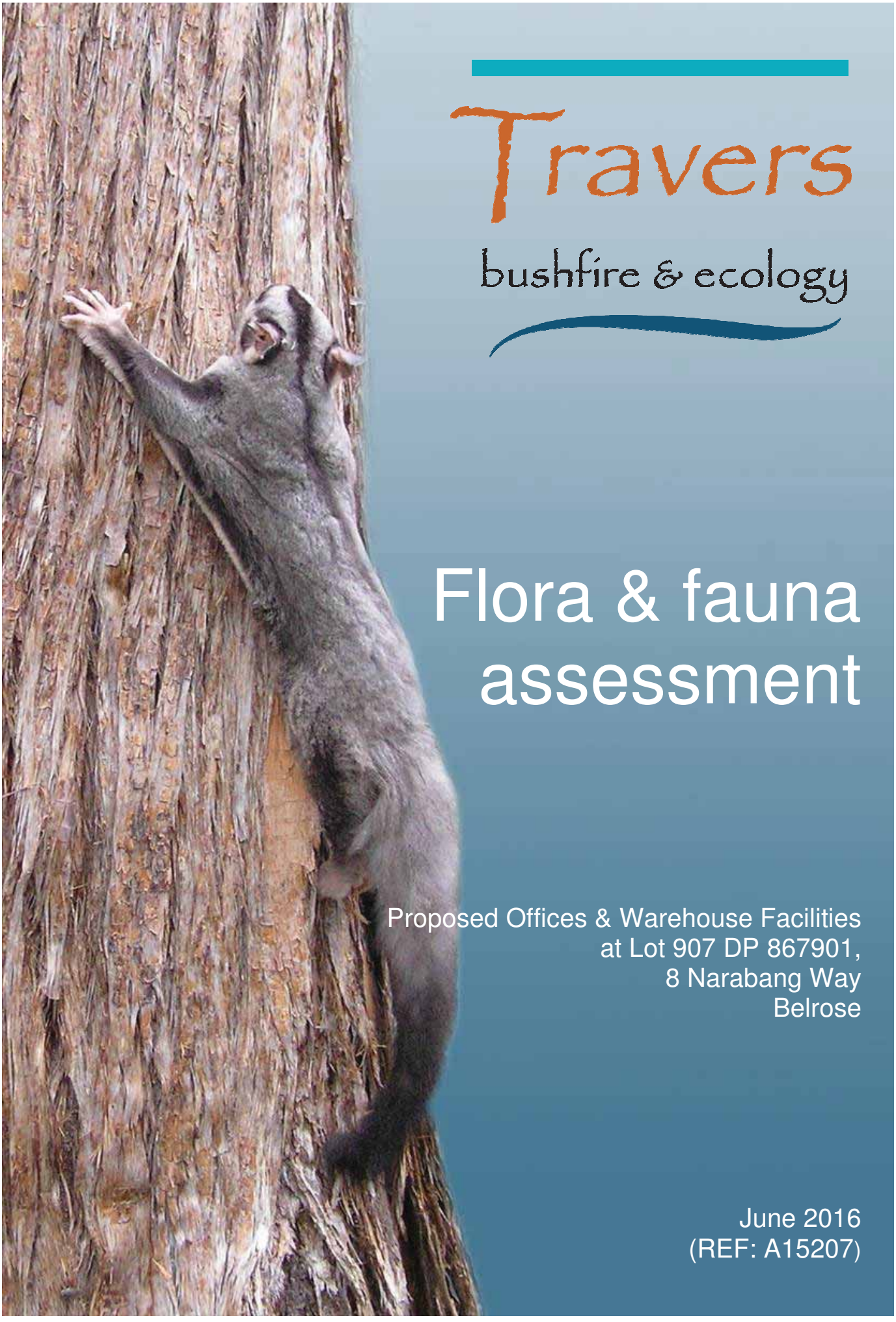

Travers

bushfire & ecology

Flora & fauna assessment

Proposed Offices & Warehouse Facilities
at Lot 907 DP 867901,
8 Narabang Way
Belrose

June 2016
(REF: A15207)

Flora & Fauna Assessment

8 Narabang Way, Belrose
Lot 907 DP 867091

June 2016

Report Authors:	John Travers *B. App. Sc. / Ass. Dip. / Grad. Dip.* Managing - Director
	Lindsay Holmes *B. Sc.* - Botanist
	Corey Mead *B. App. Sc.* - Fauna Ecologist
Plans prepared:	Emma Buxton *B. Sc.*
Approved by:	John Travers
Date:	6/6/16
File:	A15207

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.

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, the location of all mapped features are 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

Attachments

Attachment 1 Fauna Survey Effort
Attachment 2 Flora & Fauna Species List
Attachment 3 Threatened Flora & Fauna Habitat Assessment
Attachment 4 7 Part Test of Significance (Section 5A EPA Act 1979)

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DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)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)
DOE	Commonwealth Department of Environment
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 DOE)
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

Ecological Assessment

1.0 Background

Travers bushfire & ecology has been engaged to undertake survey and ecological assessment at Lot 907 DP 867091, 8 Narabang Way, Belrose. Previous assessments including a species impact statement (SIS) have been prepared for the site approximately 15 years ago with minor updates through to 2006 by Teresa James.

The biggest ecological issue identified on site was the presence of Duffys Forest, an endangered ecological community (EEC) which typically occurs on plateau areas of northern Sydney in the vicinity of Frenchs Forest, Belrose, Terrey Hills and Duffys Forest (and some outlier suburbs) where there are shale lenses and presence of laterites (ironstone nodules).

Travers bushfire & ecology has undertaken a series of botanical quadrats to further investigate the vegetation status to advice the presence / absence of this EEC, and identify if there are other ecological features or constraints for future development.

A development application to construct warehouse and office facilities is proposed for approximately 3/4 of the site, with the remaining 1/4 in the northern portion to be retained in the current zoning of E2. There is a small intrusion of E2 land in the central eastern portion of the site which is proposed for rezoning.

This report ideally seeks to rezone this very small portion of E2 land to B7, continuous with the surrounding land use. Ecological survey and assessment has been extended across the entire lot and immediate adjoining bushland for contextual purposes.

An aerial appraisal of the full extent of the site is provided in Figure 1. Figure 2 shows the current zoning and Figure 3 shows the proposal for the site and location of the E2 lands within.

2.0 Proposed development

The proposal initially seeks to rezone a small portion of land adjacent to the eastern boundary of approximately 150m^2, prior to a development application being submitted to Council. The proposal is inconsistent with the objectives for the E2 zoning, thus the Applicant is seeking a rezoning to B7 to match adjoining properties.

After the rezoning is successful, it is proposed that warehouse and office facilities with associated parking and access will be constructed within the southern and central portions of the site. The northern portion which is currently zoned E2 will remain unchanged. Figure 2 shows current zoning whilst Figure 3 shows the proposed works.

Figure 1 – Aerial appraisal

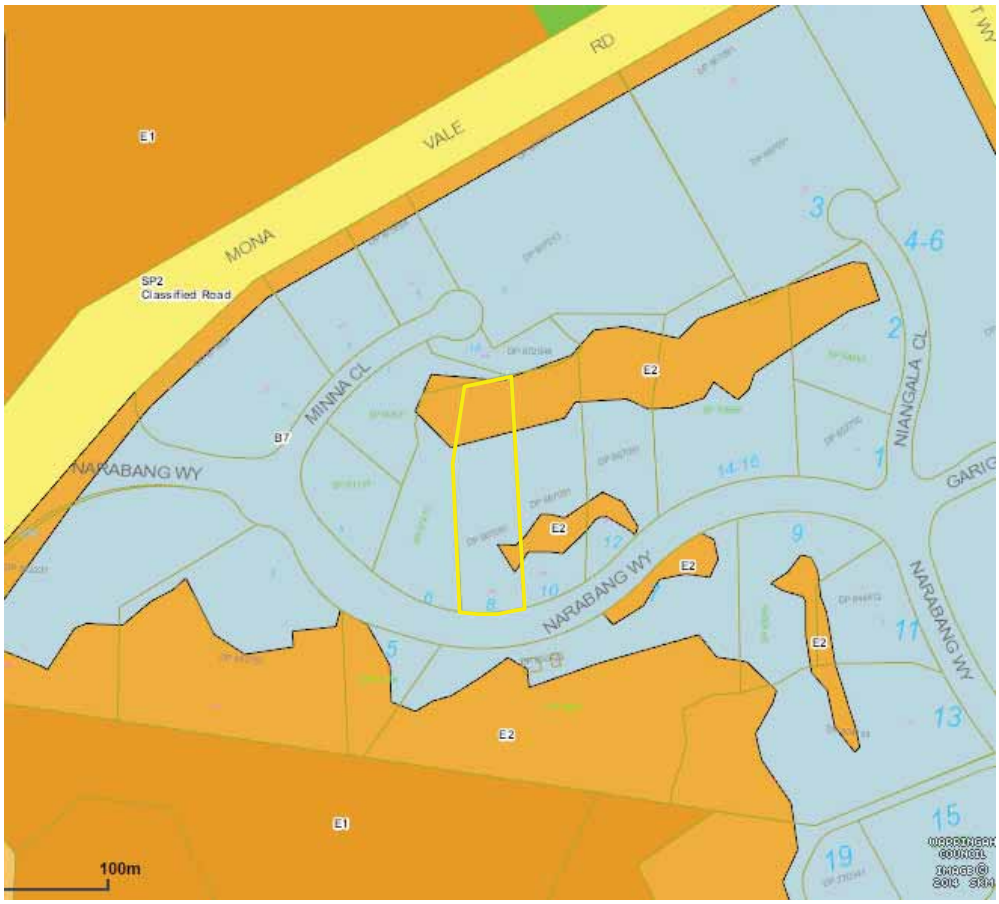

Figure 2 – Current Land Use Zoning for the study area (Warringah LEP 2011)

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	Lot 907 DP 867901, 8 Narabang Way, Belrose
Size	7,237 m^2
Local government area	Northern Beaches (formerly Warringah)
Grid reference	334050E 6269100N
Topography	The study area has slight to moderate slopes, steeper in the northern portion of the site where rock outcropping occurs. The aspect is southerly.
Geology and soils	Geology; Hawkesbury sandstone Hawkesbury Soil Landscape
Catchment and drainage	Overland flow will head southwards into the Bare Creek Catchment. There are some drainage lines on site but they are not creeks.
Vegetation	Sandstone Gully Forest
Existing land use	Vacant bushland zoned B7 and E2
Clearing	Clearing has occurred along the southern perimeter of approximately 0.04 ha.

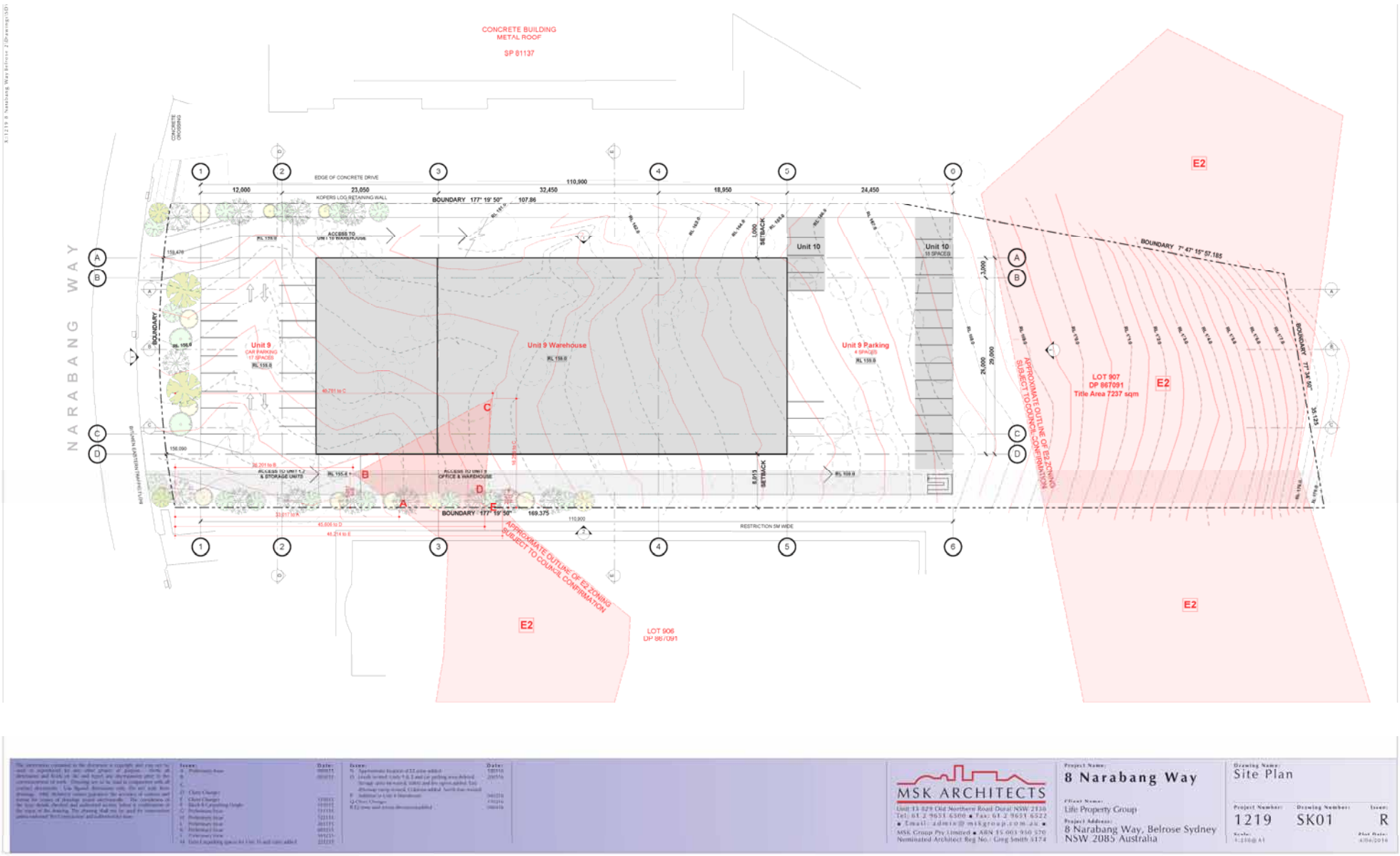

Figure 3 – Proposed site layout and location of E2 zone

Figure 4 – Flora and fauna survey effort and results

4.0 Flora

4.1 Site assessment

A review of the Atlas of NSW Wildlife (OEH 2016) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the subject site.

Botanical survey was undertaken over approximately 3.5 hrs on 6 January 2016, and over 5 hrs on 6 May 2016.

6 January 2016

4x 20x20m quadrats were undertaken and analysed against the vegetation community descriptions in the Sydney Metropolitan CMA vegetation mapping (2013) against:

Coastal Enriched Sandstone Dry Forest.....S_DSF04
Coastal Sandstone Gully Forest ..... S_DSF09
Sydney Ironstone Bloodwood-Silvertop Ash Forest ..... S_DSF14 (Duffys Forest)

Target searches for threatened species were limited on that date due to the very poor weather conditions.

6 May 2016

Botanical survey included a random meander in accordance with *Cropper* (1993) to gain a full species list of the plants within the site. Four (4) 20x20m quadrats with a 50m transect (Biometric style) were undertaken within or immediately adjacent to the full extent of the site. One (1) additional transect was undertaken along the southern boundary of the site through the previously cleared portion.

Threatened species searches were conducted during the random meander and during stratified surveys. Flora species recorded during the survey are listed in Table A2.1 in Attachment 2. Figure 4 shows the mapped vegetation communities.

4.2 Vegetation communities

Published vegetation mapping

The Sydney Metropolitan CMA 2013 vegetation mapping advises that the vegetation within the site is Duffys Forest. Adjoining communities are Coastal Enriched Sandstone Dry Forest and Coastal Sandstone Gully Forest. Figure 5 shows this mapping.

The Sydney Royal Botanic Gardens (RBG) vegetation mapping (Figure 6) shows the site as containing Sandstone Gully Forest.

Warringah Council also have published vegetation maps, see Figure 7. Their mapping shows the site as containing Duffys Forest.

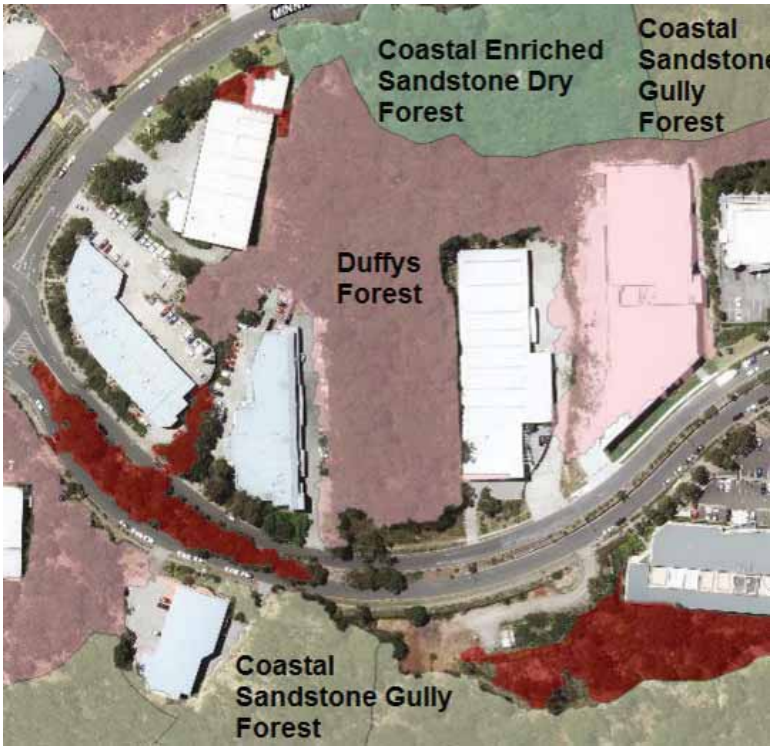

Figure 5 – Sydney Metropolitan CMA vegetation mapping

Figure 6 – Sydney RBG vegetation mapping

Figure 7 – Warringah Council vegetation mapping

Previous mapping of the site

Surveys undertaken by previous consultants and during the SIS of 2001 (later amended in 2005 with a 2006 update for additional threatened species recorded within a 10km radius of the site) described the vegetation on site as a component of Duffys Forest.

Current vegetation mapping of the site

Two (2) vegetation communities were recorded within the study area:

- Cleared
- Coastal Sandstone Gully Forest

Within the subject site, that being the small E2 zoning section along the eastern boundary, the vegetation community present is Coastal Sandstone Gully Forest.

Cleared

This community covers the southern boundary of the site adjacent to Narabang Way, which has undergone previous vegetation clearance, allowing non-native species to dominate that part of the landscape. The approximate extent of the cleared lands is 0.04 ha.

Dominant species include *Ageratina adenophora*, Calochlaena dubia, Imperata cylindrica* var. *major, Hypolepis muelleri, Lomandra longifolia* and *Andropogon virginicus*.*

Photo 1 – Cleared vegetation along the interface of the property with Narabang Way

Coastal Sandstone Gully Forest

The northern portion of the study area contains a drier more exposed variant of this community which has lower species richness, dominated by *Lomandra longifolia* in the understorey. The northern portion of the site is on more exposed sandstone towards the top of the local gully. Whilst outcropping is present, there are no laterites.

Canopy – Mostly 17-30m in height with a projected foliage cover averaging 40%. Common species include *Angophora costata, Eucalyptus sieberi, Eucalyptus capitellata, Eucalyptus oblonga* and *Corymbia gummifera.* In the central section of the site *Acacia schinoides* was very dominant. Occasional or infrequent canopy species include *Eucalyptus pilularis, Eucalyptus piperita, Eucalyptus globoidea* and *Eucalyptus haemastoma.*

Mid-storey – From 1 to 8m in height (mostly), with a projected foliage cover averaging 20%. Common species include *Acacia ulicifolia, Banksia spinulosa, Callicoma serratifolia, Ceratopetalum gummiferum, Grevillea linearifolia, Lasiopetalum ferrugineum, Leptospermum polygalifolium, Ozothamnus diosmifolius, Persoonia pinifolia* and *Pittosporum undulatum.*

Ground layer – To 1m tall comprising grasses, many ferns, forbs, sedges and herbs. Common species include *Calochaena dubia, Entolasia stricta, Epacris longiflora, Gahnia melanocarpa, Gonocarpus teucrioides, Hibbertia aspera, Hibbertia linearis, Hypolepis glandulifera, Imperata cylindrica* var. *major, Lindsaea linearis, Lomandra longifolia, Lomandra obliqua, Pteridium esculentum* and *Smilax glyciphylla.*

Photo 2 – Vegetation near the central portion of the study area where Acacia schinoides dominates

Photo 3 – Vegetation within the subject site (E2 zone on eastern boundary)

Photo 4 – Looking across the slope at the northern boundary

Photo 5 – Dense fern and sedge layer just to the west of the subject site

4.3 Threatened flora species

Threatened Species Conservation Act (TSC Act) – A search of the *Atlas of NSW Wildlife* (OEH, 2016) provided a list of threatened flora species previously recorded within a 10km radius of the subject site. These species are listed in Attachment 3 (Table A3.1) 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* identified a list of threatened flora species or species habitat likely to occur within a 10km radius of the subject site.

In accordance with Table A3.1, the following threatened flora species are considered to have potential habitat within the subject site.

Table 2 – Threatened flora species with suitable habitat present

Scientific Name	TSC Act	EPBC Act	Potential to occur
Epacris purpurascens var. *purpurascens*	V	V	Possible but low likelihood
Microtis angusii	E1	E	Possible but low likelihood
Persoonia hirsuta	E1	E	Possible but very low likelihood
Pimelea curviflora var. *curviflora*	V	V	Possible but low likelihood
Tetratheca glandulosa	V	-	Moderate but more likely in northern portion of site near the top of the slope

Many of the locally occurring threatened species are found in sandstone environments, mostly ridgetop or plateau areas as opposed to gullies, hence the number of threatened species considered to have potential habitat in this instance, due to being in gully is less than what would be expected along the nearby Mona Vale Road. Again, most species that were considered to have some potential habitat were thought to have a low likelihood given they are more likely found on ridges and plateaus. The northern portion of the study area which is proposed for retention (and zoned E2), has a higher likelihood for threatened species potential as it is nearer the ridge line.

Survey has been conducted by this firm on the 6th of January and 6th of May 2016. This does not cover the full suite of flowering times particularly for cryptic or threatened species. Notwithstanding that, there has been previous surveys by E.S.P. Ecological Surveys and Planning in 1998 which found no threatened species, nor did the species impact statement or amendment (James, T.A. & J. Anderson (March 2001). Species Impact Statement - Lot 907 Narabang Way, Belrose. Report to Access Industrial Holdings Pty Ltd) (James, T.A. & Anderson Ecological Surveys (March 2005). Amended Species Impact Statement for proposed development at 8 Narabang Way, Austlink Corporate Park, Belrose).

Of the threatened flora candidates, the most likely to occur is *Tetratheca glandulosa.* Survey by this firm has not been conducted during its flowering period thus cannot be ruled out by our surveys. Notwithstanding that, it is believed that sufficient survey would have been undertaken during the species impact statement to confirm that the species is absent.

In conclusion, threatened flora species do not appear to be a constraint for development of the study area.

4.4 Endangered flora populations

No endangered flora populations occur within a 10km radius of the subject site and there are no currently listed endangered flora populations within Warringah LGA.

4.5 Endangered ecological communities

A series of quadrats have been undertaken to determine the status of the vegetation on site. Comparisons have been made to the scientific communities' final determinations for Duffys Forest, against various communities listed in the Sydney Metropolitan CMA Vegetation Mapping (2013), as well as comparing the data with a tool prepared by Tim Hager (OEH) for comparison of Cumberland Plain vegetation types (with modifications by Greg Steenbeeke).

Some previous mapping for the site including a Species Impact Statement covering the Belrose 'business park' has described the vegetation as being Duffys Forest, an endangered ecological community.

To be commensurate with the determination of the EEC Duffys Forest, it must fit various criteria that relate not only to the vegetation characteristics, but also elevation and geological features such as the presence of laterites. Ironstone nodules are typically present where shale lenses occur over sandstone geology; the main distribution of Duffys Forest.

The vegetation of Duffys Forest contains a heath-like understorey with a high proportion of sedges and graminoides.

Geology

Geological mapping of the area shows the shale and laminates to the north of site (coloured blue in Figure 8 below) which is typically indicative of Duffys Forest EEC. No lateritic soils were noted during the inspection, and the large sandstone protrusions in the northern part of the site, immediately north of quadrat 3 to the northern boundary are atypical of the geology associated with Duffys Forest.

Figure 8 – Geological mapping

Soils

The site sits within the Hawkesbury Soil Landscape. The northern tip may extend into the southern edge of the Blacktown Soil Landscape which Duffys Forest is known to occur, however the underlying geology and rock outcrop in the northern tip as said above, is atypical of a Duffys Forest association.

Vegetation

There is a dense ground layer of *Lomandra longifolia* and ferns, and a number of more typical gully forest or sheltered forest species are present than what would normally occur within Duffys Forest. The site lacks a high diversity or abundance of sedge-type and graminoid species that are often dominant in Duffys Forest, such as *Cyathochaeta diandra, Actinotus minor, Lomandra multiflora, Patersonia* spp., and *Tetratheca juncea.*

Quadrat data

An analysis of the quadrats 1 to 4 was undertaken against the Sydney Metropolitan CMA tool which lists the positive diagnostic species for each vegetation community. A selection of three (3) vegetation communities were chosen as per those mapped on site and adjacent, noted on Figure 2.

Coastal Enriched Sandstone Dry Forest.....S_DSF04
Coastal Sandstone Gully Forest ..... S_DSF09
Sydney Ironstone Bloodwood-Silvertop Ash Forest ..... S_DSF14 (Duffys Forest)

To adequately determine the vegetation community to a 95% confidence interval, the quadrat should contain a minimum number of species and a minimum number of positive diagnostic species.

Coastal Enriched Sandstone Dry Forest – 38 species in quadrat, 21 positive diagnostic
Coastal Sandstone Gully Forest - 45 species in quadrat, 32 positive diagnostic
Sydney Ironstone Bloodwood-Silvertop Ash Forest - 42 species in quadrat, 29 positive diagnostic.

The native species richness within the quadrats was moderate but often did not meet the minimum numbers due to an abundance or dominance of particular ground layer species such as *Lomandra longifolia* and *Calochlaena dubia.* Notwithstanding that, an analysis was still applied.

Table 3 – Quadrat 1-4 results (Sydney Metro. CMA Veg. Mapping)

	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4
No. Native Species	34	27	37	44
Coastal Enriched Sandstone Dry Forest	18	11	12	15
Coastal Sandstone Gully Forest	20	14	24	24
Sydney Ironstone Bloodwood-Silvertop Ash Forest (Duffys Forest)	9	7	15	14

Based on the above numbers, it appears that the number of positive diagnostic species for Duffys Forest was relatively low, and lowest for 3/4 quadrats. The vegetation appears to be more consistent with the Coastal Sandstone Gully Forest community based upon this test.

A comparison against the final determinations was also made:

Quadrat 1 - 17/34 (50%)
Quadrat 2 – 11/27 (41%)
Quadrat 3 – 20/37 (54%)
Quadrat 4 – 21/44 (48%)

The numbers are low to moderate for quadrats 1, 3 and 4. It would appear that Quadrat 3 has the highest proportion of Duffys Forest species, comparable with the above table results.

The application of the Duffys Forest Index was also undertaken which did not favour Duffys Forest for any quadrat.

In May 2016, a further 4 quadrats were undertaken across the study area or partly traversing the lot boundary. The data from all 8 quadrats was put into the tool by Tim Hagar (and Greg Steenbeeke) to assess the 'best fit'.

Table 4 – Quadrat results analysis using Tozer (2010) tool by Tim Hagar

	Ratio of +ve diagnostic species : total native species	
	Coastal Sandstone Gully Forest	**Duffys Forest**
Quadrat 1	53%	44%
Quadrat 2	44%	41%
Quadrat 3	64%	50%
Quadrat 4	64%	48%
Quadrat 5	51%	44%
Quadrat 6	63%	52%
Quadrat 7	38%	41%
Quadrat 8	48%	39%
Average	53.1%	44.9%

For 7 of the 8 quadrats, the ratio of positive diagnostic species to total native species favoured Coastal Sandstone Gully Forest. Vegetatively, the tool indicates an overall weighting towards the Coastal Sandstone Gully Forest.

Conclusion in regards to Duffys Forest

Our vegetation analysis against the various tools and final determination suggests the study area contains Coastal Sandstone Gully Forest rather than Duffys Forest. Although the weighting away from the EEC may not be overwhelming or statistically convincing, there was a definite pattern which showed Duffys Forest as less favourable. Whilst the canopy and mid-storey appear moderately consistent with the EEC, the ground layer and some mid-storey is rather inconsistent. The dominance of *Acacia schinoides* near the centre of the study area, and abundance of ferns is atypical.

Supporting information to rule out Duffys Forest is also the lack of any lateritic material from shale lenses over sandstone, and the site is not on the plateau.

A peer review of the initial 4 quadrats and their data, coupled with additional survey by *Keystone Ecological* was undertaken in March 2016. The peer review concluded that the initial assessment by *Travers bushfire & ecology* in January 2016 was sound and that Duffys Forest was absent.

Warringah Council advised (2nd June 2016), the following: Council has completed this study (peer review) and can advise that the vegetation within the proposed development footprint, is not the threatened Ecological Community, Duffys Forest. Please note that this applies only to vegetation within the footprint and not to that located within the E2 zone at the top of the site which is not proposed for development.

5.0 Fauna

5.1 Site assessment

Fauna survey including diurnal and nocturnal survey and threatened species habitat assessment was undertaken within the study area on the 1st June 2016.

Diurnal fauna survey included frog and reptile habitat searches, bird census points and opportunistic call survey, activity searches (scats, scratches, diggings, burrows, etc) and habitat tree survey throughout the study area. Nocturnal fauna survey included spotlighting, ultrasonic microbat recording (x2 passive recording stations) and threatened owl call-playback.

There was no rain or windy conditions during the survey however rain had occurred on site in the day prior to the two site visits on this day. Therefore in respect to weather conditions survey was only constrained by cold conditions on the first day of winter. This would likely reduce potential to record some microbats, some frogs and reptile activity. This limitation is not considered to cause any concern for the survey validity as no likely important habitat for threatened microbats, frogs or reptiles was considered to be present within the subject site as part of the habitat assessment.

The full survey effort table showing timing and weather conditions is provided in Attachment 1. Specific survey effort locations and results are shown on Figure 3. All fauna species recorded during survey within the subject site and nearby surrounds are listed in Table A2.2 in Attachment 2.

A review of the Atlas of NSW Wildlife (OEH 2016) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the subject site.

5.2 Hollow-bearing trees

Hollow-bearing trees were surveyed within the study area during the fauna survey with a total of seven (7) trees containing hollows within or close to the subject site area. These trees were found to contain eight (8) small hollows (0-10cm in size). None of these trees are located within the subject site itself and therefore no impact on hollows will occur as part of the rezoning. None of the hollows are considered suitable for threatened large forest owls or cockatoos. No such suitable hollows for nesting will also be indirectly impacted nearby. Hollow-bearing tree data for the subject site is provided in Table 5.

Table 5 – Hollow-bearing tree data

Tag No.	Common Name	DBH (cm)	Spread (m)	Height (m)	Vigour (%)	Hollows recorded
HT1	Smooth-barked Apple	55	19	34	75	1x 0-5cm branch spout
HT2	stag	25	1	11	0	1x 0-5cm exfoliated bark opening
HT3	Silvertop Ash	55	14	28	70	1x 5-10cm low trunk
HT4	Brown Stringybark	50	12	21	55	1x 0-5cm trunk
HT5	Blackbutt	90	23	38	85	1x 5-10cm trunk (good), 1x 5-10cm branch spout
HT6	Brown Stringybark	30	5	12	20	1x 5-10cm arboreal termite nest hollow
HT7	Brown Stringybark	55	16	24	50	1x 5-10cm trunk

Habitat trees 1, 2 & 3 will likely be removed as part of the future development area of the lot. The recorded hollows may be suitable for hollow-dependent threatened microbats. Therefore the future assessment associated with the DA of the study area will recommend relocation or replacement of hollows.

5.3 Threatened fauna species

TSC Act – A search of the *Atlas of NSW Wildlife* (OEH, 2016) provided a list of threatened fauna species previously recorded within a 10km radius of the subject site. These species are listed in Attachment 3 (Table A3.2) and are considered for potential habitat within the subject site. Strictly coastal and oceanic threatened species found within 10km have not been included as there is no coastal interface or marine related habitat present within the study area.

One (1) state listed threatened fauna species the Glossy Black-Cockatoo (*Calyptorhynchus lathami*) was recorded present during survey.

The 7 part test (Attachment 4) has concluded that there is unlikely to be a significant impact on any state listed threatened fauna species as a result of development associated with the proposed rezoning of the subject site.

State Environmental Planning Policy No. 44 (SEPP 44) - Koala Habitat Protection – The subject site is required to be considered under SEPP 44 as it falls within the old Warringah LGA, which is listed on Schedule 1 of this Policy.

No Koala food tree species as listed on Schedule 2 of *SEPP 44 - Koala Habitat Protection*, were recorded within the study area. Therefore the study area does not provide potential Koala habitat (PKH) under the definitions of SEPP 44. No Koalas are considered likely to utilise the study area as part of established home ranges, extended habitat or even temporarily in dispersal.

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 been listed in Attachment 3 (Table A3.2). Based on a review of the EPBC significant impact criteria, no threatened species listed under this act are likely to be significantly impacted by the proposal.

In accordance with Table A3.2 the following state and nationally listed threatened fauna species are considered to have potential habitat within the subject site. The TSC Act listed species are to be considered for impact assessment in a seven-part test of significance (Attachment 4).

Table 6 – Threatened fauna species with suitable habitat present

Common name	TSC Act	EPBC Act	Potential to occur
Glossy Black-Cockatoo	V	-	recorded
Little Lorikeet	V	-	✓
Powerful Owl	V	-	✓
Varied Sittella	V	-	✓
Grey-headed Flying-fox	V	V	✓

Common name	TSC Act	EPBC Act	Potential to occur
Little Bentwing-bat	V	-	✓
Eastern Bentwing-bat	V	-	✓
Little Eagle	V	-	low
Square-tailed Kite	V	-	low
Barking Owl	V	-	low
Sooty Owl	V	-	low
East-coast Freetail Bat	V	-	low
Large-eared Pied Bat	V	V	low
Eastern Falsistrelle	V	-	low
Greater Broad-nosed Bat	V	-	low
Giant Burrowing Frog	V	V	unlikely
Red-crowned Toadlet	V	-	unlikely
Rosenberg's Goanna	V	-	unlikely
Gang-gang Cockatoo	V	-	unlikely
Masked Owl	V	-	unlikely
Scarlet Robin	V	-	unlikely
Spotted-tailed Quoll	V	E	unlikely
Southern Brown Bandicoot	E	E	unlikely
Eastern Pygmy Possum	V	-	unlikely
Yellow-bellied Sheathtail-bat	V	-	unlikely
New Holland Mouse	-	V	unlikely

The potential habitat for protected migratory species listed under the *EPBC Act* is considered in Table A3.3. Based on a review of the EPBC significant impact criteria, no protected migratory species are likely to be significantly impacted by the proposal.

5.4 Endangered fauna populations

Endangered populations are identified to the old northern Sydney LGA's or specific locations. There are no endangered fauna populations recognised as occurring within the old Warringah LGA. Endangered populations occurring within 10km of the study area (Koala, Squirrel Glider and Gang-gang Cockatoo) are not likely to occur based on habitat suitability or separation between known records.

5.5 Vegetation connectivity

The vegetation within the study area is part of a fragmented remnant that runs from behind the existing neighbouring industrial buildings through the site towards the frontage with Narabang Way (see Figure 9). The site does provide connectivity for small flying and gliding birds, bats and gliders through this remnant which has been fragmented by Narabang Way, Niangala Close, Minna Close and the very wide and busy Mona Vale Road and Forest Way. Beyond these roads connectivity continues immediately into Garigal and Ku-ring-gai Chase National Parks.

Due to the fragmentation caused from these roads and surrounding industrial development, the remaining internal remnants now provide reduced habitat potential for fauna diversity by comparison to that encountered within the National Parks beyond these roads. Table A2.2 shows a surprisingly small number of recorded birds during the site visit. There are also more direct connectivity options across Mona Vale Road and Forest Way between Garigal and Ku-ring-gai Chase National Parks (see Figure 9).

Development associated with the proposed rezoning will further fragment the connectivity potential of the internal remnant, particularly to the south. Despite this and as outlined above, the species diversity via this connective option is already highly reduced and unlikely to provide for valuable movements by threatened fauna species.

Figure 9 – Local connectivity through the study area and associated road barriers (Google Earth 2016)

6.0 Conclusions

The proposed rezoning and associated development of a small portion of E2 Environmental Conservation land within the study area will not likely cause any significant impact on locally occurring threatened fauna species with varying considered potential to occur.

The site was found to display a very low diversity of bird species diversity. Aside from the temporary roosting of the threatened Glossy Black-Cockatoo, all other birds recorded are resilient to fragmentation of habitats. The site is fragmented by surrounding roads and the direct connectivity that remains is limited. This combined with the dominance of Noisy Miners attributes to the overall low species diversity present. Higher species diversity would be expected during warmer months and flowering periods. Despite local nearby and recent records of some threatened fauna species, this fragmentation is expected to limit use of the site by the majority of terrestrial threatened fauna species considered for assessment.

Seven (7) hollow-bearing trees containing only small hollows were recorded within the study area however none of these were located within the subject site itself. Therefore, whilst other threatened fauna species have potential to frequent the site seasonally or on occasion (listed in Table 4), the development area is not expected as likely critical to life-cycle requirements or central to home range areas of these additional species. This is also given

that no frog, flying-fox, owl or cockatoo breeding habitat is present in the study area and no mirobat breeding habitat is present in the subject site.

No threatened flora species were detected during the survey by *Travers bushfire & ecology* nor during previous surveys conducted for the SIS. The site provides limited or marginal habitat for a few species and whilst survey has not been conducted during the flowering period for *Tetratheca glandulosa,* it has not been previously recorded in the Austlink Business Park.

Vegetation observed on site has some affiliation to Duffys Forest EEC, particularly the canopy, however the understorey is quite different to what would be expected and there are no laterites on site. The subject site and study area are thus not constrained by EEC vegetation.

No endangered populations are likely to occur on site.

A Species Impact Statement is not considered to be relevant for the proposal on site, and a referral to the Commonwealth Department of Environment (DOE) is not required.

6.1 Recommendations

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

- Undertake regular low impact weed control within the retained E2 portion of the site (northern boundary) to minimise establishment and spread of invasive weeds.

- There are no recommendations in respect to threatened fauna species for the proposed rezoning, however the future assessment associated with a development application of the B7 Business Park zoned area will require relocation or replacement of hollows and supervision during their removal.

- Undertake planting of native species within garden beds to minimise garden escapes dominating native bushland.

Attachment 1:

Fauna Survey Effort

Table A1.1 - Fauna survey effort

Fauna group	Date	Weather conditions	Survey technique(s)	Survey effort / time (24hr)
Diurnal birds	1/6/16	8/8 cloud, no wind, previous rain, no wind, 15°C 8/8 cloud, no wind, previous rain, no wind, 13°C	Diurnal opportunistic Diurnal opportunistic	2hrs 1200 - 1400 30mins 1700 - 1730
Nocturnal birds	1/6/16	2/8 cloud, moderate/strong ENE wind, 16°C	Spotlighting Call playback (threatened owls)	1hr 10min 1730 - 1840 Commenced @ 1800
Arboreal mammals	1/6/16	2/8 cloud, moderate/strong ENE wind, 16°C	Spotlighting	1hr 10min 1730 - 1840
Terrestrial mammals	1/6/16	2/8 cloud, moderate/strong ENE wind, 16°C	Spotlighting	1hr 10min 1730 - 1840
Bats	1/6/16	2/8 cloud, moderate/strong ENE wind, 16°C	Spotlighting / ultrasonic recording (passive monitoring) x2	2hr 20min 1730 - 1840
Reptiles	1/6/16	8/8 cloud, no wind, previous rain, no wind, 15°C	Diurnal opportunistic	2hrs 1200 - 1400
Amphibians	1/6/16	2/8 cloud, moderate/strong ENE wind, 16°C	Spotlighting & call identification	1hr 10min 1730 - 1840

Attachment 2:

Flora & Fauna Species Lists

Table A2.1 - Flora species list

Family	Scientific name	Common name
Trees		
Mimosaceae	*Acacia elata*	Cedar Wattle
Mimosaceae	*Acacia irrorata* subsp. *irrorata*	Green Wattle
Mimosaceae	*Acacia parramattensis*	Parramatta Wattle
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Proteaceae	*Banksia serrata*	Old Man Banksia
Cunoniaceae	*Callicoma serratifolia*	Black Wattle
Casuarinaceae	*Casuarina cunninghamiana*	River Oak
Lauraceae	*Cinnamomum camphora**	Camphor Laurel
Myrtaceae	*Corymbia gummifera*	Red Bloodwood
Cyatheaceae	*Cyathea australis*	Rough Tree-fern
Eleocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash
Myrtaceae	*Eucalyptus capitellata*	Brown Stringybark
Myrtaceae	*Eucalyptus globoidea*	White Stringybark
Myrtaceae	*Eucalyptus haemastoma*	Scribbly Gum
Myrtaceae	*Eucalyptus oblonga*	-
Myrtaceae	*Eucalyptus pilularis*	Blackbutt
Myrtaceae	*Eucalyptus piperita* subsp. *piperita*	Sydney Peppermint
Myrtaceae	*Eucalyptus sieberi*	Silvertop Ash
Phyllanthaceae	*Glochidion ferdinandi*	Cheese Tree
Arecaceae	*Livistona australis*	Cabbage Tree Palm
Myrsinaceae	*Myrsine variabilis*	Muttonwood
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Myrtaceae	*Tristaniopsis laurina*	Water Gum
Shrubs		
Mimosaceae	*Acacia fimbriata*	Fringed Wattle
Mimosaceae	*Acacia floribunda*	Sally Wattle
Mimosaceae	*Acacia longifolia* var. *longifolia*	Sydney Golden Wattle
Mimosaceae	*Acacia myrtifolia*	Red Stem Wattle
Mimosaceae	*Acacia suaveolens*	Sweet Scented Wattle
Mimosaceae	*Acacia terminalis*	Sunshine Wattle
Mimosaceae	*Acacia ulicifolia*	Prickly Moses
Proteaceae	*Banksia ericifolia* var. *ericifolia*	Heath-leaved Banksia
Proteaceae	*Banksia marginata*	Silver Banksia
Proteaceae	*Banksia oblongifolia*	-
Proteaceae	*Banksia spinulosa* var. *spinulosa*	Hairpin Banksia
Cunoniaceae	*Bauera rubioides*	River Rose
Rutaceae	*Boronia ledifolia*	Sydney Boronia
Fabaceae	*Bossiaea heterophylla*	Variable Bossiaea
Fabaceae	*Bossiaea obcordata*	Spiny Bossiaea
Cunoniaceae	*Ceratopetalum gummiferum*	Christmas Bush
Sapindaceae	*Dodonaea triquetra*	Hop Bush
Ericaceae	*Dracophyllum secundatum*	-
Epacridaceae	*Epacris longiflora*	Native Fuschia
Proteaceae	*Grevillea linearifolia*	Linear-leaf Grevillea
Proteaceae	*Hakea dactyloides*	Broad-leaved Hakea
Proteaceae	*Hakea teretifolia*	Dagger Hakea

Family	Scientific name	Common name
Dilleniaceae	*Hibbertia riparia*	-
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart
Fabaceae	*Hovea linearis*	-
Proteaceae	*Lambertia formosa*	Mountain Devil
Sterculiaceae	*Lasiopetalum ferrugineum* var. *ferrugineum*	Rusty Velvet-bush
Myrtaceae	*Leptospermum polygalifolium*	Tantoon
Myrtaceae	*Leptospermum trinervium*	Flaky-barked Tea-tree
Epacridaceae	*Leucopogon juniperinus*	Prickly Beard-heath
Oleaceae	*Ligustrum sinense**	Small-leaved Privet
Proteaceae	*Lomatia silaifolia*	Crinkle Bush
Oleaceae	*Notelaea longifolia*	Mock Olive
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
Rubiaceae	*Opercularia aspera*	Common Stinkweed
Asteraceae	*Ozothamnus diosmifolius*	White Dogwood
Proteaceae	*Persoonia lanceolata*	Lance-leaved Geebung
Proteaceae	*Persoonia levis*	Broad-leaved Geebung
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung
Proteaceae	*Persoonia pinifolia*	Pine-leaved Geebung
Euphorbiaceae	*Phyllanthus hirtellus*	Thyme Spurge
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum
Fabaceae	*Platylobium formosum*	Handsome Flat-pea
Fabaceae	*Pultenaea daphnoides*	Large-leaf Bush Pea
Lamiaceae	*Westringia fruiticosa*	Coast Westringia
Groundcovers		
Orchidaceae	*Acianthus fornicatus*	Pixie Caps
Asteraceae	*Ageratina adenophora**	Crofton Weed
Myrsinaceae	*Anagallis arvensis**	Scarlet Pimpernel
Poaceae	*Andropogon virginicus**	Whisky Grass
Poaceae	*Anisopogon avenaceus*	Oat Speargrass
Iridaceae	*Aristea ecklonii**	Blue Stars
Poaceae	*Aristida vagans*	Three-awn Speargrass
Poaceae	*Axonopus fissifolius**	Narrow-leafed Carpet Grass
Restionaceae	*Baloskion tetraphyllum* subsp. *meiostachyum*	
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern
Dicksoniaceae	*Calochlaena dubia*	Rainbow Fern
Apiaceae	*Centella asiatica*	Indian Pennywort
Asteraceae	*Cirsium vulgare**	Spear Thistle
Asteraceae	*Conyza sumatrensis**	Fleabane
Poaceae	*Cortaderia selloana**	Pampas Grass
Orchidaceae	*Cryptostylis erecta*	Bonnet Orchid
Orchidaceae	*Cryptostylis subulata*	Large Tongue Orchid
Cyperaceae	*Cyathochaeta diandra*	-
Cyperaceae	*Cyperus brevifolius**	Mullumbimby Couch
Phormiaceae	*Dianella caerulea* var. *caerulea*	Flax Lily
Convolvulaceae	*Dichondra repens*	Kidney Weed
Iridaceae	*Dietes grandiflora**	Spanish Iris
Orchidaceae	*Dipodium variegatum*	Blotched Hyacinth Orchid
Poaceae	*Echinopogon caespitosus* var.	Tufted Hedgehog Grass

Family	Scientific name	Common name
	caespitosus	
Restionaceae	*Empodisma minus*	-
Poaceae	*Entolasia stricta*	Wiry Panic
Asteraceae	*Erechtites valerianifolia**	Brazilian Fireweed
Asteraceae	*Euchiton sphaericus*	-
Euphorbiaceae	*Euphorbia peplus**	Spurge
Cyperaceae	*Gahnia clarkei*	Tall Saw-sedge
Cyperaceae	*Gahnia erythrocarpa*	Saw Sedge
Cyperaceae	*Gahnia sieberiana*	Red-fruit Saw-sedge
Gleicheniaceae	*Gleichenia dicarpa*	Pouched Coral Fern
Haloragaceae	*Gonocarpus teucroides*	Raspwort
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower
Dilleniaceae	*Hibbertia linearis*	-
Apiaceae	*Hydrocotyle peduncularis*	Pennywort
Asteraceae	*Hypochaeris radicata**	Flatweed
Dennstaedtiaceae	*Hypolepis grandulifera*	Downy Ground Fern
Dennstaedtiaceae	*Hypolepis muelleri*	Harsh Ground Fern
Poaceae	*Imperata cylindrica* var. *major*	Blady Grass
Juncaceae	*Juncus usitatus*	Common Rush
Cyperaceae	*Lepidosperma filiforme*	-
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Cyperaceae	*Lepidosperma urophorum*	-
Restionaceae	*Leptocarpus tenax*	Slender Twine-rush
Restionaceae	*Lepyrodia scariosa*	Scale Rush
Lindsaeaceae	*Lindsaea linearis*	Screw Fern
Lindsaeaceae	*Lindsaea microphylla*	Lacy Wedge-fern
Lomandraceae	*Lomandra cylindrica*	-
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Lomandraceae	*Lomandra multiflora* var. *multiflora*	Many-flowered Mat-rush
Lomandraceae	*Lomandra obliqua*	Twisted Mat-rush
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Grass
Davalliaceae	*Nephrolepis cordifolia**	Fish-bone Fern
Liliaceae	*Nothoscordum borbonicum**	Onion Weed
Poaceae	*Oplismenus aemulus*	Basket Grass
Poaceae	*Oplismenus imbecillis*	-
Oxalidaceae	*Oxalis corniculata**	Yellow Wood Sorrel
Poaceae	*Panicum simile*	Two Colour Panic
Poaceae	*Paspalum dilatatum**	Paspalum
Iridaceae	*Patersonia sericea*	Wild Iris
Poaceae	*Phalaris aquatica**	Phalaris
Thymelaeaceae	*Pimelea linifolia* subsp. *linifolia*	Slender Rice Flower
Plantaginaceae	*Plantago lanceolata**	Ribwort
Lobeliaceae	*Pratia purpurascens*	Whiteroot
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Cyperaceae	*Schoenus melanostachys*	Black Bog Rush
Asteraceae	*Senecio madagascariensis**	Fireweed
Poaceae	*Setaria parviflora**	-
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Solanaceae	*Solanum nigrum**	Black Nightshade
Asteraceae	*Sonchus oleraceus**	Common Sow-thistle
Poaceae	*Sporobolus africanus**	Parramatta Grass

Family	Scientific name	Common name
Asteraceae	*Taraxacum officinale**	Dandelion
Elaeocarpaceae	*Tetratheca thymifolia*	Black-eyed Susan
Fabaceae	*Trifolium repens**	White Clover
Verbenaceae	*Verbena bonariensis**	Purpletop
Plantaginaceae	*Veronica plebeia*	Creeping Speedwell
Violaceae	*Viola hederacea*	Ivy-leaved Violet
Xanthorrhoaceae	*Xanthorrhoea media*	-
Apiaceae	*Xanthosia pilosa*	Woolly Xanthosia
Apiaceae	*Xanthosia tridentata*	Rock Xanthosia
Vines		
Apocnyaceae	*Araujia sericifera**	Mothvine
Pittosporaceae	*Billardiera scandens* var. *scandens*	Apple Dumplings
Lauraceae	*Cassytha glabella* forma *glabella*	Slender Devil's Twine
Lauraceae	*Cassytha pubescens*	Common Devil's Twine
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Fabaceae	*Glycine clandestina*	Twining Glycine
Fabaceae	*Glycine microphylla*	-
Fabaceae	*Hardenbergia violacea*	False Sarsparilla
Araliaceae	*Hedera helix**	English Ivy
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea-flower
Fabaceae	*Kennedia rubicunda*	Dusky Coral Pea
Passifloraceae	*Passiflora edulis**	Common Passionfruit
Smilacaceae	*Smilax glyciphylla*	Sarsaparilla
Fabaceae	*Vicia sativa* subsp. *sativa**	Common Vetch
*** denotes exotic species**		

Table A2.2 - Fauna species list

Common name	Scientific name	Method observed
Birds		**June 2016**
Eastern Whipbird	*Psophodes olivaceus*	O W
Glossy Black-Cockatoo [TS]	*Calyptorhynchus lathami*	O W
Laughing Kookaburra	*Dacelo novaeguineae*	E
Noisy Miner	*Manorina melanocephala*	O W
Pied Currawong	*Strepera graculina*	W
Rainbow Lorikeet	*Trichoglossus haematodus*	O W
Spotted Pardalote	*Pardalotus punctatus*	W
Superb Fairy-wren	*Malurus cyaneus*	W[PR]
Mammals		
Swamp Wallaby	*Wallabia bicolor*	P[PR]

Note: * indicates introduced species
[TS] indicates threatened species

All species listed are identified to a high level of certainty unless otherwise noted as:

[PR] indicates species identified to a 'probable' level of certainty – more likely than not
[PO] indicates species identified to a 'possible' level of certainty – recorded to a moderate to high level of uncertainty usually applied to a threatened species of note.

E - Nest/roost	H - Hair/feathers/skin	P - Scat	W - Heard call
F - Tracks/scratchings	K - Dead	Q - Camera	X - In scat
FB - Burrow	O - Observed	T - Trapped/netted	Y - Bone/teeth/shell
G - Crushed cones	OW - Obs & heard call	U - Anabat/ultrasound	Z - In raptor/owl pellet

Attachment 3:

Threatened Flora & Fauna
Habitat Assessment

Table A3.1 - Threatened flora habitat assessment

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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 pubescens OEH	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	x	-	-	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
Ancistrachne maidenii OEH	V	-	Decumbent grass. Grows in sandstone-derived soils. Distribution limits Berowra Waters, Brooklyn and Wisemans Ferry.	x	x	-	-	x	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

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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**	
Boronia umbellata OEH	V	V	Orara Boronia is an open shrub, 1 – 2m tall. Geographically restricted to Glenreagh and Lower Bucca, north of Coffs Harbour where it grows around gullies in wet open forest.	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	-	-	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	x	-	-	x	x
Chamaesyce psammogeton OEH	E1	-	Prostrate herb. Coastal dunes. Distribution limits N-Tweed Heads S-Jervis Bay.	x	x	-	-	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
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	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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 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	x	-	-	x	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
Diuris bracteata OEH EPBC	E1	Ext.	An orchid that grows in dry sclerophyll woodland. Was thought to be extinct until approximately 10yrs ago. Found in the Sydney Basin Bioregion. Flowers in September.	x	x	-	-	x	x
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	marginal	✓	✓	low	✓
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 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	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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 scoparia OEH	E1	V	Smooth-barked tree only known from vicinity of Bald Rock.	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	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
Grevillea shiressii EPBC	V	V	Shrub 2-5m high. Flowers mainly spring. Grows along creek banks in wet sclerophyll forest. Sandy soil on Hawkesbury sandstone. Restricted to the Gosford area. CC.	x	x	-	-	x	x
Haloragis exalata subsp. *exalata* OEH	V	V	Shrub to 1.5m high. Grows in damp places near watercourses. Distribution limits N-Tweed Heads 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**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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**	
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.	-	-	-	-	-	-
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	Only one record within 10km, pre 1950	x	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	x	Only one record within 10km	✓	x	x
Kunzea rupestris OEH EPBC	V	V	Shrub to 1.5m high. Grows in cracks and fissures on Hawkesbury sandstone rock platforms. Distribution limits N-Maroota S-Glenorie.	x	x	-	-	x	x
Lasiopetalum joyceae OEH EPBC	V	V	Erect shrub to 2m high. Grows in heath and open forest on Hawkesbury sandstone. Distribution limits Hornsby Plateau.	x	x	-	-	x	x
Leptospermum deanei OEH EPBC	V	V	Shrub to 5m high. Grows on forested slopes. Distribution limits Near watershed of Lane Cove River.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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**	
Melaleuca biconvexa 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	-	-	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	possible	✓	✓	low	✓
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	poor	✓	✓	very low	✓
Persoonia mollis subsp. *maxima* OEH 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

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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**	
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	marginal	✓	✓	low	✓
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	x	-	-	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
Senecio spathulatus OEH	E1	-	A low growing daisy that prefers primary dunes. Known to occur at Cape Howe and between Kurnell north to Myall Lakes National Park. Also occurs in coastal locations in eastern Victoria.	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	x	-	-	x	x

Scientific name DATABASE SOURCE	***TSC Act***	***EPBC Act***	**Growth form and habitat requirements**	**Recorded on site (✓)**	**If not recorded onsite**				**Considered in 7 part test of significance (✓) Refer to Attachment 4**
					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**	
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	moderate	✓	✓	✓	✓
Thesium australe 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

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
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 A3.2 - Threatened fauna habitat assessment

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**IF NOT RECORDED ON-SITE**				**CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)**
					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.*	×	marginal	×	✓	unlikely	✓
Stuttering Frog *Mixophyes balbus* EPBC	E	V	Terrestrial inhabitant of rainforest and wet sclerophyll forests. *Distribution Limit: N-near Tenterfield S-South of Bombala.*	×	×	-	-	×	×
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.*	×	marginal	✓	✓	unlikely	✓
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.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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.*	×	×	-	-	×	×
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.*	×	marginal	✓	✓	unlikely	✓
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.*	×	marginal	×	×	Not likely	×
Wompoo Fruit-dove *Ptilinopus magnificus* OEH	V	-	Inhabits large undisturbed patches of lowland and adjacent highland rainforest and moist eucalypt forests where it feeds on fruit. *Distribution Limit: N-Tweed Heads. S-Sydney.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
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.*	×	×	-	-	×	×
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.*	×	×	-	-	×	×
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.*	×	×	-	-	×	×
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.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**IF NOT RECORDED ON-SITE**				**CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)**
					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 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.*	×	Sub-optimal	✓	✓	low	✓
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.*	×	✓	×	✓	low	✓
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.*	×	×	-	-	×	×
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.*	×	×	-	-	×	×
Australian Painted Snipe *Rostratula australis* OEH 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.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
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.*	×	✓	×	×	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.*	✓	-	-	-	-	✓
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.*	×	✓	✓	✓	✓	✓
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.*	×	×	-	-	×	×
Turquoise Parrot *Neophema pulchella* OEH	V	-	Inhabits coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands. *Distribution Limit: N-Near Tenterfield. S-South of Eden.*	×	marginal	×	×	Not likely	×

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
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.*	×	Sub-optimal	✓	✓	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.*	×	✓	✓	✓	✓	✓
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.*	×	Sub-optimal	×	✓	unlikely	✓
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.*	×	✓	×	✓	low	✓
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.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
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.*	×	×	-	-	×	×
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.*	×	✓	×	×	Not likely	×
Black-chinned Honeyeater *Melithreptus gularis gularis* OEH	V	-	Found in woodlands containing box-ironbark associations and River Red Gums, also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence. *Distribution Limit: N-Cape York Pen. Qld. S-Victor H. Mt Lofty Ra & Flinders Ra. SA.*	×	×	-	-	×	×
Grey-crowned Babbler *Pomatostoomus temporalis temporalis* OEH	V	-	Found in dry open forests, woodland scrubland, farmland with isolated trees. Distribution Limit mostly west of Great Dividing Range except Hunter Valley. *Distribution Limit: N-Qld widespread. S-Mornington Pen. E-se SA.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
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.*	×	✓	×	✓	✓	✓
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.*	×	✓	×	×	unlikely	✓
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.*	×	Sub-optimal	✓	✓	unlikely	✓
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.*	×	Sub-optimal	✓	✓	unlikely	✓

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**IF NOT RECORDED ON-SITE**				**CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)**
					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.*	×	×	-	-	×	×
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.*	×	Sub-optimal	✓	✓	unlikely	✓
Squirrel Glider *Petaurus norfolcensis* OEH	V	-	Mixed aged stands of eucalypt forest & woodlands including gum barked & high nectar producing species & hollow bearing trees. *Distribution Limit: N-Tweed Heads. S-Albury.*	×	Sub-optimal	×	×	Not likely	×
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.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	**TSC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**IF NOT RECORDED ON-SITE**				**CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)**
					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**	
Long-nosed Potoroo *Potorous tridactylus* EPBC	V	V	Coastal heath and dry and wet sclerophyll forests with a dense understorey. *Distribution Limit: N-Mt Warning National Park. S-South of Eden.*	×	Sub-optimal	×	×	Not likely	×
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.*	×	×	-	-	×	×
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.*	×	✓	✓	✓	✓	✓
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* OEH	V	-	Rainforests, sclerophyll forests and woodlands. *Distribution Limit: N-North of Walgett. S-Sydney.*	×	✓	×	×	unlikely	✓

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
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.*	×	Sub-optimal	×	✓	low	✓
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.*	×	Sub-optimal	×	✓	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.*	×	Sub-optimal	×	✓	low	✓
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.*	×	✓	✓	✓	✓	✓
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.*	×	✓	✓	✓	✓	✓

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
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.*	×	×	-	-	×	×
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.*	×	✓	×	✓	low	✓
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. Recolonise of regenerating burnt areas. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	×	Sub-optimal	×	✓	unlikely	N/A
Dural Land Snail *Pommerhelix duralensis* EPBC	-	E	Inhabits shale-influenced habitat along the north-western fringes of the Cumberland Plan on shale-sandstone transitional landscapes. Occur in low abundance and shelters under logs, debris, and leaf litter. *Distribution Limit: St Albans to Mulgoa with most records from The Hills LGA.*	×	×	-	-	×	×

Common name ***Scientific name*** DATABASE SOURCE	TSC Act	EPBC Act	Preferred habitat ***Distribution limit***	Recorded on site (✓)	IF NOT RECORDED ON-SITE				CONSIDERED IN 7 PART TEST (✓) (Refer to Attachment 4)
					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	
Macquarie Perch *Macquaria australasica* EPBC	V (FM Act 1994)	E	Occurs in south east Australia at moderate to high altitudes in rivers and reservoirs. Historical records show the species was widespread and abundant in the upper reaches of the Lachlan, Murrumbidgee and Murray Rivers and their tributaries. Allen (1989) states that introduced populations are present in Nepean River and water supply dams in the Sydney area. Occurs in lakes and flowing streams, usually in deep holes.	×	×	-	-	×	×
Australian Greyling *Prototroctes maraena* EPBC	Part 2, Section 19 – Protected Fish (FM Act 1994)	V	Clear, moderate to fast flowing water in the upper reaches of rivers (sometimes to altitudes above 1,000m). Typically found in gravel bottom pools. Often forming aggregations below barriers to upstream movement (e.g. weirs, waterfalls).	×	×	-	-	×	×

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
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 A3.3 – Migratory fauna habitat assessment

COMMON NAME *Scientific Name*	PREFERRED HABITAT *Migratory Breeding*	Suitable Habitat Present (✓)	Recorded on Site (✓)	COMMENTS
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.	✓	×	-
White-bellied Sea Eagle (*Haliaeetus leucogaster*)	Coasts, islands, estuaries, inlets, large rivers, inland lakes, reservoirs. *Sedentary; dispersive.*	×	-	-
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.*	✓	×	-
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.*	✓	×	-
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.*	×	-	-
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.*	✓	×	-
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.	×	-	-
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.*	✓	×	-
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.*	✓	×	-

COMMON NAME *Scientific Name*	PREFERRED HABITAT *Migratory Breeding*	Suitable Habitat Present (✓)	Recorded on Site (✓)	COMMENTS
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.*	×	-	-
Bar-tailed Godwit (*Limosa lapponica*)	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh.	×	-	-
Common Greenshank (*Tringa nebularia*)	Found in a wide variety of inland wetlands and sheltered coastal habitats (with large mudflats and saltmarsh, mangroves or seagrass) of varying salinity, Habitats include embayments, harbours, river estuaries, deltas and lagoons. It uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. Also artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. In NSW the Hunter River estuary has been identified as a site of international importance. *Breeds in Eurasia, the northern British Isles, Scandanavia, east Estonia and north-east Belarus, through Russia and east.*	×	-	-

COMMON NAME *Scientific Name*	PREFERRED HABITAT *Migratory Breeding*	Suitable Habitat Present (✓)	Recorded on Site (✓)	COMMENTS
Little Curlew (*Numenius minutus*)	Feeds in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used. When resting, congregates around pools, river beds and water-filled tidal channels, and shallow water at edges of billabongs. Prefers pools with bare dry mud and they do not use pools if they are totally dry, flooded or heavily vegetated. *Breeds in Russia.*	×	-	-
Little Tern (*Sternula albifronds*)	In Australia, Little Terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches. Little Terns nest on sand-spits, banks, ridges or islets and also on wide and flat or gently sloping sandy ocean beaches, and occasionally in sand-dunes. Forage in shallow waters of estuaries, coastal lagoons and lakes, frequently over channels next to spits and banks or entrances, and often close to breeding colonies. They also forage along open coasts, especially around bars off the entrances to rivers and lagoons, less often at sea, and usually within 50 m of shore.	×	-	-
Osprey (*Pandion haliaetus*)	Favours coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over clear, open water. Breeds from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometer of the sea.	×	-	-
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.*	✓	×	-

Attachment 4:

7 Part Test of Significance
(Section 5A EPA Act 1979)

7 Part Test of Significance

(Section 5A EPA Act 1979)

Council, or the authorising authority is required to consider the impact upon threatened species, populations and / or EECs from any development or activity via the process of a 7 part test of significance. The significance of the assessment is then used to determine the need for a more detailed SIS.

Flora and fauna investigations and habitat assessments of the study area have resulted in the identification of suitable habitat for the following threatened species and populations with varying potential to occur. Species recorded or with a considered potential to occur have been noted. The potential for any direct or indirect impacts on these species has also been considered and noted.

Threatened flora

Scientific name	*TSC Act*	Potential to occur	Potential impact
Epacris purpurascens var. *purpurascens*	V	low	Removal of marginal potential habitat
Microtis angusii	E1	low	Removal of marginal potential habitat
Persoonia hirsuta	E1	very low	Removal of marginal potential habitat
Pimelea curviflora var. *curviflora*	V	low	Removal of marginal potential habitat
Tetratheca glandulosa	V	low	Removal of marginal potential habitat

Threatened fauna

Common name	TSC Act	Potential to occur	Potential habitat impact
Glossy Black-Cockatoo	V	recorded	Direct - Temporary perching
Little Lorikeet	V	✓	Direct - suitable foraging
Powerful Owl	V	✓	Direct - suitable foraging & roosting
Varied Sittella	V	✓	Direct - suitable foraging unlikely roosting & breeding
Grey-headed Flying-fox	V	✓	Direct - likely seasonal foraging
Little Bentwing-bat	V	✓	Direct - suitable foraging
Eastern Bentwing-bat	V	✓	Direct - likely foraging
Little Eagle	V	low	Direct - low potential foraging
Square-tailed Kite	V	low	Direct - suitable foraging
Barking Owl	V	low	Direct - low potential foraging
Sooty Owl	V	low	Direct - low potential foraging
East-coast Freetail Bat	V	low	Direct - low potential foraging
Large-eared Pied Bat	V	low	Direct - low potential foraging
Eastern Falsistrelle	V	low	Direct - low potential foraging
Greater Broad-nosed Bat	V	low	Direct - low potential foraging
Giant Burrowing Frog	V	unlikely	Direct - unlikely foraging & burrowing
Red-crowned Toadlet	V	unlikely	Direct - unlikely dispersal
Rosenberg's Goanna	V	unlikely	Direct - unlikely summer foraging
Gang-gang Cockatoo	V	unlikely	Direct - unlikely foraging
Masked Owl	V	unlikely	Direct - unlikely foraging
Scarlet Robin	V	unlikely	Direct - unlikely seasonal foraging
Spotted-tailed Quoll	V	unlikely	Direct - unlikely foraging
Southern Brown Bandicoot	E	unlikely	Direct - unlikely foraging, denning & breeding

Common name	TSC Act	Potential to occur	Potential habitat impact
Eastern Pygmy Possum	V	unlikely	Direct - unlikely foraging
Yellow-bellied Sheathtail-bat	V	unlikely	Direct - unlikely foraging

Endangered populations

- None for fauna
- None for flora

Endangered ecological communities

- No EECs

The 7 part test of significance is as follows:

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

The direct impacts of the proposal within the subject site are considered as:

- Removal/modification of up to 0.56 ha of vegetation (estimate), of which there is 0.52 ha of native vegetation – Coastal Sandstone Gully Forest. The subject site (E2 lands for rezoning) however is less than 0.02 ha.
- Subsequent removal of a small portion of threatened fauna species foraging habitat.

There are not potential indirect impacts considered of development associated with the proposed rezoning of the subject site.

With consideration to the relative direct impacts on all threatened species with varying potential to occur, it is considered that the proposal is unlikely to disrupt the life cycle for any of these listed species such that a viable local population would be placed at risk of extinction. Species recorded present during survey, previously recorded nearby or with high potential to occur and requiring further discussion given potential impacts are further discussed in detail below.

Summary of threatened species recorded

Glossy Black-Cockatoo *(Calyptorhynchus lathami)*

The Glossy Black-Cockatoo inhabits mountain forests, coastal woodland, open forest and trees bordering watercourses where there are substantial stands of *Allocasuarina*. They feed almost exclusively on the fruit of *Allocasuarina* species (*Lindsey* 1992). They choose trees with larger cone crops but show no sign of selecting trees on the basis of cone size – concentrating foraging in trees with a high ratio of total seed weight to cone weight. (Clout 1989). They breed in hollow trees or stumps usually in Eucalypts.

Six (6) Glossy Black-Cockatoo were observed fling into the study area and temporarily perching in the upper slopes area. They did not perch for long so the exact perch tree could not be effectively located at this time. An approximate location is shown on Figure 4. The birds flew in from the north and then flew off to the south. An analysis of the perching area did not locate any nearby seeding Allocasuarina trees. No seeding Allocasuarina trees are also present within the remaining study area. No suitable breeding hollows are also present

within the study area or nearby. Therefore the temporary landing location is termed a temporary perch location as no foraging or roosting habitat exists within the entire study area.

Given that the subject site does not provide any likely important habitat the development associated with the proposed rezoning is not likely to significantly impact on a local population of this species.

Summary of threatened species with highest potential to occur

Other threatened fauna species considered with highest potential to occur include the Little Lorikeet, Powerful Owl, Varied Sittella, Grey-headed Flying-fox, Little Bentwing-bat and Eastern Bentwing-bat. The subject site does not likely provide any breeding habitat or habitat of otherwise importance for these species.

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

Endangered populations are identified to the old northern Sydney LGA's or specific locations. There are no endangered fauna populations recognised as occurring within the old Warringah LGA. Endangered populations occurring within 10km of the study area (Koala, Squirrel Glider and Gang-gang Cockatoo) are not likely to occur based on habitat suitability or separation between known records.

No endangered flora populations occur within a 10km radius of the subject site and there are no currently listed endangered flora populations within Warringah LGA.

Therefore, it is considered that the action proposed is not likely to have an adverse effect on the life cycle of listed species above that constitute the endangered populations such that a viable local population of these species is likely to be placed at risk of extinction.

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

i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

The vegetation within the subject site and study area was not commensurate with locally occurring EECs, such as Duffys Forest. Section 4 provides details on the analysis.

It is therefore considered that the proposed development is unlikely to have an adverse effect on the extent of any ecological community such that its local occurrence is likely to be placed at risk of extinction.

ii. Is likely to substantially and adversely modify the composition such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

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

It is considered that the habitat attributes of the subject site provide known or potential habitat for *Epacris purpurascens* var. *purpurascens, Microtis angusii, Persoonia hirsuta, Pimelea curviflora* var. *curviflora, Tetratheca glandulosa,* Giant Burrowing Frog, Red-crowned Toadlet, Rosenberg's Goanna, Little Eagle, Square-tailed Kite, Gang-gang Cockatoo, Glossy Black-Cockatoo, Little Lorikeet, Barking Owl, Powerful Owl, Masked Owl, Sooty Owl, Varied Sittella, Scarlet Robin, Spotted-tailed Quoll, Southern Brown Bandicoot, Eastern Pygmy Possum, Grey-headed Flying-fox, Yellow-bellied Sheathtail-bat, East-coast Freetail Bat, Large-eared Pied Bat, Eastern Falsistrelle, Little Bentwing-bat, Eastern Bentwing-bat, Greater Broad-nosed Bat and New Holland Mouse.

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

The subject site has an area of less than 0.02 ha, containing Coastal Sandstone Gully Forest. Once rezoned, the total removal or modification of vegetation will amount to 0.56 ha approximately. Some of the vegetation proposed for removal or modification will have some level of suitable habitat for the aforementioned species.

ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The vegetation within the study area is part of a fragmented remnant that runs from behind the existing neighbouring industrial buildings through the site towards the frontage with Narabang Way (see Figure 9). The site does provide connectivity for small flying and gliding birds, bats and gliders through this remnant which has been fragmented by Narabang Way, Niangala Close, Minna Close and the very wide and busy Mona Vale Road and Forest Way. Beyond these roads connectivity continues immediately into Garigal and Ku-ring-gai Chase National Parks.

Due to the fragmentation caused from these roads and surrounding industrial development, the remaining internal remnants now provide reduced habitat potential for fauna diversity by comparison to that encountered within the National Parks beyond these roads. Table A2.2 shows a surprisingly small number of recorded birds during the site visit. There are also more direct connectivity options across Mona Vale Road and Forest Way between Garigal and Ku-ring-gai Chase National Parks (see Figure 9).

Development associated with the proposed rezoning will further fragment the connectivity potential of the internal remnant, particularly to the south. Despite this and as outlined above, the species diversity via this connective option is already highly reduced and unlikely to provide for valuable movements or core habitat for threatened fauna species.

Therefore, it is considered that known habitat for a threatened species, population or ecological community within the local area and region is unlikely to become isolated or fragmented as a result of the proposal.

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

In respect to threatened fauna species recorded or with potential to occur the proposed rezoning area itself and the likely associated development area of impact are not likely of high

quality, of any breeding importance or central to the home range requirements of any species such that behaviour or ecology of these species will be significantly altered in any way.

The proposal will remove or modify only low or marginal habitat for a few selected threatened flora species, however no known specimens.

The vegetation proposed for removal or modification is not part of a currently listed EEC.

There are no endangered populations being impacted by the proposal.

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

The site has not been identified as critical habitat within the provisions of the TSC Act. Therefore this matter does not require any further consideration at this time.

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

Draft state recovery plans have been prepared for the following threatened species with potential habitat within the subject site:

- Barking Owl (*Ninox connivens*) (NPWS 2003)

Approved state recovery plans have been prepared for the following threatened species with potential habitat within the subject site:

- Large Forest Owls ((Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*)) (DEC 2006).
- Southern Brown Bandicoot (*Isoodon obesulus*) (DEC 2006)

It is considered that the proposed development is generally consistent with the objectives or actions of the above-mentioned draft and approved recovery plans.

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

A key threatening process is defined in the *TSC Act* as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities.

The current list of key threatening processes under the *TSC Act*, and whether the proposed activity is recognised as a threatening process, is shown below.

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	**Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?**		
	Likely	**Possible**	**Unlikely**
Aggressive exclusion of birds by Noisy Miners (*Manorina melanocephala*)		✓	
Alteration of habitat following subsidence due to longwall			✓

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	Possible	Unlikely
mining			
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands			✓
Anthropogenic Climate Change		✓	
Bushrock removal			✓
Clearing of native vegetation	✓		
Competition and habitat degradation by feral goats			✓
Competition and grazing by the feral European Rabbit (*Oryctolagus cuniculus*)			✓
Competition from feral honeybees			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments			✓
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners			✓
High frequency fire resulting in the disruption of life-cycle processes in plants and animals and loss of vegetation structure and composition		✓	
Herbivory and environmental degradation caused by feral deer			✓
Importation of red imported fire ants into NSW			✓
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae		✓	
Infection of native plants by *Phytophthora cinnamomi*		✓	
Introduction of the large earth bumblebee (*Bombus terrestris*)			✓
Invasion and establishment of exotic vines and scramblers			✓
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)			✓
Invasion and establishment of the Cane Toad (*Bufo marinus*)			✓
Invasion, establishment and spread of *Lantana camara*			✓
Invasion of native plant communities by bitou bush & boneseed *Chrysanthemoides monilifera*			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of native plant communities by African Olive (*Olea europaea* subsp. *cuspidata*)			✓
Invasion of the Yellow Crazy Ant (*Anoplolepis gracilipes*)			✓
Loss of Hollow-bearing trees			✓
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants		✓	

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	Possible	Unlikely
Loss and/or degradation of sites used for hill-topping by butterflies			✓
Predation and hybridisation by feral dogs (*Canis lupus familiaris*)			✓
Predation by the European Red Fox (*Vulpes vulpes*)			✓
Predation by the Feral Cat (*Felis catus*)			✓
Predation by Gambusia holbrooki Girard, 1859 (plague minnow or mosquito fish)			✓
Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island			✓
Predation, habitat degradation, competition & disease transmission from Feral pigs (*Sus scofa*)			✓
Removal of dead wood and dead trees			✓

The above key threatening processes have been considered in reference to the proposal. It was considered that the proposal may contribute to a small degree to a number these processes as described below. It was not considered that the proposal will have a large or significant impact on any of the following key threatening processes. Some mitigation measures have been listed under each process to minimise or reduce such impacts upon those processes.

Summary of "likely" or "possible" Key Threatening Processes

This section identifies what mitigation measures can be implemented to address threatening processes.

Human-caused Climate Change

The rezoning proposal is associated with likely development of the southern portion of the study area. This will involve the removal of a small amount of vegetation which will result in a negative contribution to climate change. Vegetation is considered to act as a sink for a range of greenhouse gases but in particular Carbon Dioxide. The maintenance of native vegetation cover is a key strategy to combat the contributing impacts of the proposed action on Climate Change. Whilst almost insignificant in size, the proposal is part of the accumulative effect and thus should be considered as contributing to this threatening process.

Clearing of native vegetation

The proposal will require the removal of native vegetation and thus contributes to the cumulative impact of native vegetation loss. Landscaping of future garden beds will assist in limiting the impact but not compensate for it.

High frequency fire resulting in the disruption of life-cycle processes in plants and animals and loss of vegetation structure and composition

The rezoning proposal is associated with likely development of the southern portion of the study area. This will potentially result in increased bushfire mitigation burns of the remaining

remnant that will in-turn likely deplete the capacity for this remnant to support remaining flora and fauna species diversity.

Infection of native plants by Phytophthora cinnamomi

The proposal may temporarily increase the risk of fungal infection on site as it may be spread via vehicular movement and relocation of soil and vegetation. Consequently standard *Phytophthora cinnamomi* protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres. Any equipment found to contain soil or vegetation material is to be cleaned in a quarantined work area or wash station and treated with anti-fungal pesticides.

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

'Myrtle Rust' may be spread via machinery, animals and humans as well as by environmental factors such as wind. The presence of machinery and construction works is likely to slightly increase the potential for spread of this newly listed key threatening process. Similar protocols as to *Phytophthora cinnamomi* should be applied.

Loss of hollow-bearing trees

There are no recorded hollows within the subject site itself however the future associated development proposal of the study are will remove a small number of small hollows. The removal of these hollows will cause the proposal to be a key threatening process at this DA stage. The relocation or replacement of hollows will be a recommended mitigation measure to overcome this issue.

Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

There is potential that the E2 remnant bushland in the northern portion of the site may be impacted in the future by poor choices of planting for landscaping beds. Choosing locally occurring native species where possible will limit the risk.

Removal of dead wood and dead trees

No dead wood or dead trees of any likely value to threatened species habitat are present within the subject site area proposed for rezoning. Therefore the immediate proposal is not a key threatening process. There is however deadwood and dead trees that will require removal as part of future development of the study area as a result of the rezoning.