Travers

bushfire & ecology

Flora & Fauna Assessment

Residential Aged Care Facility

158 Macquarie Road,
CARDIFF

May 2016
(REF: A15069F2)

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(Residential Aged Care Facility)

Lot 2 DP 788892,
158 Macquarie Road, Cardiff

May 2016

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Survey effort has been reduced to provide an indication of the insitu vegetation and fauna habitat present. The 7 part test of significance is based on this survey data and further survey may result in the observation of threatened species not considered in this assessment. Consequently, further target threatened species survey may be required by the determining authority. The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy. Consequently, the location of all mapped features is to be confirmed by a registered surveyor.

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List of abbreviations

APZ	asset protection zone
BPA	bushfire protection assessment
DCP	Development Control Plan
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)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*
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*
RF Act	*Rural Fires Act*
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SEPP 44	*State Environmental Protection Policy No 44 – Koala Habitat Protection*
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

Travers bushfire & ecology has been engaged to undertake an ecological assessment at 158 Macquarie Road, Cardiff (Lot 2 DP 788892) within the Lake Macquarie City Council local government area (LGA). This lot runs parallel to Macquarie Road and will hereafter be referred to as the study area.

The full extent of the proposed development area within Lot 2 and thus subject to direct impacts will hereafter be referred to as the 'subject site'.

1.0 Proposed development

The proposed Stage 1 development involves the construction of a number of small cottage facilities totaling 99 beds, for residential aged care use. The proposed administration building / shop will be located at the south-western corner of the site as shown in Figure 1.

Figure 1 – Proposed development

A Vegetation Management Plan is recommended to guide the landscaping and tree planting works, particularly in order to restore cross-site connectivity for gliders and replace the native foraging potential of trees removed.

2.0 Survey

Botanical survey was undertaken on the 26th of November 2013. Botanical survey included a random meander in accordance with Cropper (1993) to gain a full species list of the plants within the site. One (1) 20x20m quadrat was undertaken within a remnant of vegetation in the south eastern corner of the site and one (1) 80m transect was undertaken along the western edge. Flora species recorded during survey are listed in Table A2.1 in Appendix 2. All vegetation survey work was undertaken over approximately 2.5hrs.

Fauna survey including diurnal and nocturnal survey and threatened species habitat assessment was undertaken within the subject site and nearby surrounds on 19th and 20th April 2016.

Diurnal fauna survey included bird activity and call survey, activity searches (scats, scratches, diggings, burrows, etc) and habitat tree survey. Nocturnal fauna survey included spotlighting, frog call identification, Anabat recording (x2 passive recording stations) and threatened owl, glider and Koala call-playback.

A site visit with a tree climber was undertaken on the 5th May 2016 to inspect all hollows within the study area and nearby identified as being suitable for Squirrel Glider

The full survey effort table showing timing and weather conditions is provided in Table A1.1 in Appendix 1. All fauna species recorded during survey within the subject site and nearby surrounds are listed in Table A2.2 in Appendix 2.

A review of the *Atlas of NSW Wildlife* (OEH 2013 and updated in 2016) and searches of the *EPBC Act* protected matters coordinate tool, were undertaken prior to the site visits to determine the threatened species previously recorded within 10km of the subject site. These species were considered in the habitat assessment (see Appendix 3 Tables 3.1 & 3.2).

Figure 4 shows the survey effort and results within the subject site.

3.0 Site description

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

Table 1 – Site features

	158 Macquarie Rd, Cardiff
Size	5.25ha
Local government area	Lake Macquarie
Grid reference	374500E 6352900N
Topography	Situated on a very slight northerly aspect. 30-40m AMSL
Geology and soils	Geology; Boolaroo Sub-Group – Irregular coal seams, tuff, sandstone, shale. Soils; Warners Bay Soil Landscape – moderately deep and poorly drained soils, undulating to rolling hills on fine-grained sediments of the Newcastle Coal Measures in the Awaba Hills.
Catchment and drainage	The site drains north into an unnamed tributary coming off Winding Creek, part of the Lake Macquarie catchment.
Vegetation	Some remnant vegetation remaining on the site but mostly cleared. Remnant vegetation is canopy only.
Existing land use	Golf range
Clearing	Previously cleared

Figure 2 – Aerial appraisal (source: *NearMap*)

3.1 Riparian features

Based on Six Maps topographic mapping (accessed on the 6th April 2015), the site does not contain any mapped watercourses (figure 3). As such the site is not considered to contain nor does the proposal impact on waterfront land. As such a referral to the NSW Office of Water under the Water Management Act (2000) is not required.

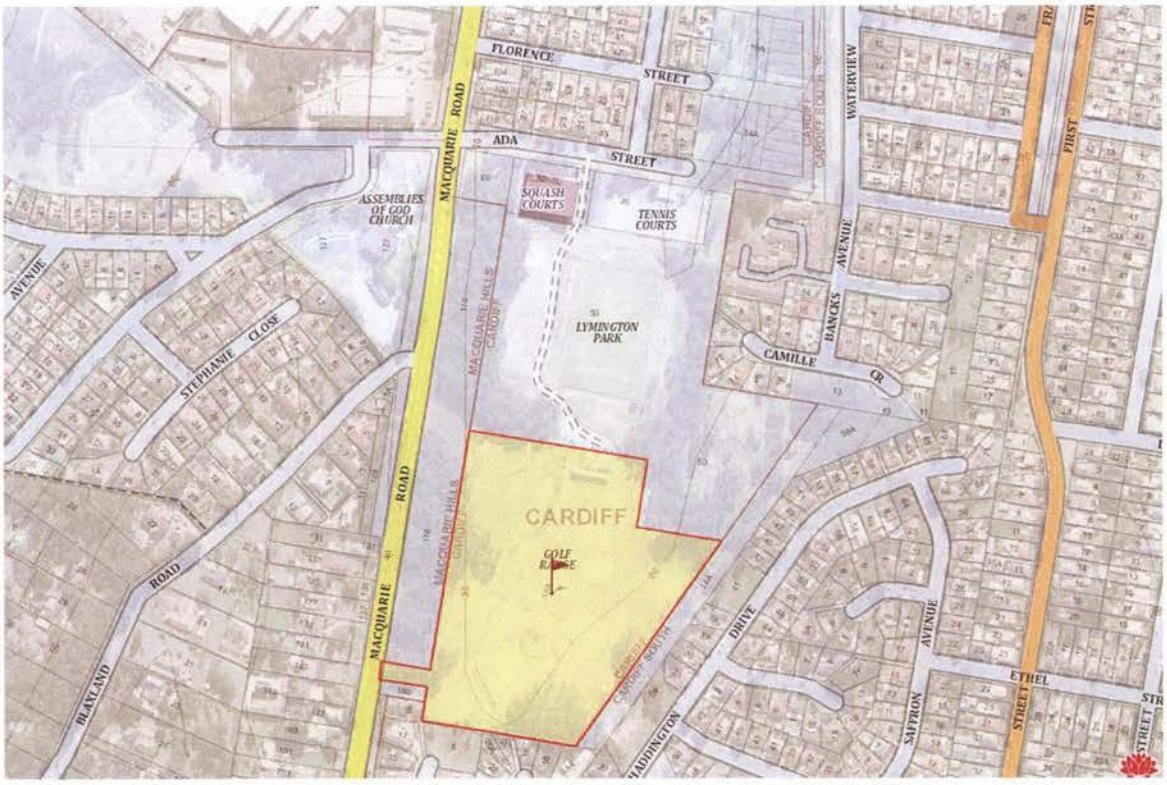

Figure 3 – Mapped streams (source: *Six Maps*)

An inspection of the site has identified the presence of two drainage lines which receive urban stormwater runoff from the surrounding residential areas. The inspection revealed that the site has been highly modified in the past with partial fragments of historical watercourses found within the site.

The extent of the northern most mapped stream (unnamed tributary of Wingding Creek) on adjoining lands is accurate and represents the commencement of a stream receiving stormwater from the local catchment including the proposed site.

Between the subject site and the northern most unnamed tributary, the stormwater passes through a stormwater pipe system surrounding the oval that has evidence of significant damage and potential blockages where the pipes have collapsed. The existing stormwater system appears to be dysfunctional as a result of poor capacity and broken pipe works.
The two drainage lines as confirmed onsite include (Figure 4):

- Drainage line 1 – centrally located north / south stormwater drainage line
- Drainage line 2 – north eastern artificial stormwater drainage line

Drainage line 1

The drainage line through the site and downstream have been highly modified but drainage line 1 shows natural characteristics which suggests that it is a historical watercourse.

The northern downstream portion of the drainage line has defined banks which have also been filled to create tee off points. However, there is no natural riparian vegetation present (Photos 1 & 2).

Photo 1 – Drainage line 1 - downstream crossing on northern site boundary

Photo 2 – Drainage line 1 - downstream portion showing fill on RHS but a stabilised natural formation channel

Photo 3 – Drainage line 1 - central portion showing pipe section (forefront) and stream channel (background).

The southern upstream end of the drainage line has been lowered, potentially as a combination of erosion and excavation of the channel. Urban stormwater is delivered into this drainage line through a concrete dish (off site to the south), stormwater pipes and is released via a culvert on to the site. The upstream southern portion of this drainage line is

not considered to be a watercourse given its constructed nature and has been formed as a result of stormwater diversion and channel construction.

The southern portion of the drainage is degraded, will require stabilisation such as an open channel with a low flow pipe or it could potentially be fully partially piped. Approximately midway through the site, the channel widens and becomes a more natural stream bank formation suggesting that the northern portion of the drainage line is natural and a former watercourse. Further downstream, land filling has occurred and the drainage line channel has steeply incised banks and contains many weed species.

Photo 4 – Drainage line 1 - southern portion showing channelised portion with active bed lowering

Photo 5 – Drainage line 1 – upstream stormwater culvert, commencement of watercourse

Portions of drainage line 1 have been piped for crossings and one section has blown out and requires rectification.

Photo 6 – Drainage line 1 – blowout at crossing

Drainage line 2

Drainage line 2 is fed by two (2) stormwater diversion drains on the south western boundary, the channel appears to have been significantly deepened, but only a small portion impacts on the site. Drainage line 2 is an artificial watercourse that was created by construction of a channel and diversion drainage above a former quarry site. The constructed drainage line has been retained and currently delivers urban stormwater from the eastern aspects of the site down to the unnamed tributary to the north.

Based on the site investigation, we have classified the channel as an intermittent first order stream in that functions as a watercourse. Portions of the channel within the site require bank and bed stabilisation works and will require rectification in the future.

Photo 7 – Drainage line 2 – channel immediately downstream of lot boundary

Photo 8 – Drainage line 2 – on site channel

Photo 9 – Upstream feeder drain into Drainage line 2

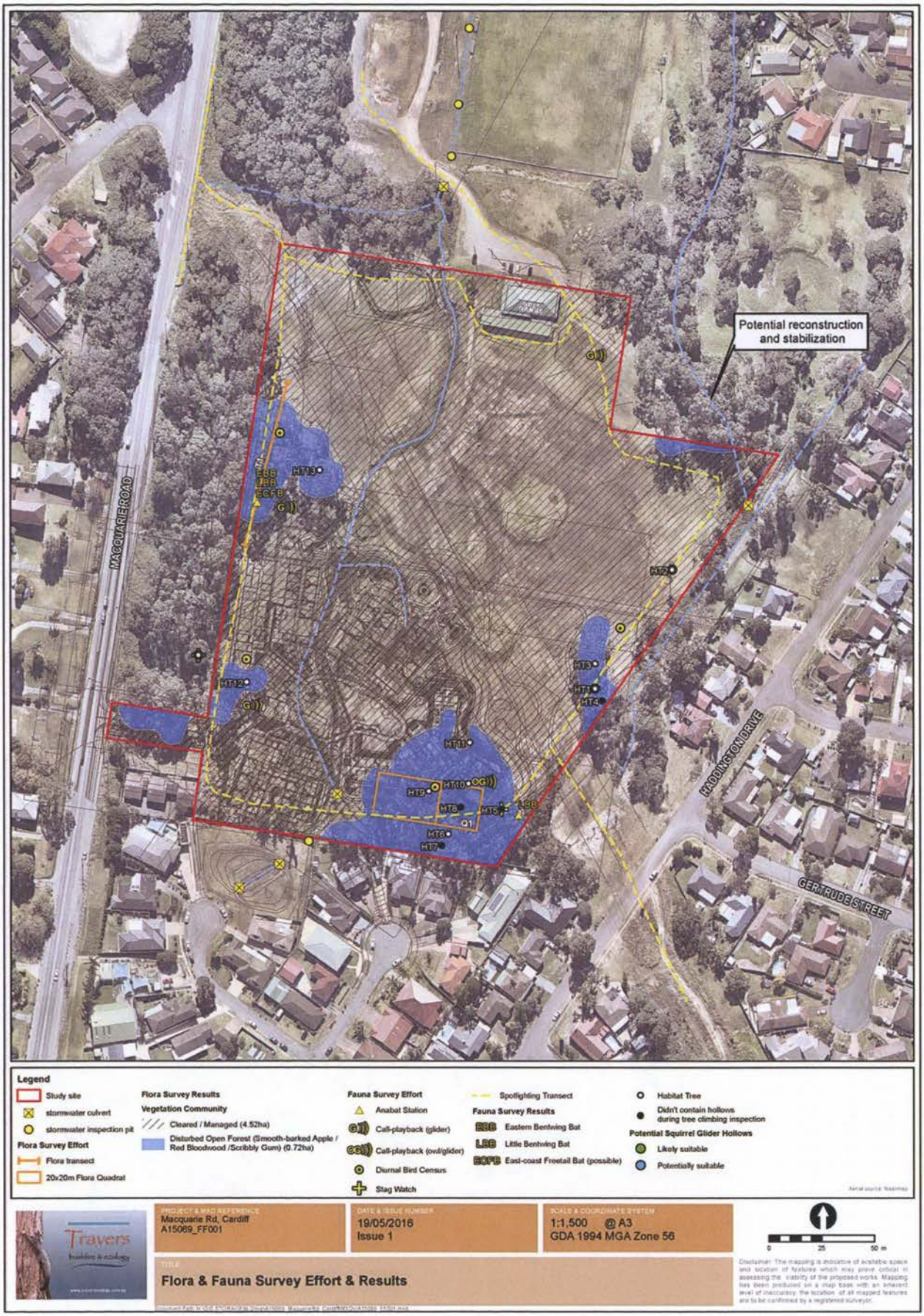

Figure 4 – Flora and fauna survey effort and results

4.0 Flora

4.1 Vegetation communities

Lake Macquarie City Council has produced vegetation mapping of the entire LGA (2013) as a working draft. A review of this mapping indicates the subject site is likely to contain the following vegetation types, either within the site or within remnant vegetation patches adjoining the subject site boundary:

- Map Unit 11 – Coastal Sheltered Apple – Peppermint Forest
- Map Unit 30e – Coastal Plains Stringybark – Apple Forest

Ground truthing of vegetation remnants within the subject site was undertaken to identify the communities present.

Two (2) vegetation communities were recorded on site:

- Disturbed Open Forest (Smooth-barked Apple / Red Bloodwood / Scribbly Gum)
- Cleared / Managed

Disturbed Open Forest (Smooth-barked Apple / Red Bloodwood / Scribbly Gum)

This vegetation community describes all bushland remaining within the subject site. Approximately 0.72ha or 14% of the subject site contains remnant bushland, centred on the peripheral edges.

The canopy comprises mostly *Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus signata* (Scribbly Gum) to a height of 17-25m and a projected foliage cover of approximately 35-40%.

The mid-storey was generally absent from all remnant patches and is mown or managed, however, some species were noted. There were no mid-storey species present within the quadrat undertaken in the south eastern corner of the subject site. Where mid-storey species were present, they were considered to be rare with few individuals observed more than once.

The ground layer of vegetation contained a limited number of native herbs, grasses and ferns. Within Quadrat 1, five (5) native grass species were recorded occupying 85% of all native species in the ground layer. Four (4) native small shrub, herb or forb species were recorded, along with four (4) exotic species.

Remnant bushland is considered to be poor to moderate quality with low native species diversity and generally an absent mid-storey. The pressures of current management would limit the regenerative capacity of the remnants and the pressures of edge effects are high, noted by the many non-native species observed.

These remnants are not part of any currently listed endangered ecological community (EEC) and, overall, have limited value ecologically. There is fragmented connectivity north and south of the subject site which has significant barriers such as major roads and transmission infrastructure.

The subject site contains limited remnant bushland which adds very little to the overall connective value within the local area. The remnant vegetation adjacent to the site is 40-50m in width (immediately west) and may provide a sufficient parcel for fauna movement, however, the vegetation is heavily fragmented and would most likely only be utilised by highly mobile species such as birds and bats.

The remnant bushland is of a condition that has a low likelihood of supporting locally threatened flora species.

Photo 10 – Remnant managed vegetation within Quadrat 1

Cleared / Managed

The vegetation within the majority of the subject site (86%) has been cleared and is managed grass / turf for the purpose of its utilisation as a golf range. The drainage line running north / south, near the centre of the subject site, contains high levels of exotic species such as *Paspalum dilatatum, Cyperus eragrostis* and *Rumex crispus.*

The cleared areas are managed for the provision of the golf driving range and have no viability for threatened flora species. These areas may have once supported some species but unless they were retained before the clearing, are not likely to return.

4.2 Threatened flora species

Threatened Species Conservation Act (TSC Act) – A search of the *Atlas of NSW Wildlife* (OEH, 2015) indicated a list of species that have been recorded within a 10 km radius of the subject site. These species are listed in Appendix 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* indicated the potential for a list of threatened flora species to occur within a 10km radius of the subject site. These species have also been listed in Appendix 3 Table A3.1 for consideration of potential to occur.

Based on the habitat assessment within Table A3.1 it is considered that the subject site provides potential habitat for the following threatened flora species. These species will be considered in the seven-part test within Appendix 3:

Table 2 – Threatened flora species with suitable habitat present

Scientific name	TSC Act	EPBC Act	Potential to occur
Grevillea parviflora subsp. *parviflora*	V	V	Low
Melaleuca biconvexa	V	V	Unlikely
Tetratheca juncea	V	V	Low

The disturbed nature of the site gives the impression that whilst the vegetation may host these species, the likelihood of their occurrence is considerably low. Notwithstanding that, a 7 part test of significance for these species is provided in Appendix 3.

4.3 Endangered populations

Whilst the *Eucalyptus parramattensis* subsp. *parramattensis* population is known from the Lake Macquarie region, it has not been recorded within a 10km radius of the subject site. No specimens of this population were noted during the botanical inspection.

4.4 Endangered ecological communities

Vegetation within the subject site does not form part of any locally occurring EEC. Most locally occurring EEC's are on floodplains which this is not.

5.0 Fauna

5.1 Habitat assessment

During the fauna survey a habitat assessment was undertaken with consideration to threatened species recorded within 10km.

The following habitat features were noted present:

- Native canopy trees for roosting
- Presence of small (0-10cm entry) to medium (10-30cm entry) hollows
- Mostly spring and summer flowering resources within canopy trees *Corymbia gummifera, Eucalyptus signata, Eucalyptus piperita* and *Angophora costata*
- *Eucalyptus signata* is a SEPP 44 Koala feed tree but, given the lack of records for Koala in the local area and highly fragmented connectivity, they are unlikely to occur
- Bark exfoliations at the base of smooth-barked trees
- Highly modified and cleared drainage line suitable for common amphibians, but no large open water sections

Habitat trees were surveyed as part of recent updated survey. Habitat tree locations are shown on Figure 4 and data is provided in Table 3.

Table 3 – Habitat tree data

Tree No	Common Name	Scientific Name	DBH (cm)	Base Diam (cm)	Spread (m)	Height (m)	Vigour (%)	Hollows Recorded
HT1	Scribbly Gum	E signata	40	70	17	9	70	1x 0-5cm branch spout, 2x 5-10cm branch spouts, 1x 10-15cm trunk (SGa) Rainbow Lorikeets at spouts Hollow inspections found Common Ringtail Possum and Rainbow Lorikeet feathers
HT2	stag	stag	40	50	6	1	0	1x 5-10cm broken trunk (SGb), 1x 5-10cm low trunk No fauna or occupation evidence observed
HT3	Smooth-barked Apple	A costata	40	55	26	10	90	1x 0-5cm branch spout
HT4	Scribbly Gum	E signata	55	80	20	9	70	No suitable cavity on inspection
HT5	Scribbly Gum	E signata	65	90	25	15	60	No suitable cavity on inspection
HT6	Scribbly Gum	E signata	35	40	24	11	40	1x 0-5cm branch spout, 1x 5-10cm branch spout
HT7	Scribbly Gum	E signata	35	40	15	5	40	No suitable cavity on inspection
HT8	Scribbly Gum	E signata	50	75	26	10	70	No suitable cavity on inspection
HT9	Scribbly Gum	E signata	60	90	29	12	75	1x 5-10cm trunk
HT10	Scribbly Gum	E signata	50	70	24	8	60	2x 0-5cm branch spout, 1x 5-10cm branch spout
HT11	Scribbly Gum	E signata	45/45/5	100	22	6	35	2x 5-10cm branch spouts
HT12	Broad-leaved White Mahogany	E umbra	65	85	22	7	15	1x 0-5cm low branch spout
HT13	Smooth-barked Apple	A costata	45	45	21	3	10	1x 0-5cm branch spout, 1x 10-15cm trunk

SGa - Hollow suitable for Squirrel Glider
SGb - Hollow may be suitable for Squirrel Glider

No large hollows suitable for threatened owls or cockatoos were recorded present within the subject site or adjacent remaining remnant open forest patches. One hollow-dependent threatened fauna species, the East-coast Freetail Bat was recorded to a 'possible' level of certainty during survey. Hollows recorded present may be suitable for roosting and breeding by this species therefore careful hollow removal mitigation measures have been recommended.

5.2 Local fauna matters

No fauna species listed as a regionally significant under section 8.3.6 of the Lake Macquarie Flora and Fauna Survey Guidelines were recorded present during survey.

A Draft Squirrel Glider Planning and Management Guidelines (*SGPMG*) has been prepared by LMCC (2015) to inform future local land use planning and development impacts on this species.

Map 7 of the *SGPMG* identifies the areas recognised to contain the separate populations within the LGA based on current knowledge and habitat mapping predictions. The study area is not located within any of these identified areas, likely due to consideration to patch size thresholds less than 4 ha in size. The closest population area is the 'North-east population' to the east occupying approximately 1767 ha with a potential maximum number of 300-600 gliders (see Figure 5).

In determining the significance of impacts, the guidelines suggest that for this North-east population any loss of habitat is likely to have a significant impact on squirrel gliders and a reduction of habitat patch size below 4 ha would be significant.

The habitat available for Squirrel Glider within the study area has been considered with key reference to the SGPM Guidelines:

Foraging - LMCC vegetation mapping indicates the subject site is likely to contain Map Unit 30e Coastal Plains Stringybark – Apple Forest with Map Unit 11 Coastal Sheltered Apple – Peppermint Forest occurring to the adjacent north. Scribbly Gum does not occur in the descriptions for these communities yet is well represented within the study area. These two map units and the other potential map units containing Scribbly Gum are all notable for recording the higher numbers of Squirrel Glider records. Therefore foraging habitat is considered suitable.

The Scribbly Gum identified to the site is *Eucalyptus signata* which may commence flowering in the mid-late winter. Winter flowing foraging opportunities are important for habitat suitability however Scribbly Gum has not been identified by the Management Guidelines as providing important winter nectar. It is possible that the actual absence of winter foraging opportunities, including the absence of Acacias for gum and Banksias for supplementary foraging opportunity, provides a key limitation in the suitability of habitat within the study area.

Denning - The hollows considered suitable or potentially suitable for Squirrel Glider within the subject site are indicated on Figure 4. Initially six trees within the study area and one other nearby were considered potentially suitable for use by Squirrel Glider. Tree climbing inspections of all of these trees found only two of these as suitable within the study area and one nearby within the council reserve to the immediate west. Two of these were found to contain Common Ringtail Possum at the time of inspection and the remaining tree is considered of lower potential for use as it is an isolated low stag.

Therefore the study area and adjacent council reserve to the west are unlikely to provide significance for Squirrel Glider given the low density of hollows present and that the few hollows that are suitable are currently occupied by possums. Therefore the density of available hollows is unsuitable to support a family group of gliders in association to the recorded presence of Common Ringtail Possum.

Connectivity - The study area exists in a highly fragmented setting surrounded by urban development. The connective opportunity to the site exists along the powerline easement that runs through the site and towards the south. Some trees occur along the edge of this easement providing the connective access to the site from extensive high quality habitat further south. A gap of 55m exists along this tree line; whilst trees at both ends are approximately 20m high, the slope causes a gliding height differential from the north to the south of only 5m.

The guidelines indicate that the average gap crossing distance between trees for gliders is 1.8 times launch height minus 2 m. Furthermore, road gaps >35 m wide are considered a potential barrier to crossing. Therefore glides are considered possible in one direction towards the site but not upslope and away from the site at this location.

Other gaps eliminating gliding potential exist immediately surrounding the subject site. All of the gliding opportunity and connectivity is depicted on Figures 5 and 5a.

Figure 5 – Local connectivity and Squirrel Glider records

Figure 5a – Gliding connectivity surrounding the study area

Patch size - The management Plan indicates that habitat patches of less than 4 ha are considered unsuitable for permanent occupancy. Small habitat patches of 4 ha to 30ha, are considered at high risk of local extinction. The connective and adjacent combined patch size of remnant vegetation surrounding Lot 2 and the existing driving range is no more than 5 hectares in total. All of this area does contain habitat consistent with suitable vegetation to support glider records (as described above) however significant gaps eliminating gliding passage between these remnants also further fragments the true extent of usable habitat.

Figure 5a details the gliding opportunities between patches and highlights the fact that the council reserve to the west, whilst providing the largest consolidated patch of trees for the calculated 5 ha, is actually isolated from the other patches when considering gliding potential. Trees are generally 20m high (from the highest potential gliding perch) at both sides of the indicated gaps. Squirrel Gliders may make passage along the ground to such remnants but are unlikely to do so on a regular basis within nightly foraging forays.

Assessment - The subject site is not part of the mapped populations identified by the *SGPMG*. Therefore habitat removal has been assessed according to the general criteria including:

- An area of squirrel glider habitat of more than 4 ha will be cleared, and/or

  ***Response**: No*

- More than 1 ha of habitat will be cleared and the habitat patch size will be reduced to less than 4 ha, and/or

  ***Response**: Up to approximately 0.72 ha of remnant tree habitat will be removed by the proposal. Given the fragmented nature of remnants and barriers to effective gliding distances the combined current habitat patch size is already less than 4 ha.*

- There is a greater than 5% loss of a habitat patches with an area of more than 10 ha, and/or

  ***Response**: There will be a greater than 5% loss of the combined patches surrounding the study area however these are currently fragmented and their total combined habitat patch is not greater than 10 ha.*

- There will be any impact on a key strategic corridor linkage connecting habitat patches, and/or

  ***Response**: The study area does not form part of any key strategic corridor linkage. The study area does provide a 'stepping-stone' of trees towards the north where connectivity continues before dissipating approximately 1km away. Therefore this connectivity is not forming a 'corridor' between major habitat areas.*

  This report recommends that the proposal provide canopy tree planting to restore the potential for gliding to the adjacent habitat to the west such that this may become more usable as a result of the tree loss required for the proposal.

- Habitat connectivity to a habitat patch will be lost, or narrowed to a width that is not suitable for maintaining in the long term.

  ***Response**: As noted above, the study area does provide a 'stepping-stone' of trees towards the north where connectivity continues before dissipating*

approximately 1km away. There are no Squirrel Glider records along this passage but there are records further north of the Cardiff town centre.

The terminating area of this connectivity to the north is not entirely urban landscape but rather parks and playing fields that do connect to further habitat areas to the north-east of Cardiff. Therefore there is opportunity for future planting in the surrounds to enable glider passage. In either case there are more extensive connectivity options to this area further to the east.

The proposal will potentially reduce the gliding gap to the council reserve to the immediate west but will not sever the gap along the connectivity to the north (see the development proposal over the identified vegetation communities on Figure 4).

This report recommends that the proposal provide canopy tree planting to restore the potential for gliding to the adjacent habitat to the west such that this may become more usable for Squirrel Gliders in the long term.

Summary - In consideration to the above criteria it is considered unlikely that the subject site provides important habitat to support Squirrel Gliders considering the size of existing remnants, the fragmented nature of these remnants reducing gliding opportunities, the small total area of vegetetaion available and the low density of available hollows.

Survey to date incorporating spotlighting and call-playback as well as the identification and inspection of suitable denning hollows by a tree climber has not recorded presence of Squirrel Gliders. One Red Bloodwood tree within the subject site shows scars of old sap feeding by gliders however these scars appear old and possibly originated previously when better connectivity opportunity existed. No other Red Bloodwoods within and surrounding the study area were found to show scarring.

Whilst the subject site does not currently likely support core habitat for Squirrel Gliders it has likely supported this in the past and may be made more viable for use as part of the proposed development. At the least it may better support seasonal foraging habitat. Habitat viability may be improved by permitting two way gliding opportunity between patches, the planting of higher representation of winter flowering trees, and the placement of nest boxes to supplement natural denning opportunities.

Whilst each of these strategies are important, the opportunity for more extensive year-round foraging opportunity is considered the key habitat element to improve the suitability of habitat for Squirrel Gliders. Therefore the habitat removed should be replaced with equivalent or more plantings in selected strategic locations to permit connectivity to surrounding remnants of suitable habitat.

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 Appendix Table A3.2 and are considered for potential habitat within the subject site. Although the subject site is located close to the coastline, strictly coastal and oceanic threatened species found within 10km have not been included for consideration as no marine, estuarine or foreshore habitat exists.

SEPP 44 – *(State Environmental Planning Policy No. 44) Koala Habitat Protection* – The subject site is required to be considered under SEPP 44 as it falls within the Lake Macquarie local government area (LGA), which is listed on Schedule 1 of this policy.

One (1) Koala food tree species - *Eucalyptus signata* as listed on Schedule 2 of *SEPP 44 - Koala Habitat Protection*, was recorded within the subject site. This Scribbly Gum comprised

greater than 15% of the total number of trees within the Open Forest vegetation community and, therefore, this area is classified under SEPP 44 as potential Koala habitat (PKH).

No Koalas or signs of their presence, including characteristic scratch marks, were recorded during survey. The nearest record is 3km away to the north east and the most recent record is in 2006, 7km to the south. The highly fragmented connectivity within the local area is unlikely to be suitable to support a viable population area and Koalas are unlikely to utilise the habitat present as part of dispersal or free ranging habitat.

As such, the subject site is not considered to comprise core Koala habitat (CKH) as defined under SEPP 44 and there are no further requirements under this policy.

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

EPBC Act – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10km radius of the subject site. These species have also been listed in Appendix 3, in Table A3.2.

In accordance with Table A3.2, the following Table 4 summarises the considered varying potential to occur for state and nationally listed threatened fauna species within the subject site. The state listed species will be assessed in the seven-part test (Appendix 3) and the nationally listed species have been considered

Table 4 – Threatened fauna species with suitable habitat present

Common name	*TSC Act*	*EPBC Act*	Potential to occur
Little Bentwing-bat	V	-	recorded
Eastern Bentwing-bat	V	-	recorded
East-coast Freetail Bat	V	-	Recorded (possible)
Little Lorikeet	V	-	✓
Swift Parrot	E	E	✓
Barking Owl	V	-	✓
Powerful Owl	V	-	✓
Masked Owl	V	-	✓
Squirrel Glider	V	-	✓
Grey-headed Flying-fox	V	V	✓
Greater Broad-nosed Bat	V	-	✓
Spotted Harrier	V	-	low
Little Eagle	V	-	low
Square-tailed Kite	V	-	low
Glossy Black-Cockatoo	V	-	low
Varied Sittella	V	-	low
Eastern Falsistrelle	V	-	low
Eastern Cave Bat	V	-	low
Gang-gang Cockatoo	V	-	unlikely
Scarlet Robin	V	-	unlikely
Yellow-bellied Sheathtail-bat	V	-	unlikely

In consideration to the species recorded and considered with most potential to occur in the table above, key consideration to hollow-dependent threatened microbats, Squirrel Glider and Little Lorikeet were made during survey given the presence of suitable roosting (or denning) and breeding hollows.

Of these species, only the East-coast Freetail Bat was recorded to a 'possible' level of certainty from a single call recording during overnight Anabat recording. Considerations to Squirrel Glider have also been made in Section 5.2, given that this species is sometimes discrete during surveys (difficult to detect) and also given the required assessment

requirements as outlined in the Draft Squirrel Glider Planning and Management Guidelines prepared by Lake Macquarie City Council 2015.

Assessment – Three (3) state listed threatened fauna species including Eastern Bentwing-bat (*Miniopterus orianae oceanensis*), Little Bentwing-bat (*Miniopterus australis*) and East-coast Freetail Bat (*Micronomus norfolkensis*) were recorded within the study area during surveys. The East-coast Freetail Bat was recorded only to a 'possible' level of certainty.

State listed threatened fauna species have been assessed according to Section 5A of the EPA Act 1979 within Appendix 4. The impact assessment for these species has concluded a not significant impact.

No nationally listed threatened fauna species were recorded within the study area during surveys undertaken.

The Significant Impact Criteria for species listed under the EPBC Act 1999 (Appendix 5) was reviewed to consider the potential impacts on nationally listed species with considered potential to occur. As the subject site does not contain any likely roosting or subsequent breeding habitat and foraging habitat to be removed is not of any likely local significance for these species, it is concluded that there will not be any likely significant impact on nationally listed threatened fauna species with potential to occur, as a result of the subdivision proposal.

It is concluded that there will be no likely significant impact any state or nationally listed threatened fauna species that may have potential to occur within the subject site.

5.3 Endangered populations

There are no endangered fauna populations within the Lake Macquarie LGA, or within 10km of the subject site.

5.4 Connectivity

Figures 4 and 5 shows that there is some tenuous vegetation connectivity along the western and eastern boundaries of the subject site. This connectivity continues further north until it disperses into widely scattered trees near Myall Road. The connectivity values are generally poor at all other aspects, with very poor canopy connectivity to the south-west, south and south-east which contains barriers such as areas of existing residential development.

The proposal will see the loss of some canopy vegetation within the subject site, however it will not break any local vegetative connectivity attributes, nor further isolate does any remnant patch of vegetation worthy of conservation for local fauna.

6.0 Conclusions

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species / provisions of the *Threatened Species Conservation Act 1995*, three (3) threatened fauna species including the Eastern Bentwing-bat (*Miniopterus orianae oceanensis*), Little Bentwing-bat (*Miniopterus australis*) and East-coast Freetail Bat (*Micronomus norfolkensis*), no threatened flora species and no EECs, were recorded within the study area.

In accordance with Section 5A of the *Environmental Planning and Assessment Act 1979*, the 7 part test of significance (Appendix 4) concluded that the proposed development will not have a significant impact on any threatened species, populations or EECs. Therefore, a Species Impact Statement should not be required for the proposal.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*, no threatened fauna species, no protected migratory bird species, no threatened flora species, and no EECs listed under this Act were recorded within the study area.

The proposed subdivision development was not considered to have a significant impact on matters of national environmental significance. As such a referral to Department of Environment should not be required.

In respect of matters relative to the *Fisheries Management Act 1994*, no suitable habitat for threatened marine or aquatic species was observed within the subject site and there are no matters requiring further consideration under this Act.

6.1 Recommendations

Some remnants of natural vegetation will be removed as part of the proposal, particularly canopy species. The vegetation adjacent to the western side of the subject site is Zoned 7(3) Environmental (General) and will be wholly retained. The vegetation to be removed is already fragmented from this habitat to the west and the proposal will initially cause further separation between these fragments. It is recommended to restore connectivity between the surrounding existing remnants under the guidance of a VMP or a canopy revegetation plan which will fundamentally aim to improve habitat connectivity for the local Squirrel Glider population.

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

1. Fuel management in asset protection zones should be minimised to a compliant fuel load of less than 3 tonnes/ha for the Inner Protection Area across the entire site in accordance with NSW Rural Fire Service (RFS) guidelines for management of asset protection zones. Maintain a discontinuous canopy and provide access for fuel reduction and maintenance. Maintain mature and health remnant trees as a priority for tree retention where appropriate.

2. Sediment and erosion control measures to minimise impact to local drainage lines.

3. Tree replanting is recommended along the southern boundary to restore connectivity to the council reserve to the immediate west as well as other adjacent patches to Lot 2. Furthermore, the potential for replanting along the edge of the powerline easement on the south-east boundary (where a gap in tree currently occurs) should be investigated. This gap created by the easement provides only one-way gliding potential and thus provides the current major limitation for Squirrel Glider access through the study area and connective patches continuing to the north. Strategic planting may overcome this.

   The planting of fast growing trees in combination with the winter flowering Swamp Mahogany and Forest Red Gum trees is recommended to replace the lost canopy vegetation.

4. Replacement landscape plantings should also consider the use of other endemic (natural locally occurring) species including ground covers to improve fauna habitat and encourage local fauna occupation within the development site.

5. The felling of hollow-bearing trees is to be conducted under the supervision of a fauna ecologist to ensure appropriate animal welfare procedures are taken, particularly for threatened species. Hollows of high quality or with fauna recorded residing within should be sectionally dismantled for relocation and all hollows should be inspected for occupation, signs of previous activity and potential for reuse.

   Good quality hollows of habitat value are to be relocated to nearby conservation areas. If these are placed as on ground habitat and are not reattached to a new recipient tree then they are to be replaced with appropriately sized nest boxes. Every second nest box should be a design suitable for microbat species and every other box designed suitable for Squirrel Glider. Boxes should be constructed all of weatherproof timber, fasteners and external paint and appropriately affixed to a recipient tree under the guidance of a fauna ecologist.

   If a threatened species is found to be occupying the hollow, then the hollow section containing the animal is to be reattached to a recipient tree within the nearby tree retention areas as selected and directed by the fauna ecologist. The welfare and temporary holding of the residing animal(s) is at the discretion of the fauna ecologist. The hollow section should be well secured in the recipient tree in a manner that will not compromise the current or future health of that tree.

6. The fire trail is to be located to minimise tree removal in accordance with the Tree Assessment Report (*Travers bushfire & ecology*, 2015).

7. Existing drainage lines to be stabilised and revegetated with native plant species to minimise erosion and provide habitat for frog species.

Appendix 1:

Fauna Survey Effort

Table A1.1 - Fauna survey effort

Fauna group	Date	Weather conditions	Survey technique(s)	Survey effort / time (24hr)
Diurnal birds	19/4/16 20/4/16	1/8 cloud, no wind, no rain, temp 22°C 3/8 cloud, no wind, no rain, temp 23°C	Diurnal opportunistic / census Diurnal opportunistic / census	1hr 45min 1600 - 1745 1hr 35min 1610 - 1745
Nocturnal birds	19/4/16 20/4/16	0/8 cloud, no wind, no rain, ¾ moon, temp 22°C 0/8 cloud, no wind, no rain, 4/4 moon, temp 22°C	Spotlighting Call playback (threatened owls) Spotlighting Call playback (threatened owls)	1hr 45min 1745 - 1930 Commenced @ 1800 1hr 45min 1745 - 1930 Commenced @ 1800
Arboreal mammals	19/4/16 20/4/16 5/5/16	0/8 cloud, no wind, no rain, ¾ moon, temp 22°C 0/8 cloud, no wind, no rain, 4/4 moon, temp 22°C 0/8 cloud, no wind, no rain, temp 24°C	Spotlighting Call playback (Squirrel Glider) Spotlighting Call playback (Squirrel Glider) Hollow inspections for Squirrel Glider presence	1hr 45min 1745 - 1930 Commenced @ 1815 1hr 45min 1745 - 1930 Commenced @ 1815 4 hrs 0830 - 1230
Terrestrial mammals	19/4/16 20/4/16	0/8 cloud, no wind, no rain, ¾ moon, temp 22°C 0/8 cloud, no wind, no rain, 4/4 moon, temp 22°C	Spotlighting Spotlighting	1hr 45min 1745 - 1930 1hr 45min 1745 - 1930
Bats	19/4/16 20/4/16	0/8 cloud, no wind, no rain, ¾ moon, temp 22°C 0/8 cloud, no wind, no rain, 4/4 moon, temp 22°C	Spotlighting Anabat (Passive monitoring) x2 Spotlighting Anabat (Passive monitoring) x2	1hr 45min 1745 - 1930 O'night from 1740 1hr 45min 1745 - 1930 1hr 50min 1740 - 1930
Reptiles	19/4/16 20/4/16	1/8 cloud, no wind, no rain, temp 22°C 3/8 cloud, no wind, no rain, temp 23°C	Diurnal opportunistic Diurnal opportunistic	1hr 45min 1600 - 1745 1hr 35min 1610 - 1745
Amphibians	19/4/16 20/4/16	0/8 cloud, no wind, no rain, ¾ moon, temp 22°C 0/8 cloud, no wind, no rain, 4/4 moon, temp 22°C	Spotlighting & call identification Spotlighting & call identification	1hr 45min 1745 - 1930 1hr 45min 1745 - 1930

Appendix 2:

Flora & Fauna Species Lists

Table A2.1 – Flora species recorded

Family	Scientific name	Common name
TREES		
Mimosoideae	*Acacia irrorata*	Green Wattle
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Lauraceae	*Cinnamomum camphora**	Camphor Laurel
Myrtaceae	*Corymbia gummifera*	Red Bloodwood
Myrtaceae	*Eucalyptus capitellata*	Brown Stringybark
Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint
Myrtaceae	*Eucalyptus signata*	Scribbly Gum
Myrtaceae	*Eucalyptus umbra* subsp. *umbra*	Broad-leaved White Mahogany
Arecaceae	*Livistona australis*	Cabbage Tree Palm
Meliaceae	*Melia azedarach* var. *australasica*	White Cedar
Pinaceae	*Pinus elliotti**	Slash Pine
SHRUBS		
Mimosoideae	*Acacia longifolia* var. *longifolia*	Sydney Golden Wattle
Mimosoideae	*Acacia terminalis*	Sunshine Wattle
Faboideae	*Bossiaea heterophylla*	Variable Bossiaea
Myrtaceae	*Callistemon* sp.* (cultivar)	-
Verbenaceae	*Lantana camara**	Lantana
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Oleaceae	*Ligustrum sinense**	Small-leaved Privet
Myrtaceae	*Melaleuca sieberi*	-
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung
Rosaceae	*Rubus anglocandicans**	Blackberry
Cesalpinioideae	*Senna pendula* var. *glabrata**	-
GROUNDCOVERS		
Alliaceae	*Agapanthus praecox**	Agapanthus
Poaceae	*Aira cupaniana**	Silvery Hairgrass
Asphodelaceae	*Aloe sp.**	Aloe
Myrsinaceae	*Anagallis arvensis**	Pimpernel
Apocynaceae	*Asclepias curassavica**	Redhead Cotton Bush
Asphodelaceae	*Asphodelus fistulosus**	Onion Weed
Asteraceae	*Aster subulatus**	Wild Aster
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Poaceae	*Briza subaristata**	-
Poaceae	*Bromus carthariticus**	Prairie Grass
Cannaceae	*Canna indica**	Indian Shot
Apiaceae	*Centella asiatica*	Swamp Pennywort
Asteraceae	*Cirsium vulgare**	Spear Thistle
Asteraceae	*Conyza sumatrensis**	Tall Fleabane
Iridaceae	*Crocosmia* X *crocosmiiflora**	Montbretia
Apiaceae	*Cyclospermum leptophyllum**	Slender Celery
Poaceae	*Cynodon dactylon*	Common Couch
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge
Phormiaceae	*Dianella caerulea*	Blue Flax Lily
Poaceae	*Entolasia stricta*	Wiry Panic
Asteraceae	*Gamochaeta americana**	Cudweed
Goodeniaceae	*Goodenia heterophylla* subsp. *heterophylla*	Variable Leaved Goodenia
Apiaceae	*Hydrocotyle bonariensis**	Pennywort
Asteraceae	*Hypochaeris radicata**	Flatweed
Poaceae	*Imperata cylindrica*	Blady Grass
Poaceae	*Joycea pallida*	Red Anther Grass

Family	Scientific name	Common name
Juncaceae	*Juncus subsecundus*	Finger Rush
Juncaceae	*Juncus usitatus*	Common Rush
Poaceae	*Lolium perrenne**	Perennial Ryegrass
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Lomandraceae	*Lomandra obliqua*	Twisted Mat-rush
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow
Poaceae	*Paspalum dilatatum **	Paspalum
Poaceae	*Paspalum urvillei**	Vasey Grass
Poaceae	*Pennisetum clandestinum **	Kikuyu
Polygonaceae	*Persicaria hydropiper*	Water Pepper
Plantaginaceae	*Plantago lanceolata**	Ribwort
Lamiaceae	*Plectranthus ciliatus**	Cockspur Flower
Caryophyllaceae	*Polycarpon tetraphyllum**	Four-leaved Allseed
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Polygonaceae	*Rumex crispus**	Curled Dock
Poaceae	*Rytidosperma (Austrodanthonia) tenuius*	Wallaby Grass
Alismataceae	*Sagittaria platyphylla*	Sagittaria
Asteraceae	*Senecio madagascariensis**	Fireweed
Iridaceae	*Sisyrinchium sp A**	Pigroot
Solanaceae	*Solanum chenopoides**	Whitelip Nightshade
Asteraceae	*Soliva sessilis**	Jojo
Asteraceae	*Sonchus oleraceus**	Common Sow-thistle
Caryophyllaceae	*Stellaria media**	Common Chickweed
Poaceae	*Stenotaphrum secundatum **	Buffalo Grass
Poaceae	*Themeda australis*	Kangaroo Grass
Faboideae	*Trifolium repens**	White Clover
Verbenaceae	*Verbena bonariensis**	Purpletop
Plantaginaceae	*Veronica persica**	Creeping Speedwell
Poaceae	*Vulpia myuros**	Rat's Tail Fescue
Agavaceae	*Yucca aloifolia**	Dagger Plant
VINES		
Convolvulaceae	*Ipomoea cairica**	Blue Morning Glory
Convolvulaceae	*Ipomoea indica**	Coastal Morning Glory
Faboideae	*Kennedia rubicunda*	Dusky Coral Pea
Faboideae	*Vicia sativa **	Common Vetch
* Denotes Exotic Species		

Note: It should be noted that not all garden, landscape or planted species have been identified as part of the assessment.

Table A2.2 – Fauna species list

Common name	Scientific name	Method Observed
Birds		**Apr 2016**
Australian King Parrot	*Alisterus scapularis*	W
Australian Magpie	*Cracticus tibicen*	O W
Australian Raven	*Corvus coronoides*	O W
Eastern Rosella	*Platycercus eximius*	O W
Laughing Kookaburra	*Dacelo novaeguineae*	O W
Little Corella	*Cacatua sanguinea*	O W
Little Wattlebird	*Anthochaera chrysoptera*	W
Noisy Miner	*Manorina melanocephala*	O W
Pied Currawong	*Strepera graculina*	W
Rainbow Lorikeet	*Trichoglossus haematodus*	O W
Sulphur Crested Cockatoo	*Cacatua galerita*	W
Tawny Frogmouth	*Podargus strigoides*	O
White-browed Scrubwren	*Sericornis frontalis*	W
Mammals		
Black Rat *	*Rattus rattus*	O
Brown Hare *	*Lepus capensis*	O
Common Ringtail Possum	*Pseudocheirus peregrinus*	O
East-coast Freetail Bat TS	*Micronomus norfolkensis*	U[PO]
Eastern Bentwing-bat TS	*Miniopterus orianae oceanensis*	U
Eastern Freetail-bat	*Mormopterus ridei*	U
Gould's Wattled Bat	*Chalinolobus gouldii*	U[PO]
Large Forest Bat	*Vespadelus darlingtoni*	U[PO]
Little Bentwing-bat TS	*Miniopterus australis*	U
Little Forest Bat	*Vespadelus vulturnus*	U[PO]
Amphibians		
Common Eastern Froglet	*Crinia signifera*	W
Dusky Toadlet	*Uperoleia fusca*	W
Striped Marsh Frog	*Limnodynastes peronii*	O W

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

Appendix 3:

Threatened Flora & Fauna Habitat Assessment

Table A3.1 – Threatened flora species habitat assessment

Scientific name DATABASE SOURCE	*TSC Act*	*EPBC Act*	Growth form and habitat requirements	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
Angophora inopina OEH EPBC	V	V	Small tree in open sclerophyll forest growing on deep sandy soils with associated lateritic outcrops. Distribution limits N-Wyee S-Gorokan with a disjunct population near Karuah.	x	x	-	-	x	x
Asterolasia elegans EPBC	-	E	Erect shrub 1-3m high growing in moist sclerophyll forests on Hawkesbury sandstone slopes hillsides. Distribution limits Maroota region.	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
Corunustylis insignis EPBC	E1	CE	Recorded from four localities between Chain Valley Bay and Wyong in Wyong local government area. Grows in patches of Themeda australis (Kangaroo Grass) amongst shrubs and sedges in heathland and forest. Flowering period is September to October.	x	x	-	-	x	x
Cryptostylis hunteriana 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
Cynanchum elegans OEH EPBC	E1	E	Climber or twiner to 1m. Grows in rainforest gullies, scrub & scree slopes. Distribution limits N-Gloucester S-Wollongong.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	*TSC Act*	*EPBC Act*	Growth form and habitat requirements	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
Diuris praecox OEH EPBC	V	V	Terrestrial orchid. Grows in sclerophyll forest near the coast. Distribution limits N-Nelson Bay S-Ourimbah.	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	x	-	-	x	x
Eucalyptus camfieldii OEH EPBC	V	V	Stringybark to 10m high. Grows on coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone. Distribution limits N-Norah Head S-Royal NP.	x	x	-	-	x	x
Eucalyptus parramattensis subsp. *decadens* EPBC	V	V	Red gum to 15m high. Grows in dry open forest on sandy to clay soils often in lowly elevated moist sites. Distribution limits N-Port Macquarie S-Kurri Kurri.	x	x	-	-	x	x
Grevillea parviflora subsp. *parviflora* OEH EPBC	V	V	Open to erect shrub to 1m. Grows in woodland on light clayey soils Distribution limits N-Cessnock S-Appin.	x	marginal	✓	✓	low	✓
Grevillea shiressii OEH	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
Maundia triglochinoides OEH	V	-	A reed-like herb which grows in swamps and shallow fresh water on clay. Distribution Limits N-Qld border S-Wyong.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	TSC Act	EPBC Act	Growth form and habitat requirements	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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 OEH EPBC	V	V	Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation. Distribution limits N-Port Macquarie S-Jervis Bay.	x	✓	Very limited local records but one record in close proximity	✓	unlikely	✓
Muehlenbeckia costata OEH	V,P	-	Scrambling Lignum is a scrambling climber. Scattered distribution from Queensland to the Blue Mountains in NSW. Records on the New England Tablelands and North West Slopes include Bald Rock north of Tenterfield, Warra and Butterleaf National Parks near Glen Innes and Mt Kaputar.	x	x	-	-	x	x
Pterostylis gibbosa EPBC	E1	E	Terrestrial orchid which occurs near Wollongong and in Hunter Valley in sclerophyll forest, sometimes with paperbarks.	x	x	-	-	x	x
Pultenaea maritima OEH	V,P	-	A prostrate, mat forming shrub with hairy stems. Occurs in New South Wales and Queensland. Within NSW, the species has been recorded from Newcastle north to Byron Bay on 16 headlands.	x	x	-	-	x	x
Rutidosis heterogama OEH EPBC	V	V	Erect herb to 30cm. Grows mostly in heath, often along roadsides. Distribution limits N-Maclean S-Hunter Valley.	x	x	-	-	x	x
Senecio spathulatus OEH	E	-	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
Streblus pendulinus EPBC	-	E	Tree or large shrub to 6m tall. Coastal species along watercourses in warmer rainforest area.	x	x	-	-	x	x

Scientific name DATABASE SOURCE	*TSC Act*	*EPBC Act*	Growth form and habitat requirements	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
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
Tetratheca glandulosa OEH	V	V	Spreading shrub to 0.2m high. Sandy or rocky heath or scrub. Distribution limits N-Mangrove Mountain S-Port Jackson.	x	x	-	-	x	x
Tetratheca juncea OEH EPBC	V	V	Prostrate shrub to 1m high. Dry sclerophyll forest and heath. Distribution limits N-Bulahdelah S-Port Jackson.	x	marginal	✓	✓	low	✓
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
Zannichellia palustris OEH	E1	-	Submerged herb. Fresh or slightly saline stationary or slow-flowing water. Distribution limits N-Tweed Heads S-Newcastle.	x	x	-	-	x	x

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

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
Wallum Froglet *Crinia tinnula* OEH	V	-	Found in acidic paperbark swamps and wallum country with dense groundcover. Breeds in temporary and permanent pools and ponds of high acidity. *Distribution Limit: N-Tweed Heads S-Kurnell.*	x	x	-	-	x	x
Giant Barred Frog *Mixophyes iteratus* EPBC	E	E	Terrestrial inhabitant of rainforest and open forests. *Distribution Limit: N-Border Ranges National Park. S-Narooma.*	x	x	-	-	x	x
Red-crowned Toadlet *Pseudophryne australis* OEH	V	-	Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Individuals can also be found under logs and rocks in non-breeding periods. *Distribution Limit: N-Pokolbin. S-near Wollongong.*	x	x	-	-	x	x
Green and Golden Bell Frog *Litoria aurea* OEH EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. *Distribution Limit: N-Byron Bay S-South of Eden.*	x	x	-	-	x	x
Littlejohn's Tree Frog *Litoria littlejohnii* EPBC	V	V	Found in wet and dry sclerophyll forest associated with sandstone outcrops at altitudes 280-1,000m on eastern slopes of Great Dividing Range. Prefers flowing rocky streams. *Distribution Limit: N-Hunter River S-Eden.*	x	x	-	-	x	x
Broad-headed Snake *Hoplocephalus bungaroides* EPBC	E	V	Sandstone outcrops, exfoliated rock slabs and tree hollows in coastal and near coastal areas. *Distribution Limit: N-Mudgee Park. S-Nowra.*	x	x	-	-	x	x

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
Magpie Goose *Anseranas semipalmata* OEH	V	-	A strongly nomadic species found in tropical through to sub-tropical wetlands, flood plains, large swamps, dams and wet grasslands with dense growths of rushes and sedges. *Distribution Limit: N-Tweed Heads. S-Mulwala.*	x	x	-	-	x	x
Blue-billed Duck *Oxyura australis* OEH	V	-	A completely aquatic species occurring mainly throughout the Murray-Darling basin in cool to warm temperate deep permanent freshwater lakes, lagoons and swamps with extensive reed-beds. *Distribution Limit: N-Tenterfield. S-Albury.*	x	x	-	-	x	x
Freckled Duck *Stictonetta naevosa* OEH	V	-	Occurs mainly within the Murray-Darling basin and the channel country within large cool temperate to sub-tropical swamps, lakes and floodwaters with cumbungi, lignum or melaleucas. *Distribution Limit: N- Tenterfield. S-Albury.*	x	x	-	-	x	x
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.*	x	x	-	-	x	x
Rose-crowned Fruit-dove *Ptilinopus regina* OEH	V	-	Occurs in dense rainforests with a substantial understorey where it feeds entirely on fruit. *Distribution Limit" N-Tweed Heads. S-Wollongong.*	x	x	-	-	x	x
Superb Fruit-dove *Ptilinopus superbus* OEH	V	-	Rainforests, adjacent mangroves, eucalypt forests, scrubland with native fruits. *Distribution Limit: N-Border Ranges National Park. S-Bateman's Bay.*	x	x	-	-	x	x

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	
Black-necked Stork *Ephippiorhynchus asiaticus* OEH	E	-	Occurs in tropical to warm temperate terrestrial wetlands, estuarine and littoral habitats such as mangroves, tidal mudflats, floodplains, open woodlands, irrigated lands, bore drains, sub-artesian pools, farm dams and sewerage ponds. *Distribution Limit: N-Tweed Heads. S-Nowra.*	x	x	-	-	x	x
Australasian Bittern *Botaurus poiciloptilus* OEH EPBC	E	E	Found in or over water of shallow freshwater or brackish wetlands with tall reedbeds, sedges, rushes, cumbungi, lignum and also in ricefields, drains in tussocky paddocks, occasionally saltmarsh, brackish wetlands. *Distribution Limit: N-North of Lismore. S- Eden.*	x	x	-	-	x	x
Black Bittern *Ixobrychus flavicollis* OEH	V	-	Found in shadowy, leafy waterside trees such as callistemons, casuarinas, paperbarks, eucalypts, mangroves and willows along tidal creeks, freshwater and brackish streams and ponds, sheltered mudflats and oyster slats. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Spotted Harrier *Circus assimilis* OEH	V	-	Utilises grassy plains, crops and stubblefields; saltbush, spinifex associations; scrublands, mallee, heathlands; open grassy woodlands. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	✓	x	✓	low	✓
Little Eagle *Hieraaetus morphnoides* OEH	V	-	Utilises plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes. *Distribution Limit - N-Tweed Heads. S-South of Eden.*	x	✓	x	✓	low	✓

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
Square-tailed Kite *Lophoictinia isura* OEH	V	-	Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds. *Distribution Limit: N-Goondiwindi. S-South of Eden.*	x	✓	x	x	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.*	x	x	-	-	x	x
Black Falcon *Falco subniger* OEH	V	-	Inhabits plains, grasslands, foothills, timbered watercourses, wetland environs, crops; occasionally over towns and cities. *N-Tweed Heads. S-South of Eden*	x	x	-	-	x	x
Comb-crested Jacana *Irediparra gallinacean* OEH	V	-	Floating vegetation of deep and permanent vegetation-choked tropical and warm temperate wetlands and dams. Occasionally feeds along muddy wetland margins. *Distribution Limit: N-Tweed Heads. S-Ku-ring-gai Chase National Park.*	x	x	-	-	x	x
Australian Painted Snipe *Rostratula australis* OEH EPBC	E	V	Most numerous within the Murray-Darling basin and inland Australia within marshes and freshwater wetlands with swampy vegetation. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	
Black-tailed Godwit *Limosa limosa* OEH	V	-	Regular summer migrant that forages along tidal mudflats, estuaries, sandspits, shallow river margins, sewerage ponds, inland on large shallow fresh or brackish waters. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Gang-gang Cockatoo *Callocephalon fimbriatum* OEH	V	-	Prefers wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. *Distribution Limit: mid north coast of NSW to western Victoria.*	x	marginal	x	x	unlikely	✓
Glossy Black-Cockatoo *Calyptorhynchus lathami* OEH	V	-	Open forests with *Allocasuarina* species and hollows for nesting. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	very limited	x	✓	low	✓
Little Lorikeet *Glossopsitta pusilla* OEH	V	-	Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	✓	x	✓	✓	✓
Swift Parrot *Lathamus discolour* OEH EPBC	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	x	✓	✓	x	✓	✓
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.*	x	marginal	x	x	unlikely	x

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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.*	x	✓	x	✓	✓	✓
Powerful Owl *Ninox strenua* OEH	V	-	Forests containing mature trees for shelter or breeding and densely vegetated gullies for roosting. *Distribution Limits: N-Border Ranges National Park. S-Eden.*	x	✓	✓	✓	✓	✓
Masked Owl *Tyto novaehollandiae* OEH	V	-	Open forest and woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting. *Distribution Limit: N-Border Ranges National Park. S-Eden.*	x	✓	✓	✓ None nearby	✓	✓
Sooty Owl *Tyto tenebricosa* OEH	V	-	Tall, dense, wet forests containing trees with very large hollows. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	x
Eastern Bristlebird *Dasyornis brachypterus* EPBC	E	E	Coastal woodlands, dense scrubs and heathlands, especially where low heathland borders taller woodland or dense tall tea-tree. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Speckled Warbler *Chthonicola sagittata* OEH	V	-	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution Limit: N-Urbanville. S-Eden.*	x	x	-	-	x	x
White-fronted Chat *Epithianura albifrons* OEH	V	-	Found in open damp ground, grass clumps, fence lines, heath, samphire saltmarshes, mangroves, dunes, saltbush plains. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	E	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution Limit: N-Urbanville. S-Eden.*	x	✓	x	x	unlikely	x
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.*	x	x	-	-	x	x
Varied Sittella *Daphoenositta chrysoptera* OEH	V	-	Open eucalypt woodlands / forests (except heavier rainforests); mallee, inland acacia, coastal tea-tree scrubs; golf courses, shelterbelts, orchards, parks, scrubby gardens. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	x	✓	x	✓	low	✓
Hooded Robin *Melanodryas cucullata cucullata* OEH	V	-	Found in Eucalypt woodlands, *Acacia* scrubland, open forest, and open areas adjoining large woodland blocks, with areas of dead timber. *Distribution Limit: N-Central Qld. S-Spencer Gulf SA.*	x	x	-	-	x	x
Scarlet Robin *Petroica boodang* OEH	V	-	Found in foothill forests, woodlands, watercourses; in autumn-winter, more open habitats: river red gum woodlands, golf courses, parks, orchards, gardens. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	sub-optimal	x	✓	unlikely	✓

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
Spotted-tailed Quoll *Dasyurus maculatus* OEH EPBC	V	E	Dry and moist open forests containing rock caves, hollow logs or trees. *Distribution Limit: N-Mt Warning National Park. S-South of Eden.*	x	x	-	-	x	x
Brush-tailed Rock-wallaby *Petrogale penicillata* EPBC	E	V	Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. *Distribution Limit: N-North of Tenterfield. S-Bombala.*	x	x	-	-	x	x
Koala *Phascolarctos cinereus* OEH EPBC	V	V	Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Eastern Pygmy Possum *Cercatetus nanus* OEH	V	-	Found in a variety of habitats from rainforest through open forest to heath. Feeds on insects but also gathers pollen from banksias, eucalypts and bottlebrushes. Nests in banksias and myrtaceous shrubs. *Distribution Limit: N-Tweed Heads. S-Eden.*	x	x	-	-	x	x
Yellow-bellied Glider *Petaurus australis* OEH	V	-	Tall mature eucalypt forests with high nectar producing species and hollow bearing trees. *Distribution Limit- N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	x

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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	
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.*	x	✓	✓	✓	✓	✓
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.*	x	x	-	-	x	x
Grey-headed Flying-fox *Pteropus poliocephalus* OEH EPBC	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. *Distribution Limit: N-Tweed Heads. S-Eden.*	x	✓	✓	✓	✓	✓
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* OEH	V	-	Rainforests, sclerophyll forests and woodlands. *Distribution Limit: N-North of Walgett. S-Sydney.*	x	✓	2 only and almost 10km away	x	unlikely	✓
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.*	✓ (possible)	-	-	-	-	✓

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					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-eared Pied Bat *Chalinolobus dwyeri* OEH EPBC	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. *Distribution Limit: N-Border Ranges National Park. S-Wollongong.*	x	x	-	-	x	x
Eastern Falsistrelle *Falsistrellus tasmaniensis* OEH	V	-	Recorded roosting in caves, old buildings and tree hollows. *Distribution Limit: N-Border Ranges National Park. S-Pambula.*	x	✓	✓	✓ No recent nearby	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.*	✓	-	-	-	-	✓
Large-footed Myotis *Myotis macropus* OEH	V	-	Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water. *Distribution limits: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	x
Greater Broad-nosed Bat *Scoteanax rueppellii* OEH	V	-	Inhabits areas containing moist river and creek systems, especially tree lined creeks. *Distribution Limit: N-Border Ranges National Park. S-Pambula.*	x	✓	x	✓	✓	✓

Common name *Scientific name* DATABASE SOURCE	*TSC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded onsite				7 part test of significance likely to be required (✓)
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	
Eastern Cave Bat *Vespadelus troughtoni* OEH	V	-	Inhabits drier open forests and woodlands. Roosts in well-lit parts of caves and mineshafts. *Distribution Limit: Along GDR from N-Tweed Heads. S-Kempsey.*	x	✓	x	✓	low	✓
New Holland Mouse *Pseudomys novaehollandiae* OEH 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.*	x	x	-	-	x	x
Giant Dragonfly *Petalura gigantean* OEH	E	-	Inhabits large relatively deep permanent swamps and bogs with high water quality and moss or other soft vegetation along the edge for egg laying. *It occurs in the far NE NSW, south to Kempsey, & in a patch between Gosford & Nowra.*	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	-	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

A detailed assessment in accordance with Section 5A of the *EPA Act* will be completed for these species in Appendix 3 of this report.

Table A3.3 provides an assessment of potential habitat within the subject site for nationally *protected* migratory fauna species recorded within 10km on the *EPBC Act* Protected Matters Tool. Nationally *threatened* migratory species are considered in Table A3.2.

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.	x	-	-
White-bellied Sea Eagle (*Haliaeetus leucogaster*)	Coasts, islands, estuaries, inlets, large rivers, inland lakes, reservoirs. *Sedentary; dispersive.*	x	-	-
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.*	✓	x	-
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.*	✓	x	-
Spectacled Monarch (*Monarcha trivirgatus*)	Understorey of mountain / lowland rainforest, thickly wooded gullies, waterside vegetation, mostly well below canopy. *Summer breeding migrant to south-east Qld and north-east NSW down to Port Stephens from Sept/Oct to May. Uncommon in southern part of range.*	x	-	-
Black-faced Monarch (*Monarcha melanopsis*)	Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. *Summer breeding migrant to coastal south east Australia, otherwise uncommon.*	x	-	-
Yellow Wagtail (*Motacilla flava*)	The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops.	x	-	-
Satin Flycatcher (*Myiagra cyanoleuca*)	Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. *Breeds mostly south east Australia and Tasmania over warmer months, winters in north east Qld.*	x	-	-
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.*	x	-	-

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.*	✓	x	-
Cattle Egret (*Ardea ibis*)	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats, drains. *Breeds in summer in warmer parts of range including NSW.*	✓	x	-
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.*	✓	x	-
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.	x	-	-
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.*	x	-	-
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.*	x	-	-

COMMON NAME *Scientific Name*	PREFERRED HABITAT *Migratory Breeding*	Suitable Habitat Present (✓)	Recorded on Site (✓)	COMMENTS
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.	x	-	-
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.	x	-	-
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.*	✓	x	-

Appendix 4:

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

7 Part Test of Significance

(Section 5A EPA Act 1979)

Council 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.

The following 7 part test of significance relies on the ecological assessment provided in Sections 4 and 5 of this report and should be read as such.

Flora and fauna investigations 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	EPBC Act	Potential to occur
Grevillea parviflora subsp. *parviflora*	V	V	low
Melaleuca biconvexa	V	V	unlikely
Tetratheca juncea	V	V	low

Endangered ecological communities

Nil

Endangered flora populations

Eucalyptus parramattensis subsp. *parramattensis* in the Wyong and Lake Macquarie LGA's

Threatened fauna

Common name	TSC Act	Potential to occur	Potential impact
Little Bentwing-bat	V	recorded	Negligible
Eastern Bentwing-bat	V	recorded	Negligible
East-coast Freetail Bat	V	Recorded (possible)	Direct - removal of unlikely roosting / breeding hollow
Little Lorikeet	V	✓	Direct - removal of unlikely roosting / breeding hollow and potential foraging trees
Swift Parrot	E	✓	Direct - removal of low potential foraging trees
Barking Owl	V	✓	Direct - removal of low potential foraging habitat
Powerful Owl	V	✓	Direct - removal of low potential foraging habitat
Masked Owl	V	✓	Direct - removal of low potential foraging habitat
Squirrel Glider	V	✓	Direct - removal of low potential denning / breeding hollows and foraging trees
Grey-headed Flying-fox	V	✓	Direct - removal of foraging habitat
Greater Broad-nosed Bat	V	✓	Direct - removal of unlikely roosting / breeding hollow and low potential foraging habitat

Common name	TSC Act	Potential to occur	Potential impact
Spotted Harrier	V	low	Negligible
Little Eagle	V	low	Direct - removal of unlikely foraging habitat
Square-tailed Kite	V	low	Direct - removal of unlikely foraging habitat
Glossy Black-Cockatoo	V	low	Direct - removal of unlikely foraging habitat
Varied Sittella	V	low	Direct - removal of low potential foraging habitat
Eastern Falsistrelle	V	low	Direct - removal of low potential foraging habitat
Eastern Cave Bat	V	low	Direct - removal of low potential foraging habitat
Gang-gang Cockatoo	V	unlikely	Direct - removal of low unlikely foraging habitat
Scarlet Robin	V	unlikely	Direct - removal of low unlikely foraging habitat
Yellow-bellied Sheathtail-bat	V	unlikely	Direct - removal of low unlikely foraging habitat

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

No threatened flora species were recorded within the subject site during the botanical survey.

The subject site is not considered likely to contain any unique breeding or otherwise important habitat resources central to home range requirements for any threatened fauna species with considered potential to occur. This is given that Squirrel Glider was not recorded during spotlighting, call-playback and hollow inspection surveys and the recorded East-coast Freetail Bat was not recorded to a level of activity to suggest presence of a nearby roost. Hollows for both species will however be removed by the proposal therefore the relocation or replacement of hollows with nest boxes has been recommended as a mitigation measure to habitat loss.

The Squirrel Glider has been considered in detail with respect to the Draft Lake Macquarie Squirrel Glider Planning and Management Guidelines (2015) in Section 5.2 of this report. Potential connectivity impacts to this species can be mitigated through the planting of canopy vegetation across the site and planting of winter flowering trees such that previously inaccessible habitat will become more accessible.

As no threatened flora species have been recorded and the site does not likely provide habitat that is central to the breeding or roosting requirements of threatened fauna species, the proposal is unlikely to have an adverse effect on the life cycle of the species considered such that a viable local population of these species is likely to be placed at risk of extinction.

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

Whilst the *Eucalyptus parramattensis* subsp. *parramattensis* population is known from the Lake Macquarie region, it has not been recorded within a 10km radius of the subject site. No specimens of this population were noted during the botanical inspection.

There are no endangered fauna populations within the Lake Macquarie LGA, or within 10km of the subject site.

Therefore, it is considered that the action proposed is not likely to have an adverse effect on the life cycle of these species 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 site is not on a floodplain and there are no freshwater wetlands. The site is not on a seacliff, and there is no littoral rainforest present. Vegetation within the subject site does not form part of any locally occurring EEC.

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,

There is no EEC present within the subject site. The proposal will not substantially and adversely modify the composition of any ecological community such that its local occurrence is likely to be placed at risk of extinction

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 *Grevillea parviflora* subsp. *parviflora, Melaleuca biconvexa, Tetratheca juncea,* Little Bentwing-bat, Eastern Bentwing-bat, East-coast Freetail Bat, Little Lorikeet, Swift Parrot, Barking Owl, Powerful Owl, Masked Owl, Squirrel Glider, Grey-headed Flying-fox, Greater Broad-nosed Bat, Spotted Harrier, Little Eagle, Square-tailed Kite, Glossy Black-Cockatoo, Varied Sittella, Eastern Falsistrelle, Eastern Cave Bat, Gang-gang Cockatoo, Scarlet Robin and Yellow-bellied Sheathtail-bat. The proposal is expected to remove 0.72 hectares of remnant trees with highly modified and disturbed shrub or ground layers.

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

The proposed development for an aged care facility is expected to remove 0.72 hectares of remnant trees with highly modified and disturbed shrub or ground layers.

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

Adjoining vegetation to the east and west is to be retained. The connectivity values are generally poor, with limited canopy connectivity further to the east or west. These East and West vegetation remnants do provide sparse connectivity further to the north as far as Myall Road.

The connectivity values are generally poor towards other aspects, with very poor canopy connectivity to the south-west, south and south-east which contains barriers such as areas of existing residential development.

The proposal will see the loss of some vegetation within the subject site; however it will not break any existing local important vegetative connectivity attributes, nor isolate any remnant patches of vegetation worthy of conservation for fauna. Planting of trees is recommended to

enhance connectivity across the study area for gliders. Therefore, no area of habitat is likely to become further fragmented or isolated from other areas of habitat as a result of the proposed action.

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

The importance of habitat to be impacted is considered low because it contains only a few remnant canopy species and is impacted by large scale shrub and ground layer removal. It does not contain known threatened flora habitat and has very limited foraging value for threatened fauna given its fragmented nature. The subject site does not provide any likely important or unique habitat of breeding importance for any threatened fauna species with considered potential to occur. Endangered fauna populations are unlikely to utilise the site and the vegetation is not consistent with any locally occurring endangered ecological community. The proposal will not break any local connectivity linkages nor isolate native vegetation patches.

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:

- Koala (*Phascolarctos cinereus*) (DEC 2008)
- Large Forest Owls ((Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*)) (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
Alteration of habitat following subsidence due to longwall 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/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 Plague Minnow or Mosquito Fish (*Gambusia holbrooki*)			✓
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 considered that the proposal will not 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 key threatening processes (KTPs).

Clearing of native vegetation

The proposal contributes to this key threatening process via the removal of remnant native vegetation, although realistically only limited to remnant trees. Future landscaping should consider the replacement of landscaping vegetation with endemic (naturally occurring local native) species that provide shelter and foraging value to local fauna and compliment the native vegetation within the lands adjacent.

Competition and grazing by the feral European Rabbit (Oryctolagus cuniculus)

The proposal is located within a large expanse of well-maintained grassland and will incorporate large expanses of maintained lawns within the development. This will provide ideal habitat for rabbits. It is expected that rabbit control measures such as baiting and warren removal methods will be utilised to control local rabbit populations and ameliorate this KTP.

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.

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.

Invasion and establishment of exotic vines and scramblers

The proposal is of a class of development recognised as a threatening process due to the presence of exotic vines and scramblers within the site and the potential for these species to invade any sensitive vegetation onsite. Therefore a weed control program is recommended to ensure there is adequate eradication, and control of invasive vines species.

Invasion, establishment and spread of Lantana camara

The site currently contains this species, however it is expected that the proposed development will provide an opportunity to remove, control and manage this species throughout the whole of the site by the application of suitable weed control.

Invasion of native plant communities by exotic perennial grasses

The proposal is of a class of development recognised as a threatening process due to possible incursions of grasses such as *Pennisetum clandestinum* (Kikuyu). It is recommended that species like Kikuyu are discouraged from gardens and landscaping where they adjoin remnant native vegetation.

Loss of hollow-bearing trees

Hollow-bearing tree surveys identified hollow-bearing trees containing small to medium (0-10cm and 10-15 cm) sized hollows within the proposed development area. The proposal will require the removal of some of these hollows and as such is of a class of development recognised as a threatening process. Threatened species with suitable habitat within the site and dependent on hollows of this nature include Little Lorikeet, Squirrel Glider, Eastern Falsistrelle, East-coast Freetail Bat, Greater Broad-nosed Bat and Yellow-bellied Sheathtail-bat. The East-coast Freetail Bat was recorded to a 'possible' level of certainty during survey. The relocation or replacement of hollows within the adjoining remaining treed areas is recommended to supplement the loss of natural hollows.

Removal of dead wood and dead trees

The proposal will require the removal of deadwood and/or dead trees and as such is of a class of development recognised as a threatening process. Given the low quality habitat present within the development areas, the removal of dead wood and dead trees is not considered likely to impact on threatened species or the biodiversity of the local area.

Appendix 5:

Matters of National Significance
Significant Impact Criteria
(EPBC Act 1999)

Matters of NES

(EPBC Act 1999 - Policy Statement 1.1 May 2006)

Under the EPBC Act an action will require approval from the Australian Government Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance. The following significant impact criteria were sourced from the EPBC Act Policy Statement 1.1 (May 2006):

CRITICALLY ENDANGERED AND ENDANGERED SPECIES

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

>> What is a population of a species?

A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:
- a geographically distinct regional population, or collection of local populations; or
- a population, or collection of local populations, that occurs within a particular bioregion.

>> What is habitat critical to the survival of a species or ecological community?

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:
- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- To maintain genetic diversity and long term evolutionary development; or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.

VULNERABLE SPECIES

Significant impact criteria

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

>> What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

CRITICALLY ENDANGERED AND ENDANGERED ECOLOGICAL COMMUNITIES

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
  - assisting invasive species, that are harmful to the listed ecological community, to become established; or
  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or
- Interfere with the recovery of an ecological community.

MIGRATORY SPECIES

Significant impact criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

>> What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

a) Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
b) Habitat that is of critical importance to the species at particular life-cycle stages; and/or
c) Habitat utilised by a migratory species which is at the limit of the species range; and/or
d) Habitat within an area where the species is declining.

>> What is an ecologically significant proportion?

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).

>> What is the population of a migratory species?

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.