scattered individual or small clumps of trees. Species present were a mixture of endemic natives with additional planted non-endemics and exotics.

Shrubs – were generally absent.

Groundlayer – Consisted of mostly exotic grasses that were well maintained to a short lawn. Common species were *Pennisetum clandestinum* (Kikuyu Grass), *Cynodon dactylon* (Common Couch), *Paspalum dilatatum* (Paspalum), *Ehrharta erecta* (Panic Veldtgrass) and *Microlaena stipoides* (Weeping Rice Grass).

Photo 5 – Managed Greens and Fairways to the Right – Existing clubhouse in background

4.2 Threatened flora species

Threatened Species Conservation Act (TSC Act) – A search of the *Atlas of NSW Wildlife* (OEH, 2017) indicated a list of species that have been recorded within a 10 km radius of the subject site. These species are listed in Appendix 2 Table A2.1 and are considered for potential habitat within the subject site.

Environmental Protection and Biodiversity Conservation Act (EPBC Act) – A review of the schedules of the *EPBC Act* indicated the potential for a list of threatened flora species to occur within a 10km radius of the subject site. These species have also been listed in Appendix 2 Table A2.1 for consideration of potential to occur.

Based on the habitat assessment within Table A2.1 it is considered that the subject site provides potential habitat for the following threatened flora species.

Table 2 – Threatened flora species with suitable habitat present

Scientific name	TSC Act	EPBC Act	Potential to occur
Nil	-	-	-

All threatened species in both the Bionet (NSW) and EPBC coordinate search (National) were considered to have no suitable habitat because of previous clearing and landscaping works, and lack of required habitats such as unsuitable soils / geology, unsuitable previous vegetation type, large distance to known specimens or long time since local records.

4.3 Endangered flora populations

No endangered flora populations are known to occur within the Willoughby LGA.

However, two endangered flora populations have been recorded within 10 km of the subject site. These populations are:

- *Pomaderris prunifolia* in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas, and
- *Wahlenbergia multicaulis* (Tadgell's Bluebell) in the local government Areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield.

No specimens of these endangered flora populations were observed and nor were they considered to have any potential habitat within the subject site.

4.4 Endangered ecological communities

The site is not on a floodplain and there are no freshwater wetlands. The site is not on a seacliff, and there is no littoral rainforest present. Vegetation within the subject site is highly modified and does not form part of any locally occurring EEC.

4.5 Endangered wetland communities

A number of wetland communities that have been listed as an 'endangered ecological community' under the NSW TSC Act. Those wetland communities must given due consideration in accordance with the NSW Wetlands Policy (2010) and buffers provided in accordance with the NSW DPI - WaterNSW - Controlled Activity Guidelines 2012.

- Artesian springs ecological community - endangered ecological community listing
- Castlereagh swamp woodland community - endangered ecological community listing
- Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Kurri sand swamp woodland in the Sydney Basin Bioregion - endangered ecological community listing
- Lagunaria swamp forest on Lord Howe Island - endangered ecological community listing
- Maroota Sands swamp forest - endangered ecological community listing
- Montane peatlands and swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions - endangered ecological community listing
- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion - endangered ecological community listing
- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological listing
- Sydney Freshwater Wetlands in the Sydney Basin Bioregion - endangered ecological community listing
- The shorebird community occurring on the relict tidal delta sands at Taren Point - endangered ecological community listing
- Upland wetlands of the drainage divide of the New England Tableland Bioregion - endangered ecological community listing

None of the above wetland communities were observed onsite or within 40 metres of the site and do not require any further consideration.

4.6 Groundwater dependent ecosystems (GDEs)

Groundwater dependent ecosystems are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. Some examples of ecosystems which depend on groundwater are:

- wetlands;
- red gum forests, vegetation on coastal sand dunes and other terrestrial vegetation;
- ecosystems in streams fed by groundwater;
- limestone cave systems;
- springs; and
- hanging valleys and swamps.

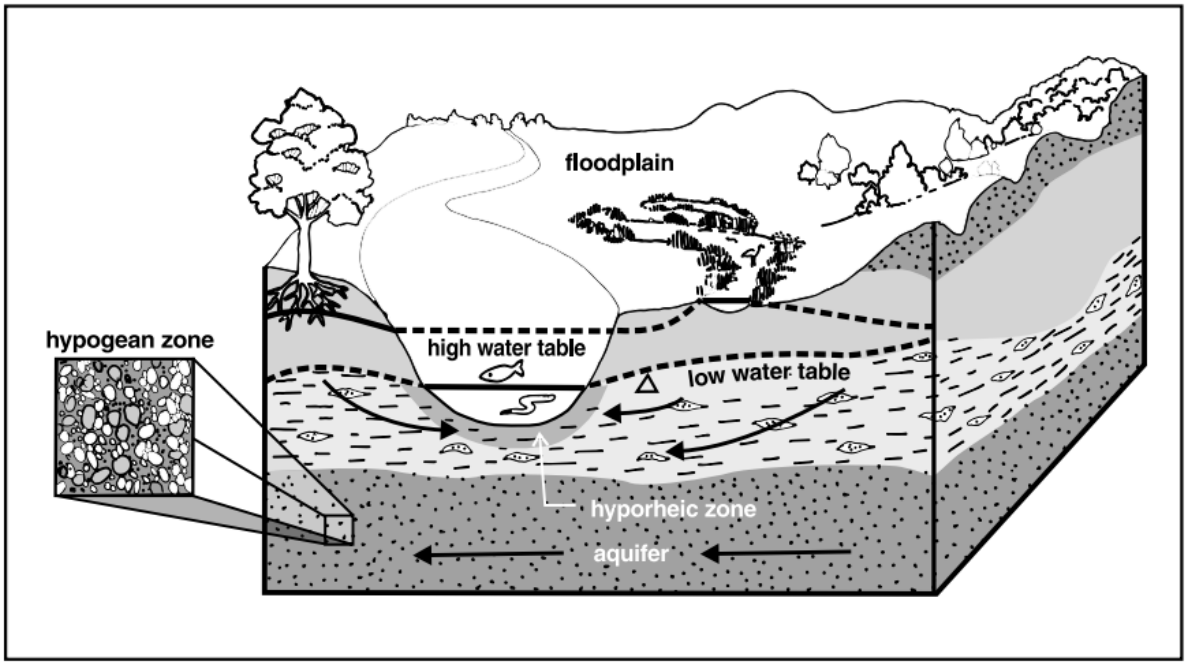

Figure 4 - Alluvial groundwater system discharging into a river

Groundwater dependent ecosystems are therefore ecosystems which have their species composition and their natural ecological processes determined by groundwater (NSW State Groundwater Dependent Ecosystems Policy April 2002)

No vegetation communities that are dependent on groundwater were observed within the subject site.

5.0 Fauna

5.1 Habitat assessment

The fauna assessment is based on desktop analysis, threatened species records (OEH 2017 and DOEE 2017) and habitat attributes identified during the flora survey. Particular note was taken to search for the following potential threatened fauna species habitat:

- Observations for presence of potential *Allocasuarina* trees for foraging by Glossy Black-Cockatoo.
- Counts of tree species present to determine 'Potential Koala Habitat' according to the definitions of SEPP 44.
- Hollow-bearing trees present.
- Caves and overhangs present for microbat roosting.
- Terrestrial shelters, burrows and/or hollows.
- Presence of drainages for frog species habitat.

The following habitat was present:

- No hollow-bearing trees were present within the subject site.
- Nectar producing tree species, principally sparsely scattered remnant native trees and a large variety of exotic or landscape species.
- Seed producing trees notably *Allocasuarina, Acacia* and *Banksia*
- Sandstone outcrops or rock terraces
- No ground hollows
- Moderate to dense ground cover of landscaping species
- Loose soil suitable for foraging
- No permanent water such as dams or creeks
- No drainages
- Minor artificial debris

5.2 Threatened fauna species

TSC Act – A search of the *Atlas of NSW Wildlife* (OEH, 2017) provided a list of threatened fauna species previously recorded within a 10km radius of the subject site. These species are listed in Appendix Table A2.2 and are considered for potential habitat within the subject site. Strictly coastal and oceanic threatened species found within 10km have not been included for consideration as the site is not part of the ocean or foreshore habitat area.

Fisheries Management Act (FM Act) – No habitats suitable for threatened aquatic species were observed within the subject site and as such the provisions of this act do not require any further consideration.

EPBC Act – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10km radius of the subject site. These species have also been listed in Appendix Table A2.2.

In accordance with Table A2.2 the following state and nationally listed threatened fauna species are considered to have suitable habitat with varying potential to occur within the subject site.

Table 3 – Threatened fauna species with suitable habitat present

Common name	*TSC Act*	*EPBC Act*	Potential to occur
Yellow-bellied Sheathtail-bat	V	-	✓
East-coast Freetail Bat	V	-	✓
Grey-headed Flying-fox	V	V	✓ - foraging only
Varied Sittella	V	-	likely
Glossy Black-cockatoo	V	-	low
Little Lorikeet	V	-	low
Swift Parrot	E1	CE	low
Barking Owl	V	-	low

Common name	*TSC Act*	*EPBC Act*	Potential to occur
Scarlet Robin	V	-	low
Large-eared Pied Bat	V	V	low
Eastern Falsistrelle	V	-	low
Little Bentwing-bat	V	-	low
Eastern Bentwing-bat	V	-	low
Little Eagle	V	-	unlikely
Square-tailed Kite	V	-	unlikely
Gang-gang Cockatoo	V	-	unlikely
Sooty Owl	V	-	unlikely
Regent Honeyeater	E4	CE	unlikely
Flame Robin	V	-	unlikely

Additionally protected migratory species listed under the *EPBC Act* are considered for habitat potential in Table A2.3.

5.3 Endangered fauna populations

There are no endangered fauna populations specifically listed within the Warringah LGA.

There is one population of animals nearby that are endangered:

- White-fronted Chat population in the Sydney Metropolitan Catchment Management Area
- Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas
- Long Nosed Bandicoot population in inner western Sydney

Two isolated sub-populations of White-fronted Chats are currently known from the Sydney Metropolitan Catchment Management Authority area. One at Newington Nature Reserve on the Parramatta River and one at Towra Point Nature Reserve in Botany Bay.

The Gang-gang Cockatoo population is located wholly within the Hornsby and Ku-ring-gai Local government areas to the north-west of Willoughby LGA.

The Long-nosed Bandicoot Population in inner western Sydney is located primarily from Chiswick and southwards and from Concord eastwards to Petersham.

The subject site is therefore not likely to support habitat for these listed endangered fauna populations.

5.4 Connectivity

Figure 5 shows that the subject site contains a narrow band of (highly modified) vegetation that connects to areas of similar (highly modified) vegetation around the fringes of the golf course. This vegetation is heavily impacted by urban edge effects such as landscaping works and exotic weed invasion. The subject site therefore provides some vegetated connectivity, however the vegetation consists of more than 90% exotic, landscaping and garden plantings. There are a few sparse occurrences of remnant native trees, however these are very isolated within the planted species that make up the bulk of the landscaped gardens.

The connectivity values are therefore generally poor, with limited canopy connectivity to the north-eastern and south-eastern Riparian Zones. Connectivity further to the north and south is limited or blocked by existing urban developments. The subject site has very tenuous connectivity to the Lane Cove River foreshores and associated Riparian Zones containing

relatively undisturbed native vegetation. The mostly exotic vegetation within the subject site has limited foraging value given the presence of adjacent dense residential development.

Figure 5 – Bushland connectivity in the local area

The proposal will see the loss of some vegetation within the subject site, however it is not likely to result in any further removal of local native vegetative connectivity attributes, nor isolate any remnant patches of native vegetation worthy of conservation for local fauna.

5.5 Noxious weeds

Thirteen (13) flora species that are listed as Noxious Weeds within the Willoughby LGA were observed within the subject sites (See Table 4).

Table 4 - Noxious weed species within the subject site

Species Name	Common Name	Noxious Weed Class
Cestrum parqui	Chilean Cestrum	Class 3
Genista monspessulana	Montpellier Broom	Class 3
Anredera cordifolia	Madiera Vine	Class 4
Asparagus aethiopicus	Asparagus Fern	Class 4
Bryophyllum delagoense	Mother-of-Millions	Class 4
Ipomoea indica	Morning Glory	Class 4
Lantana camara	Lantana	Class 4
Ligustrum lucidum	Broad-leaf Privet	Class 4
Ligustrum sinense	Small-leaf Privet	Class 4
Ochna serrulata	Mickey Mouse Plant	Class 4

Paspalum quadrifarium	Tussock Paspalum	Class 4
Protasparagus plumosus	Climbing Asparagus Fern	Class 4
Senna pendula var. glabrata	Senna	Class 4
Class 3 Control Requirements - The plant must be fully and continuously suppressed and destroyed.		
Class 4 Control Requirements - The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread.		

It is expected that the proposed development will provide an opportunity to remove the above Noxious Weeds from the subject site. Disposal of the noxious vegetative matter shall be at a suitably equipped Waste Management Facility.

6.0 Conclusions

The proposed future development of the subject site within Parts of Lot 163 DP 752067, Part Lot 1 DP 651667, Part Lot 1 DP 1124646 and Part Lot 22 DP 626634, Beaconsfield Road, Chatswood is unlikely to have a significant impact upon threatened species, endangered populations or endangered ecological communities. This is due to the low value of the subject site with respect to habitat values for threatened flora and fauna.

No threatened flora species have been observed or considered likely to occur in a natural state, although *Syzygium paniculatum* or *Eucalyptus scoparia* may occur as planted specimens as these species are available for sale at nurseries and are commonly used for landscaping or street tree purposes. A similar species to Syzygium, namely *Acmena smithii* was observed onsite, however this species is not listed as threatened. The vegetation present within the subject sites is not attributable to any locally occurring endangered ecological community.

Whilst fauna survey has not been undertaken in a comprehensive manner using overnight trapping, microchiropteran bat echolocation recording, spotlighting or owl calling, it is considered that the habitat attributes within the subject site do not provide any significant or unique habitat of breeding importance for any threatened fauna species. Remnant and planted vegetation may provide low key foraging value only. No hollow-bearing trees, nor any drainages or important Koala feed trees occur within the proposed development areas.

No endangered flora or fauna populations occur within the Willoughby LGA. The site is not within the recognised area for any threatened population. Therefore no endangered fauna populations are considered likely to utilise the subject site.

It is therefore concluded that the proposed development is not likely to be constrained by matters pertaining to section 5 of the EP&A Act. A Species Impact Statement is not likely to be required for the proposal.

The proposal was considered unlikely to have any significant impact on threatened or migratory fauna species listed as matters of national environmental significance under the *EPBC Act*. As such, a referral to the Commonwealth Department of Environment (DOE) is unlikely to be required.

The proposed development appears to be ecologically compatible with the site in regard to the expected impacts on threatened flora and fauna species, endangered ecological communities and populations. Subject to detailed fauna survey the proposed development is not expected to cause a significant impact on any threatened fauna species or associated habitat.

6.1 Recommendations

To minimise adverse ecological impacts, the following mitigation measures are recommended:

1. Sediment and erosion control measures in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) to minimise impact of possible sedimentation to local drainage lines.

2. Replacement landscaping should consider the use of locally occurring (endemic) native species commensurate with “Coastal Sandstone Foreshores Forest” including ground covers to encourage local fauna use and to consolidate remnant vegetation linkages within the locality.

3. Control and eradication of noxious and other invasive ecological weeds should be undertaken to prevent further invasion by these species.

4. A vegetation management plan is recommended to ensure that the proposed facilities and landscaping surrounding the site addresses the extent of noxious and environmental weeds which are required to be controlled in accordance with their noxious weed status.

5. Threatened fauna survey is recommended including assessment on any locally occurring threatened hollow dependent species and inspections of any potential hollows, slits or other structures that may be suitable for roosting or breeding species.

Appendix 1
Flora Species List

Table A1.1 – Flora species recorded

Family	Scientific Name	Common Name
TREES		
Mimosoideae	*Acacia decurrens*	Black Wattle
Aceraceae	*Acer negundo**	Box Elder
Myrtaceae	*Acmena smithii*	Lillypilly
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Myrtaceae	*Angophora floribunda*	Rough-barked Apple
Arecaceae	*Archontophoenix cunninghamiana*	Bangalow Palm
Sterculiaceae	*Brachychiton acerifolius*	Illawarra Flame Tree
Cupressaceae	*Callitris spp.*	
Myrtaceae	*Corymbia ficifolia**	Pink W.A. Gum
Myrtaceae	*Corymbia maculata*	Spotted Gum
Eleocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash
Malaceae	*Eriobotrya japonica**	Loquat
Faboideae	*Erythrina crista-galli**	Cockspur Coral Tree
Faboideae	*Erythrina x sykesii**	Coral tree
Myrtaceae	*Eucalyptus microcorys*	Tallowwood
Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint
Myrtaceae	*Eucalyptus racemosa*	Narrow-leaved Scribbly Gum
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany
Moraceae	*Ficus rubiginosa*	Port Jackson Fig
Oleaceae	*Fraxinus spp.**	
Phyllanthaceae	*Glochidion ferdinandi var. ferdinandi*	Cheese Tree
Proteaceae	*Grevillea robusta*	Silky Oak
Bignoniaceae	*Jacaranda mimosifolia**	Jacaranda
Lythraceae	*Lagerstroemia indica** (Cultivar)	Crepe Myrtle
Hamamelidaceae	*Liquidambar styraciflua**	Sweetgum
Myrtaceae	*Lophostemon confertus*	Brush Box
Malaceae	*Malus domestica**	Apple
Myrtaceae	*Melaleuca decora*	-
Myrtaceae	*Melaleuca quinquenervia*	Broad-leaved Paperbark
Myrtaceae	*Melaleuca stypheloides*	Prickly-leaved Tea Tree
Musaceae	*Musa acuminata** (Cultivar)	Banana
Oleaceae	*Notelaea longifolia*	Mock Olive
Oleaceae	*Olea europaea* subsp. *europaea**	Common Olive Tree
Arecaceae	*Phoenix canariensis**	Canary Island Date Palm
Pinaceae	*Pinus patula**	Patula Pine
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Anacardiaceae	*Schinus spp.**	Pepper Tree
Myrtaceae	*Syncarpia glomulifera*	Turpentine
Faboideae	*Wisteria sinensis**	Chinese Wisteria

Family	Scientific Name	Common Name
SHRUBS		
Mimosoideae	*Acacia floribunda*	White Sally
Mimosoideae	*Acacia longifolia* var. *longifolia*	Sydney Golden Wattle
Mimosoideae	*Acacia podalyriifolia*	Queensland Silver Wattle
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush
Theaceae	*Camellia japonica**	Camellia
Theaceae	*Camellia sasanqua**	Sasanqua Camellia
Solanaceae	*Cestrum parqui**	Chilean Cestrum
Malaceae	*Cotoneaster pannosus**	Cotoneaster (cultivar)
Sapindaceae	*Dodonaea triquetra*	Hop-bush
Faboideae	*Genista monspessulana**	Montpellier Broom
Verbenaceae	*Lantana camara**	Lantana
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Oleaceae	*Ligustrum sinense**	Small-leaved Privet
Magnoliaceae	*Magnolia sp.** (Cultivar)	Magnolia
Rutaceae	*Murraya spp.**	-
Apocynaceae	*Nerium oleander**	Oleander Bush
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
Malaceae	*Photinia glabra**	Japanese Photinia
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum
Apocynaceae	*Plumeria obtusa** (Cultivar)	Frangipani
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax
Euphorbiaceae	*Ricinus communis**	Castor Oil Plant
Cesalpinioideae	*Senna pendula* var. *glabrata**	-
Bignoniaceae	*Tecoma capensis**	Cape Honeysuckle
GROUNDCOVERS		
Polygonaceae	*Acetosa sagittata**	Turkey Rhubarb
Alliaceae	*Agapanthus praecox subsp. orientalis**	
Asteraceae	*Ageratina adenophora**	Crofton Weed
Asteraceae	*Arctotheca calendula**	Capeweed
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Poaceae	*Bromus molliformis**	Soft Brome
Crassulaceae	*Bryophyllum delagoense**	Mother of Millions
Cannaceae	*Canna indica**	Arrowroot
Asteraceae	*Cirsium vulgare**	Spear Thistle
Commelinaceae	*Commelina cyanea*	Scurvy Weed
Asteraceae	*Conyza bonariensis**	Flax-leaf Fleabane
Asteraceae	*Conyza sumatrensis**	Tall Fleabane
Asteraceae	*Coreopsis lanceolata**	Coreopsis
Crassulaceae	*Crassula ovata**	Jade Plant

Family	Scientific Name	Common Name
Poaceae	*Cynodon dactylon*	Common Couch
Phormiaceae	*Dianella caerulea* var. *caerulea*	Flax Lily
Poaceae	*Digitaria ciliaris**	Summer Grass
Doryanthaceae	*Doryanthes excelsa*	Gymea Lily
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Poaceae	*Entolasia marginata*	Bordered Panic
Poaceae	*Entolasia stricta*	Wiry Panic
Asteraceae	*Erechtites valerianifolia**	Brazilian Fireweed
Asteraceae	*Erigeron karvinskianus**	Bony-tipped Fleabane
Asteraceae	*Gazania spp.**	
Boraginaceae	*Heliotropium amplexicaule*	Blue Heliotrope
Dennstaedtiaceae	*Hypolepis muelleri*	Harsh Ground Fern
Poaceae	*Imperata cylindrica*	Blady Grass
Lamiaceae	*Lavandula spp.**	
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Lomandraceae	*Lomandra* spp.* (cultivar)	Mat-rush
Zamiaceae	*Macrozamia spp.*	
Poaceae	*Microlaena stipoides var. stipoides*	Weeping Rice Grass
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow
Davalliaceae	*Nephrolepis cordifolia**	Fish-bone Fern
Poaceae	*Oplismenus aemulus*	Basket Grass
Oxalidaceae	*Oxalis latifolia**	Pink Fishtail
Poaceae	*Paspalum dilatatum**	Paspalum
Poaceae	*Paspalum quadrifarium**	Tussock Paspalum
Poaceae	*Paspalum urvillei**	Vasey Grass
Poaceae	*Pennisetum clandestinum**	Kikuyu
Polygonaceae	*Persicaria lapathifolia*	Pale Knotweed
Araceae	*Philodendron bipinnatifidum**	Philodendron
Plantaginaceae	*Plantago lanceolata**	Ribwort
Lobeliaceae	*Pratia purpurascens*	Whiteroot
Asparagaceae	*Protasparagus plumosus**	Climbing Asparagus Fern
Rubiaceae	*Richardia brasiliensis**	White Eye
Rubiaceae	*Richardia humistrata**	-
Polygonaceae	*Rumex crispus**	Curled Dock
Poaceae	*Setaria spp.**	
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Solanaceae	*Solanum nigrum**	Black Nightshade
Poaceae	*Sporobolus elongatus*	Slender Rat's Tail Grass
Asteraceae	*Taraxacum officinale**	Dandelion
Acanthaceae	*Thunbergia alata**	Black-eyed Susan
Commelinaceae	*Tradescantia fluminensis**	Wandering Jew
Faboideae	*Trifolium glomeratum**	Clustered Clover

Family	Scientific Name	Common Name
Faboideae	*Trifolium pratense**	Red Clover
Faboideae	*Trifolium repens**	White Clover
Verbenaceae	*Verbena bonariensis**	Purpletop
Verbenaceae	*Verbena rigida var. rigida**	Veined Verbena
Apocynaceae	*Vinca minor**	Blue Periwinkel
Iridaceae	*Watsonia bulbillifera**	Wild Watsonia
Agavaceae	*Yucca sp.**	-
CLIMBERS		
Basellaceae	*Anredera cordifolia**	Madiera Vine
Convolvulaceae	*Calystegia silvatica**	
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Faboideae	*Glycine clandestina*	Twining Glycine
Araliaceae	*Hedera helix**	English Ivy
Convolvulaceae	*Ipomoea indica**	Morning Glory
Menispermiaceae	*Sarcopetalum harveyanum*	Pearl Vine
Faboideae	*Vicia sativa* subsp. *sativa**	Common Vetch
Fabaceae/faboideae	*Wisteria sp.** (Cultivar)	Wisteria
* - indicates exotic species		
Bold^{TS} – indicates Threatened Species		

It should be noted that not all garden, landscaped, weed or exotic species have been identified as part of this study.

Appendix 2

Threatened Flora and Fauna Species Habitat Assessment

Table A2.1 – Threatened flora species habitat assessment

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Acacia bynoeana OEH EPBC	E1	V	Erect or spreading shrub to 0.3m high growing in heath and dry sclerophyll Open Forest on sandy soils. Often associated with disturbed areas such as roadsides. Distribution limits N-Newcastle S-Berrima.	x	x	-	-	x	x
Acacia cluniesrossiae OEH	V	-	Shrub to 2m tall, flowering in September. Grows in dry sclerophyll forest in valleys and on rocky slopes from the Kowmung River and adjacent Coxs River district.	x	x	-	-	x	x
Acacia gordonii OEH	E1	E	Erect or spreading shrub 0.5-1.5m high growing in heath and dry sclerophyll forest on sandstone outcrops. Distribution limits N-Bilpin S-Faulconbridge.	x	x	-	-	x	x
Acacia pubescens OEH EPBC	V	V	Spreading shrub 1-4m high open sclerophyll growing in open forest and woodlands on clay soils. Distribution limits N-Bilpin S-Georges River.	x	x	-	-	x	x
Acacia terminalis subsp. *terminalis* OEH EPBC	E1	E	Erect shrub to 2m tall, flowers from March to July. Occurs in eucalypt woodland or forest, usually in sandy soil on creek banks, hillslopes or in shallow soil in rock crevices and sandstone platforms on cliffs. Typically restricted to the Port Jackson and eastern suburbs of Sydney.	x	Very Poor	1.5 km SE All others >4km (81 records within 10 km)	2008	x	x
Allocasuarina glareicola EPBC	E1	E	Small shrub 1-2m high growing in open sclerophyll forest on lateritic soils derived from tertiary alluviums. Distribution limits Castlereagh NR region.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Allocasuarina portuensis OEH	E1	E	A shrub of 3-5m tall, similar to other *Casuarinaceae* species. Grows in tall shrubland on sandstone headland at Nielsen Park, Vaucluse.	x	x	9km SE (6 records at same location)	1986	x	x
Amperea xiphoclada var. pedicellata OEH	E4	Ext.	An erect shrub growing up to 60cm high, was previously widespread in heath, woodland and forest on low fertility and sandy soils and is now presumed extinct.	x	Very Poor	9km SSE (1 record within 10km)	1982	Very Unlikely	x
Asterolasia elegans EPBC	E1	E	Erect shrub 1-3m high growing in moist sclerophyll forests on Hawkesbury sandstone slopes hillsides. Distribution limits Maroota region.	x	x	-	-	x	x
Caladenia tessellata OEH EPBC	E1	V	Terrestrial orchid. Clay-loam or sandy soils. LHCCREMS guidelines suggest the species grows in Map Unit 34 – Coastal Sand Wallum Woodland - Heath. Flowers in September – November. Distribution limits N-Swansea S-south of Eden.	x	x	5km E (6 records within 10km)	19**45**	x	x
Callistemon linearifolius OEH	V	-	Shrub to 4m high. Dry sclerophyll forest on coast and adjacent ranges. Distribution limits N-Nelson Bay S-Georges River.	x	Very Poor	1.5 km S (15 records within 10km)	19**17**	Very Unlikely	x
Camarophyllopsis kearneyi OEH	E1	-	Small gilled fungus Known only from Lane Cove Bushland Park in Sydney.	x	x	1.5km S (1 record within 10km)	1998	x	x
Cryptostylis hunteriana OEH EPBC	V	V	Saprophytic orchid. Grows in swamp heath on sandy soils. Distribution limits N-Gibraltar Range S-south of Eden.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Darwinia biflora OEH EPBC	V	V	Erect or spreading shrub to 0.8m high. Grows in heath or understorey of woodland on or near shale-capped ridges underlain by Hawkesbury sandstone. Distribution limits N-Gosford S-Cheltenham.	x	Very Poor	850 m N (215 records within 10km)	2012	Very Unlikely	x
Darwinia peduncularis OEH	V	-	Divaricate shrub to 1.5m high. Grows in dry sclerophyll forest on sandstone hillsides and ridges. Distribution limits N-Glen Davis S-Hornsby.	x	✓	9km NW (1 record within 10km)	1984	Very Unlikely	x
Deyeuxia appressa OEH EPBC	E1	E	Erect grass to 0.9m high. Grows on wet ground. Distribution limits N-Hornsby S-Bankstown.	x	x	-	-	x	x
Dichanthium setosum OEH	V	V	An erect perennial grass to <1m high. Flowers in summer. Grows in woodland and is associated with heavy basaltic black soils and stony red-brown hard-setting loam with clay subsoil. Known chiefly on the northern tablelands in the Saumarez area, west of Armidale, and 18-30 km east of Guyra. It is more rarely found on the north-western slopes, central western slopes and north-western plains of NSW	x	x	-	-	x	x
Dillwynia tenuifolia OEH	V	-	Erect shrub 0.6-1m high. Grows in Woodlands and Open Forest on sandstone shale or laterite. Distribution limits N-Howes Valley S-Cumberland Plain.	x	Sub-optimal	5.5 km WSW (2 records within 10km)	2011	Very Unlikely	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Epacris purpurascens var. *purpurascens* OEH	V	-	Erect shrub to 1.5m high growing in sclerophyll forest and scrub and near creeks and swamps on Sandstone. Distribution limits N-Gosford S-Blue Mountains.	x	Very Poor	1 km NNW (62 records within 10km)	1999	Very Unlikely	x
Eucalyptus camfieldii OEH EPBC	V	V	Stringybark to 10m high. Grows on coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone. Distribution limits N-Norah Head S-Royal NP.	x	x	-	-	x	x
Eucalyptus fracta OEH	V	-	Small tree or mallee to 8m tallwith grey-black ironbark to smaller branches which are smooth white bark. Confined largely to State Forest. Restricted to the northern Broken Back Range near Cessnock. The dominant tree in a narrow band along the upper edge of a sandstone escarpment. Occurs in dry eucalypt woodland in shallow soils in association with *Eucalyptus sparsifolia, E. punctata, Corymbia maculata* and *Angophora euryphylla.*	x	x	-	-	x	x
Eucalyptus nicholii OEH	V	-	This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property.	x	Only if Planted	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Eucalyptus pulverulenta OEH	V	V	A small tree, typically mallee-like on shallow soils in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhynca*), Broad-leafed Peppermint (*E. dives*), Silvertop Ash (*E. sieberi*) and Apple Box (*E. bridgesiana*). There are two main areas or occurrence including Lithgow to Bathurst, and Bredbo to Bombala.	x	x	-	-	x	x
Galium australe OEH	E1	-	Most flowering collections have been made in late spring to early autumn. In NSW (and ACT Territory in Jervis Bay), Tangled Bedstraw has been recorded in Turpentine forest and coastal Acacia shrubland. In other States the species is found in a range of near-coastal habitats, including sand dunes, sand spits, shrubland and woodland.	x	x	-	-	x	x
Genoplesium baueri OEH EPBC	E1	E	A terrestrial orchid that grows in sparse sclerophyll forest and moss gardens over sandstone. Distribution limits N – Hunter Valley S – Nowra	x	Sub-optimal	2km S (63 records within 10km)	19**18**	Very Unlikely	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Genoplesium plumosum OEH	CE	E	Terrestrial Orchid that grows on shallow soils exclusively in heathland, generally dominated by Violet Kunzea (*Kunzea parvifolia*), Common Fringe-myrtle (*Calytrix tetragona*) and parrot-peas (*Dillwynia* spp.). Flowers late February – March. Tallong area and Moreton NP.	x	x	-	-	x	x
Grammitis stenophylla OEH	E1	-	A small lithophytic fern with fronds generally <5cm. Occurs in rainforest and wet sclerophyll forest in the coastal divisions of NSW. Usually grown on rocks.	x	x	-	-	x	x
Grevillea caleyi OEH EPBC	E1	E	Shrub mostly 1-3m high. Grows in laterite. Distribution limits Terrey Hills-Belrose area.	x	x	-	-	x	x
Grevillea parviflora subsp. *parviflora* OEH	V	V	Open to erect shrub to 1m. Grows in woodland on light clayey soils Distribution limits N-Cessnock S-Appin.	x	x	-	-	x	x
Haloragodendron lucasii OEH EPBC	E1	E	Straggling shrub to 1.5m high. Grows in open forest on sheltered slopes near creeks. Distribution limits Ku-ring-gai Plateau and Mt Wilson.	x	Sub-optimal	4.5 km N	19**08**	Very Unlikely	x
Hibbertia puberula OEH	E1	-	Shrublets with branches up to 30cm long. Not been seen for 40 years however early records are from Hawkesbury River area in Sydney and the Blue Mountains.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Hibbertia spanantha OEH EPBC	CE	CE	Grows in forest with canopy species including *Eucalyptus pilularis, E. resinifera, Corymbia gummifera* and *Angophora costata.* The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Flowers Oct-Nov with odd flowers throughout the year. Substrate is identified as a light clay occurring on a shale sandstone soil transition.	x	x	3 km W (1 record within 10km)	2014	x	x
Hibbertia superans OEH	E1	-	Small spreading shrub to 0.3m high. Grows on sandstone, usually in or near SSTF. Distribution limits N-Glenorie S-Kellyville disjunct Mt Boss.	x	Sub-optimal	8 km NE (2 records within 10km)	2008	Very Unlikely	x
Hygrocybe anomala var. *inanthinomarginata* OEH	V	-	Small gilled fungus known only from Lane Cove Bushland Park, Blue Mountains National Park and Royal National Park.	x	x	1.5km S (1 record within 10km)	1998	x	x
Hygrocybe aurantipes OEH	V	-	Small gilled fungus known only from Lane Cove Bushland Park and Blue Mountains National Park.	x	x	1.5km S (1 record within 10km)	1990	x	x
Hygrocybe austropratensis OEH	E1	-	Small gilled fungus known only from Lane Cove Bushland Park.	x	x	1.5km S (1 record within 10km)	1998	x	x
Hygrocybe collucera OEH	E1	-	Small gilled fungus known only from Lane Cove Bushland Park.	x	x	2.5 km SE (1 record within 10km)	1999	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Hygrocybe griseoramosa OEH	E1	-	Small gilled fungus known only from Lane Cove Bushland Park.	x	x	2.5 km SE (1 record within 10km)	1999	x	x
Hygrocybe lanecovensis OEH	E1	-	Small gilled fungus known only from Lane Cove Bushland Park.	x	x	1.5km S (1 record within 10km)	1998	x	x
Hygrocybe reesiae OEH	V	-	Small gilled fungus known only from Lane Cove Bushland Park and Blue Mountains National Park on moss covered banks under closed canopy.	x	x	1.5km S (1 record within 10km)	1998	x	x
Hygrocybe rubronivea OEH	V	-	Occurs in gallery warm temperate forests dominated by Lillypilly *Acmena smithii,* Grey Myrtle *Backhousia myrtifolia*, Cheese Tree *Glochidion ferdinandi* and Sweet Pittosporum *Pittosporum undulatum*. Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	x	x	1.5km S (1 record within 10km)	1998	x	x
Hypsela sessiliflora OEH	E1	Ext.	Prostrate herb, rooting at nodes, growing in damp places on the Cumberland Plain.	x	x	-	-	x	x
Lasiopetalum joyceae OEH	V	V	Erect shrub to 2m high. Grows in heath and open forest on Hawkesbury sandstone. Distribution limits Hornsby Plateau.	x	Sub-optimal	4 km E (6 records within 10km)	2005	Very Unlikely	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Leptospermum deanei OEH EPBC	V	V	Shrub to 5m high. Grows on forested slopes. Distribution limits Near watershed of Lane Cove River.	x	Sub-optimal	1.5km S (19 records within 10km)	**1883**	x	x
Melaleuca biconvexa OEH EPBC	V	V	Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation. Distribution limits N-Port Macquarie S-Jervis Bay.	x	x	-	-	x	x
Melaleuca deanei OEH EPBC	V	V	Shrub to 3m high. Grows in heath on sandstone. Distribution limits N-Gosford S-Nowra.	x	x	400m NE (39 records within 10km)	19**17**	x	x
Microtis angusii OEH EPBC	E1	E	Terrestrial orchid which is known from one population at Ingleside. Associated with the Duffy's Forest vegetation community. Flowers May-Oct.	x	x	7.5 km E (1 record within 10km)	2002	x	x
Pelargonium sp. *Striatellum* EPBC	E1	E	Herb to 90cm tall which grows in damp places especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. Varied distribution from SE NSW to QLD.	x	x	-	-	x	x
Persoonia hirsuta OEH EPBC	E1	E	Erect to decumbent shrub. Grows in dry sclerophyll forest and woodland on Hawkesbury sandstone with infrequent fire histories. Distribution limits N-Glen Davis S-Hill Top.	x	Sub-optimal	4 km S (34 records within 10km)	19**03**	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Persoonia mollis subsp. *maxima* EPBC	E1	E	Erect to prostrate shrub. Grows in moist to wet sclerophyll forests on Hawkesbury sandstone. Distribution limits N-Cowan S-Hornsby.	x	x	-	-	x	x
Persoonia nutans OEH	E1	E	Erect to spreading shrub. Grows in dry sclerophyll forest and woodland on laterite and alluvial sands. Distribution limits Cumberland Plain.	x	x	-	-	x	x
Pimelea curviflora var. *curviflora* OEH EPBC	V	V	Woody herb or sub-shrub to 0.2-1.2m high. Grows on Hawkesbury sandstone near shale outcrops. Distribution Sydney.	x	Sub-optimal	2 km S (27 records within 10km)	**1887**	x	x
Pimelea spicata EPBC	E1	E	Decumbent or erect shrub to 0.5m high. Occurs principally in woodland on soils derived from Wianamatta Shales. Distribution limits N-Lansdowne S-Shellharbour.	x	x	-	-	x	x
Prostanthera junonis OEH	E1	E	Small shrub. Grows in sclerophyll forest and heath in shallow soil on sandstone. Distribution limits Somersby region.	x	Sub-optimal	All >6km E (3 records within 10km)	2008	x	x
Prostanthera marifolia OEH EPBC	CE	CE	Erect shrub to 0.3m high. Woodland dominated by Eucalyptus sieberi and Corymbia gummifera. In deeply weathered clay soil with ironstone nodules. Has been recorded previously in the Sydney Harbour region.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Pterostylis nigricans OEH	V	-	Terrestrial orchid. Prefers coastal heathland with Heath Banksia (Banksia ericifolia), and lower-growing heath with lichen-encrusted and relatively undisturbed soil surfaces, on sandy soils. The Dark Greenhood occurs in north-east NSW north from Evans Head, and in Queensland.	x	x	11 km NW (1 record within 10km)	1969	x	x
Pterostylis saxicola OEH EPBC	E1	E	Terrestrial orchid. Grows in shallow sandy soil above rock shelves, usually near Wianamatta / Hawkesbury transition. Distribution limits N-Hawkesbury River S-Campbelltown.	x	Sub-optimal	6 km SW (1 record within 10km)	2011	Very Unlikely	x
Sarcochilus hartmannii OEH	V	V	An orchid which grows on volcanic rocks, often in shallow soil in sclerophyll forest or exposed sites usually at an elevation above 500m. Distribution – north from the Richmond River in the far north of NSW.	x	x	-	-	x	x
Syzygium paniculatum OEH EPBC	V	V	Small tree. Subtropical and littoral rainforest on sandy soil. Distribution limits N-Forster S-Jervis Bay.	x	Only if Planted	-	-	x	x
Tetratheca glandulosa OEH	V	-	Spreading shrub to 0.2m high. Sandy or rocky heath or scrub. Distribution limits N-Mangrove Mountain S-Port Jackson.	x	Sub-optimal	2 km N (154 records within 10km)	19**08**	Very Unlikely	x
Tetratheca juncea OEH	V	V	Prostrate shrub to 1m high. Dry sclerophyll forest and heath. Distribution limits N-Bulahdelah S-Port Jackson.	x	x	6 km SSE (4 records within 10km)	1996	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Thesium australe OEH EPBC	V	V	Erect herb to 0.4m high. Root parasite. Themeda grassland or woodland often damp. Distribution limits N-Tweed Heads S-south of Eden.	x	x	-	-	x	x
Triplarina imbricata EPBC	E1	E	A shrub to 2.8m tall, flowers from Nov-Dec. Occurs in heath, often in damp places along creek lines; coast and adjacent ranges. Known from the Tabulum and Nymboida districts in NE NSW.	x	x	-	-	x	x
Wilsonia backhousei OEH	V	-	Perennial subshrub with procumbent branches. Grows in coastal saltmarshes. *Wilsonia backhousei* is salt tolerant and is found in intertidal saltmarshes and, more rarely, on seacliffs. In New South Wales *Wilsonia backhousei* is scattered along the coast, reaching a northern limit at Wamberal Lagoon. In the Sydney region there has been a considerable decline in the abundance of the species over the last 100yrs, largely as a result of loss of habitat. Distribution limits N-Sydney S-South of Eden.	x	x	-	-	x	x
Zannichellia palustris OEH	E1	-	Submerged herb. Fresh or slightly saline stationary or slow-flowing water. Distribution limits N-Tweed Heads S-Newcastle.	x	x	-	-	x	x

OEH	- Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*
EPBC	- Denotes species listed within 10km of the subject site in the *EPBC Act* habitat search
V	- Denotes vulnerable listed species under the relevant Act

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
E or E1	- Denotes endangered listed species under the relevant Act								
CE	- Denotes critically endangered listed species under the relevant Act								
NOTE:	1. This field is not considered if no suitable habitat is present within the subject site 2. 'records' refer to those provided by the *Atlas of NSW Wildlife* 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle								

.

Table A2.2 – Threatened fauna species habitat assessment

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Giant Burrowing Frog *Heleioporus australiacus* OEH EPBC	V	V	Inhabits open forests and riparian forests along non-perennial streams, digging burrows into sandy creek banks. *Distribution Limit: N-Near Singleton S-South of Eden.*	x	x	-	-	x	x
Stuttering Frog *Mixophyes balbus* EPBC	E	V	Terrestrial inhabitant of rainforest and wet sclerophyll forests. *Distribution Limit: N-near Tenterfield S-South of Bombala*.	x	x	-	-	x	x
Red-crowned Toadlet *Pseudophryne australis* OEH	V	-	Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Individuals can also be found under logs and rocks in non-breeding periods. *Distribution Limit: N-Pokolbin. S-near Wollongong.*	x	x	1 km E (254 records within 10km)	1999	Very Unlikely	x
Green and Golden Bell Frog *Litoria aurea* OEH EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. *Distribution Limit: N-Byron Bay S-South of Eden.*	x	x	2.5 km SE (12300 records within 10km)	1977	Very Unlikely	x

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Littlejohn's Tree Frog *Litoria littlejohnii* EPBC	V	V	Found in wet and dry sclerophyll forest associated with sandstone outcrops at altitudes 280-1,000m on eastern slopes of Great Dividing Range. Prefers flowing rocky streams. *Distribution Limit: N-Hunter River S-Eden.*	x	x	-	-	x	x
Rosenberg's Goanna *Varanus rosenbergi* OEH	V	-	Hawkesbury sandstone outcrop specialist. Inhabits woodlands, dry open forests and heathland sheltering in burrows, hollow logs, rock crevices and outcrops. *Distribution Limit: N-Nr Broke. S-Nowra Located in scattered patches near Sydney, Nowra and Goulburn.*	x	Sub-Optimal	3 km NE (86 records within 10km)	2002	Very Unlikely	x
Broad-headed Snake *Hoplocephalus bungaroides* EPBC	E	V	Sandstone outcrops, exfoliated rock slabs and tree hollows in coastal and near coastal areas. *Distribution Limit: N-Mudgee Park. S-Nowra.*	x	x	(0 records within 10km)	-	x	x
Magpie Goose *Anseranas semipalmata* OEH	V	-	A strongly nomadic species found in tropical through to sub-tropical wetlands, flood plains, large swamps, dams and wet grasslands with dense growths of rushes and sedges. *Distribution Limit: N-Tweed Heads. S-Mulwala.*	x	x	-	-	x	x

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Cotton Pygmy-goose *Nettapus coromandelianus* OEH	E	-	An aquatic species found in tropical to subtropical coastal lagoons, swamps and large bodies of calm fresh water with abundant vegetation. *Distribution Limit: N-Tweed Heads. S-Pambula.*	x	x	-	-	x	x
Freckled Duck *Stictonetta naevosa* OEH	V	-	Occurs mainly within the Murray-Darling basin and the channel country within large cool temperate to sub-tropical swamps, lakes and floodwaters with cumbungi, lignum or melaleucas. *Distribution Limit: N- Tenterfield. S-Albury.*	x	x	-	-	x	x
Superb Fruit-dove *Ptilinopus superbus* OEH	V	-	Rainforests, adjacent mangroves, eucalypt forests, scrubland with native fruits. *Distribution Limit: N-Border Ranges National Park. S-Bateman's Bay.*	x	x	-	-	x	x
Black-necked Stork *Ephippiorhynchus asiaticus* OEH	E	-	Occurs in tropical to warm temperate terrestrial wetlands, estuarine and littoral habitats such as mangroves, tidal mudflats, floodplains, open woodlands, irrigated lands, bore drains, sub-artesian pools, farm dams and sewerage ponds. *Distribution Limit: N-Tweed Heads. S-Nowra.*	x	x	-	-	x	x

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Australasian Bittern *Botaurus poiciloptilus* OEH EPBC	E	E	Found in or over water of shallow freshwater or brackish wetlands with tall reedbeds, sedges, rushes, cumbungi, lignum and also in ricefields, drains in tussocky paddocks, occasionally saltmarsh, brackish wetlands. *Distribution Limit: N-North of Lismore. S- Eden.*	x	x	-	-	x	x
Black Bittern *Ixobrychus flavicollis* OEH	V	-	Found in shadowy, leafy waterside trees such as callistemons, casuarinas, paperbarks, eucalypts, mangroves and willows along tidal creeks, freshwater and brackish streams and ponds, sheltered mudflats and oyster slats. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Spotted Harrier *Circus assimilis* OEH	V	-	Utilises grassy plains, crops and stubblefields; saltbush, spinifex associations; scrublands, mallee, heathlands; open grassy woodlands. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	Sub-optimal	10km SW (1 record within 10km)	2007	Very Unlikely	x
Red Goshawk *Erythrotriorchis radiatus* OEH EPBC	Presumed Extinct	V	Inhabits tall open forests and woodlands. Breeds in tall trees adjacent to watercourses of wetlands. *Distribution Limit: N-Border Ranges National Park. S-Foster.*	x	x	(1 record within 10km)	**1794**	x	x

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
White-bellied Sea Eagle (*Haliaeetus leucogaster*) OEH	V	-	Occupies coasts, islands, estuaries, inlets, large rivers, inland lakes and reservoirs. *Sedentary; dispersive. N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Little Eagle *Hieraaetus morphnoides* OEH	V	-	Utilises plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes. *Distribution Limit - N-Tweed Heads. S-South of Eden.*	x	Foraging only	<200m (14 records within 10km)	2004	Unlikely	✓
Square-tailed Kite *Lophoictinia isura* OEH	V	-	Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds. *Distribution Limit: N-Goondiwindi. S-South of Eden.*	x	Sub-optimal	6 km NW (8 records within 10km)	2015	Unlikely	✓
Eastern Osprey *Pandion cristatus* OEH	V	-	Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Grey Falcon *Falco hypoleucos* OEH	V	-	Occurs over mainly inland drainage systems of open plains and lightly timbered country including the acacia scrub, spinifex and tussock grasslands. *Distribution Limit: N-Mullumbimby. S-Bega.*	x	x	> 10km NW (1 record within 10km)	-	x	x

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Black Falcon *Falco subniger* OEH	V	-	Inhabits plains, grasslands, foothills, timbered watercourses, wetland environs, crops; occasionally over towns and cities. *N-Tweed Heads. S-South of Eden*	x	Sub-optimal	9.5 km SW (1 record within 10km)	1990	Very Unlikely	x
Bush Stone-curlew *Burhinus grallarius* OEH	E	-	Utilises open forests and savannah woodlands, sometimes dune scrub, savannah and mangrove fringes. *Distribution Limit: N-Border Ranges National Park. S-Near Nowra.*	x	x	-	-	x	x
Australian Painted Snipe *Rostratula australis* EPBC	E	E	Most numerous within the Murray-Darling basin and inland Australia within marshes and freshwater wetlands with swampy vegetation. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Gang-gang Cockatoo *Callocephalon fimbriatum* OEH	V	-	Prefers wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. *Distribution Limit: mid north coast of NSW to western Victoria.*	x	Low potential	5.5 km NW (60 records within 10km)	2004	Unlikely	✓
Glossy Black-Cockatoo *Calyptorhynchus lathami* OEH	V	-	Open forests with *Allocasuarina* species and hollows for nesting. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	Foraging Only	1km S (53 records within 10km)	2004	Low	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Little Lorikeet *Glossopsitta pusilla* OEH	V	-	Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. *Distribution Limit: N-Tweed Heads. S-South of Eden*.	x	Low potential	<200m (16 records within 10km)	2004	Low	✓
Swift Parrot *Lathamus discolour* OEH EPBC	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts. *Distribution Limit: N-Border Ranges National Park. S-South of Eden*.	x	Low potential	<200m (17 records within 10km)	2004	Low	✓
Superb Parrot *Polytelis swainsonii* OEH	V	V	Inhabits open woodland and riverine forests of inland NSW. *Distribution Limit: N-Near Walgett. S-South of Deniliquin.*	x	x	6.5 km NW (1 record within 10km)	1986	x	x
Barking Owl *Ninox connivens* OEH	V	-	Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting. *Distribution Limits: N-Border Ranges National Park. S-Eden.*	x	Low potential foraging	<200m (16 records within 10km)	2009	Low	✓
Powerful Owl *Ninox strenua* OEH	V	-	Forests containing mature trees for shelter or breeding and densely vegetated gullies for roosting. *Distribution Limits: N-Border Ranges National Park. S-Eden.*	x	Foraging Only	<200m (692 records within 10km)	2012	Likely	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Eastern Grass Owl *Tyto longimembris* OEH	V	-	Inhabits grassland, coastal heath and lignum swamps, sheltering in dense grass tussocks by day. *Distribution Limit: N-Tweed Heads. S-Lithgow.*	x	x	9.5 km SW (1 record within 10km)	1982	x	x
Masked Owl *Tyto novaehollandiae* OEH	V	-	Open forest and woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting. *Distribution Limit: N-Border Ranges National Park. S-Eden.*	x	x	3.5 km NW (1 record within 10km)	1976	x	x
Sooty Owl *Tyto tenebricosa* OEH	V	-	Tall, dense, wet forests containing trees with very large hollows. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	x	Foraging Only	5 km E (4 records within 10km)	2001	Unlikely	✓
Eastern Bristlebird *Dasyornis brachypterus* EPBC	E	E	Coastal woodlands, dense scrubs and heathlands, especially where low heathland borders taller woodland or dense tall tea-tree. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Regent Honeyeater *Xanthomyza Phrygia* OEH EPBC	E4A	CE	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution Limit: N-Urbanville. S-Eden.*	x	Sub-optimal Foraging Only	2 km S (9 records within 10km)	1946	Unlikely	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
White-fronted Chat *Epithianura albifrons* OEH	V	-	Found in open damp ground, grass clumps, fencelines, heath, samphire saltmarshes, mangroves, dunes, saltbush plains. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	9km SW (211 records within 10km)	1993	x	x
Painted Honeyeater *Grantiella picta* EPBC	V	V	A nomadic bird occurring in low densities within open forest, woodland and scrubland feeding on mistletoe fruits. Inhabits primarily Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. *Distribution Limit: N-Boggabilla. S-Albury with greatest occurrences on the inland slopes of the Great Dividing Range.*	x	x	-	-	x	x
Varied Sittella *Daphoenositta chrysoptera* OEH	V	-	Open eucalypt woodlands / forests (except heavier rainforests); mallee, inland acacia, coastal tea-tree scrubs; golf courses, shelterbelts, orchards, parks, scrubby gardens. *Distribution Limit: N-Border Ranges National Park. S-South of Eden*.	x	✓	4 km N (7 records within 10km)	2004	Likely	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Dusky Woodswallow *Artamus cyanopterus cyanopterus* OEH	V	-	Found 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. Prefers habitat with an open understorey. Often observed in farmland tree patches or roadside remnants. *Widespread in eastern, southern and southwestern Australia.*	x	x	3 km S (33 records within 10km)	1982	x	x
Scarlet Robin *Petroica boodang* OEH	V	-	Found in foothill forests, woodlands, watercourses; in autumn-winter, more open habitats: river red gum woodlands, golf courses, parks, orchards, gardens. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	✓	7 km NW (7 records within 10km)	1984	Low	✓
Flame Robin *Petroica phoenicea* OEH	V	-	Summer: forests, woodlands, scrubs, from sea-level to *c.* 1800 m. Autumn-winter: open woodlands, plains, paddocks, golf courses, parks, orchards. *Distribution Limit: N northern NSW tablelands. S-South of Eden.*	x	✓	>10km SW (1 record within 10km)	1969	Unlikely	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Diamond Firetail *Stagonopleura guttata* OEH	V	-	Found in Eucalypt woodlands, forests and mallee where there is grassy understorey west of the Great Div. also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence River Valleys. *Distribution Limit: N-Rockhampton Q. S-Eyre Pen Kangaroo Is. SA.*	x	x	>10km SE (1 record within 10km)	1983	x	x
Spotted-tailed Quoll *Dasyurus maculatus* OEH EPBC	V	E	Dry and moist open forests containing rock caves, hollow logs or trees. *Distribution Limit: N-Mt Warning National Park. S-South of Eden.*	x	x	-	-	x	x
Eastern Quoll *Dasyurus viverrinus* OEH	E	-	Dry and moist sclerophyll forests containing hollow logs, rock caves, abandoned burrows or trees with open grazing land interspersed. *Distribution Limit: N-Kempsey. S-South of Eden.*	x	x	-	-	x	x
Southern Brown Bandicoot *Isoodon obesulus* OEH EPBC	E	E	Utilises a range of habitats containing thick ground cover - open forest, woodland, heath, cleared land, urbanised areas and regenerating bushland. *Distribution Limit: N-Kempsey. S-South of Eden.*	x	Very Poor	4 km NE (108 records within 10km)	2011	Very Unlikely	x

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Koala *Phascolarctos cinereus* OEH EPBC	V	V	Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Eastern Pygmy Possum *Cercatetus nanus* OEH	V	-	Found in a variety of habitats from rainforest through open forest to heath. Feeds on insects but also gathers pollen from banksias, eucalypts and bottlebrushes. Nests in banksias and myrtaceous shrubs. *Distribution Limit: N-Tweed Heads. S-Eden.*	x	Very Poor	2km SW (114 records within 10km)	1972	Very Unlikely	x
Yellow-bellied Glider *Petaurus australis* OEH	V	-	Tall mature eucalypt forests with high nectar producing species and hollow bearing trees. *Distribution Limit- N-Border Ranges National Park. S-South of Eden*.	x	x	1.5 km W (1 record within 10km)	1999	x	x

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Greater Glider *Petauroides volans* EPBC	-	V	Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Population density is optimal at elevation levels at 845 m above sea level. Prefer overstorey basal areas in old-growth tree stands. Highest abundance typically in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows *Distribution Limit: N-Border Ranges National Park. S- South of Eden.*	x	x	5 km WNW (2 records within 10km)	2004	Very Unlikely	x
Brush-tailed Rock-wallaby *Petrogale penicillata* EPBC	E	V	Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. *Distribution Limit: N-North of Tenterfield. S-Bombala.*	x	x	-	-	x	x
Grey-headed Flying-fox *Pteropus poliocephalus* OEH EPBC	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. *Distribution Limit: N-Tweed Heads. S-Eden.*	x	Foraging Only	<300m (1610 records within 10km)	2004	Likely	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* OEH	V	-	Rainforests, sclerophyll forests and woodlands. *Distribution Limit: N-North of Walgett. S-Sydney.*	x	✓	5 km NNE (6 records within 10km)	2004	Low	✓
East-coast Freetail Bat *Micronomus norfolkensis* OEH	V	-	Inhabits open forests and woodlands foraging above the canopy and along the edge of forests. Roosts in tree hollows, under bark and buildings. *Distribution Limit: N-Woodenbong. S-Pambula.*	x	✓	4 km N (27 records within 10km)	2004	✓	✓
Large-eared Pied Bat *Chalinolobus dwyeri* OEH EPBC	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. *Distribution Limit: N-Border Ranges National Park. S-Wollongong.*	x	Sub-optimal	7 km NNW (2 records within 10km)	1992	Low	✓
Eastern Falsistrelle *Falsistrellus tasmaniensis* OEH	V	-	Recorded roosting in caves, old buildings and tree hollows. *Distribution Limit: N-Border Ranges National Park. S-Pambula.*	x	Foraging Only	6km NNW (3 records within 10km)	2014	Low	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required for consideration in 7 part test of significance (✓)**
					Suitable habitat Present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Little Bentwing-bat *Miniopterus australis* OEH	V	-	Roosts in caves, old buildings and structures in the higher rainfall forests along the south coast of Australia. *Distribution Limit: N-Border Ranges National Park. S-Sydney.*	x	Foraging Only	5 km NNE (11 records within 10km)	2015	Low	✓
Eastern Bentwing-bat *Miniopterus orianae oceansis* OEH	V	-	Prefers areas where there are caves, old mines, old buildings, stormwater drains and well-timbered areas. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	x	Foraging Only	300m W (245 records within 10km)	2012	Low	✓
Large-footed Myotis *Myotis macropus* OEH	V	-	Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water. *Distribution limits: N-Border Ranges National Park. S-South of Eden.*	x	x	5 km ESE (504 records within 10km)	2013	x	x
Greater Broad-nosed Bat *Scoteanax rueppellii* OEH	V	-	Inhabits areas containing moist river and creek systems, especially tree lined creeks. *Distribution Limit: N-Border Ranges National Park. S-Pambula.*	x	x	-	-	x	x

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	If not recorded on site				Required for consideration in 7 part test of significance (✓)
					Suitable habitat Present (✓)	Nearby and/or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	
New Holland Mouse *Pseudomys novaehollandiae* EPBC	-	V	Occurs in heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. Coastal populations have a marked preference for sandy substrates, a heathy understorey of leguminous shrubs less than 1m high and sparse ground litter. Recoloniser of regenerating burnt areas. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	x
Dural Woodland Snail *Pommerhelix duralensis* EPBC	-	E	Occurs on shale-sandstone transitional landscapes 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 vegetation 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.	x	x	-	-	x	x
OEH	- Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*								

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	If not recorded on site				Required for consideration in 7 part test of significance (✓)
					Suitable habitat Present (✓)	Nearby and/or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	

EPBC	-	Denotes species listed within 10km of the subject site in the *EPBC Act* habitat search
V	-	Denotes vulnerable listed species under the relevant Act
E	-	Denotes endangered listed species under the relevant Act
NOTE:	1.	This field is not considered if no suitable habitat is present within the subject site
	2.	'records' refer to those provided by the *Atlas of NSW Wildlife*
	3.	'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle

Table A2.3 provides an assessment of potential habitat within the subject site for nationally *protected* migratory fauna species recorded within 10km on the *EPBC Act* Protected Matters Tool. Nationally *threatened* migratory species are considered in Table A2.3.

Table A2.3 – Migratory fauna habitat assessment

Common name ***Scientific name***	**Preferred habitat** ***Migratory breeding***	**Suitable habitat present (✓)**	**Comments on potential impacts**
Oriental or Horsfield's Cuckoo (*Cuculus optatus*)	It mainly inhabits forests, occurring in coniferous, deciduous and mixed forest. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground.	x	-
White-bellied Sea Eagle (*Haliaeetus leucogaster*)	Coasts, islands, estuaries, inlets, large rivers, inland lakes, reservoirs. *Sedentary; dispersive.*	✓	Removal of very low potential perch trees. No likely significant impact.
White-throated Needletail (*Hirundapus caudacutus*)	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns; companies forage often along favoured hilltops and timbered ranges. *Breeds Siberia, Himalayas, east to Japan. Summer migrant to eastern Australia.*	✓	No likely impact
Rainbow Bee-eater (*Merops ornatus*)	Open woodlands with sandy, loamy soil; sandridges, sandspits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves, rainforest, woodlands, golf courses. *Breeding resident in northern Australia. Summer breeding migrant to south east and south west Australia.*	✓	No likely impact
Black-faced Monarch (*Monarcha melanopsis*)	Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. *Summer breeding migrant to coastal south east Australia, otherwise uncommon*.	x	-
Spectacled Monarch (*Monarcha trivirgatus*)	Understorey of mountain / lowland rainforest, thickly wooded gullies, waterside vegetation, mostly well below canopy. *Summer breeding migrant to south-east Qld and north-east NSW down to Port Stephens from Sept/Oct to May. Uncommon in southern part of range.*	x	-
Yellow Wagtail (*Motacilla flava*)	The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops.	x	-
Satin Flycatcher (*Myiagra cyanoleuca*)	Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. *Breeds mostly south east Australia and Tasmania over warmer months, winters in north east Qld.*	✓	No likely impact

Common name ***Scientific name***	**Preferred habitat** ***Migratory breeding***	**Suitable habitat present (✓)**	**Comments on potential impacts**
Rufous Fantail (*Rhipidura rufifrons*)	Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. *Breeding migrant to south east Australia over warmer months. Altitudinal migrant in north east NSW in mountain forests during warmer months.*	✓	Removal of low potential foraging trees. No likely significant impact.
Great Egret (*Ardea alba*)	Shallows of rivers, estuaries; tidal mudflats, freshwater wetlands; sewerage ponds, irrigation areas, larger dams, etc. *Dispersive; cosmopolitan.*	×	-
Cattle Egret (*Ardea ibis*)	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats, drains. *Breeds in summer in warmer parts of range including NSW*.	×	-
Latham's Snipe (*Gallinago hardwickii*)	Soft wet ground or shallow water with tussocks and other green or dead growth; wet parts of paddocks; seepage below dams; irrigated areas; scrub or open woodland from sea-level to alpine bogs over 2,000m; samphire on saltmarshes; mangrove fringes. *Breeds Japan. Regular summer migrant to Australia. Some overwinter.*	×	-
Fork-tailed Swift (*Apus pacificus*)	Aerial: over open country, from semi-arid deserts to coasts, islands; sometimes over forests, cities. *Breeds Siberia, Himalayas, east to Japan south east Asia. Summer migrant to east Australia. Mass movements associated with late summer low pressure systems into east Australia. Otherwise uncommon.*	✓	No likely impact