

# **Crown Land off The Lakes Way North Tuncurry**

## ***Ecological Assessment***

Landcom

12 January 2010

0092575 Final 1



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# Crown Land off The Lakes Way North Tuncurry

## *Ecological Assessment*

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Environmental Resources Management Australia Pty Ltd Quality System

Landcom

12 January 2010

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# 1 INTRODUCTION

## 1.1 INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Landcom to conduct an ecological assessment of Crown Land at North Tuncurry NSW (herein referred to as “the site”) (refer *Figure 1.1*).

This report presents the results of the ecological assessment. Specifically this report aims to:

- identify flora and fauna species, habitats and communities within the site;
- assess the conservation significance of flora and fauna species, habitats and communities identified within the site; and
- assess the potential for threatened species, populations or ecological communities as listed under relevant legislation to occur within the site.

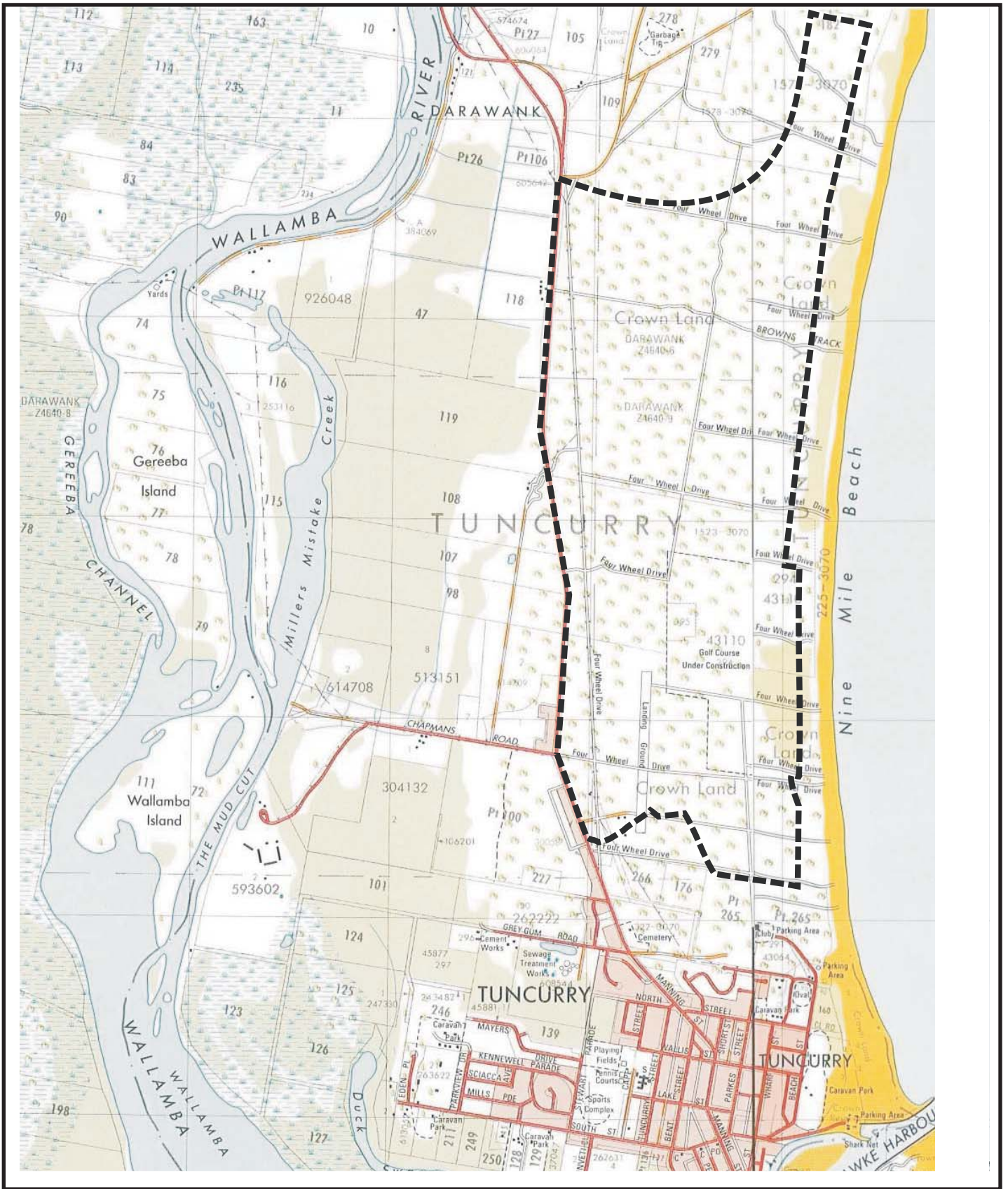
## 1.2 SITE DESCRIPTION

The site is approximately 432 hectares (ha) and is bounded by The Lakes Way and Tuncurry Road to the west, Nine Mile Beach to the east, the Tuncurry Waste Management Centre and Crown Land to the north, and Tuncurry Cemetery and residential properties to the south. The Forster Tuncurry Golf Club is located within a portion of the southern half of the site.

An electricity easement occurs within the western portion of the site parallel to The Lakes Way. The site is relatively flat with undulations increasing towards the eastern site boundary.

Vegetation is dominated by heath with patches of Blackbutt Forest and Pine Trees also present. A number of tracks traverse the site that appear to be well utilised. Rubbish dumping including abandoned cars and whitegoods was evident within the site.

Soils within the site are predominantly within the Hawks Nest soil landscape although a small area is within the Frogalla Swamp soil landscape unit. The Hawks Nest soil landscape unit comprises well drained aeric podsols on older dunes with deep rudosols on younger seaward dunes. Frogalla Swamp soil landscape unit comprises poorly drained acid peats/siliceous sands or acid peat/humic gley intergrades.



**Figure 1.1**

**Locality Plan**

**Legend**

 Site

Client:	Landcom		
Project:	North Tuncurry		
Drawing No:	0092575hv_ecol_01		
Date:	12/1/2010	Drawing size:	A4
Drawn by:	SP	Reviewed by:	NB
Source:	1:25,000 Topo Series Cooloolook & Forster		
Scale:	Refer to Scale Bar		



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### 1.2.1 *Land Use History*

Historical aerial photography of the site indicates that parts of the site were previously cleared, particularly in the north eastern corner of the site.

In the past, the site was used as a Prisoner of War (POW) camp during World War II and operated as a pine plantation with Tuncurry State Forest declared in 1916 and revoked in 1976 (Whelans, 2007). Records also show that the site was previously occupied by mining leases however there is no evidence to suggest that mining activities were undertaken at the site with a sand mining path to the north of the site evident on the air photos from 1980 and 1988 (Whelans, 2007). The Forster Tuncurry Golf Club was established in the early 1980s opening in 1984.

### 1.3 *LEGISLATIVE REQUIREMENTS*

The legal status of flora and fauna species and ecological communities identified within the site has been assessed in accordance with relevant legislation in this report. Consideration has also been given to those threatened species and ecological communities listed under the NSW *Threatened Species Conservation Act 1995 (TSC Act)* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* that may potentially occur within the site.



## 2.1

## DESKTOP SEARCH

Background literature reviews and database searches were conducted prior to field investigations to obtain recent data on flora and fauna species, populations, communities and habitats known to occur within the site and the surrounding local area.

Background information was collected via:

- a literature review of site-specific and regional studies including:
  - North Tuncurry Land Use History Report (Whelans, 2007);
  - North Tuncurry Ecological Constraints and Opportunities Ecological Assessment (ERM, 2005a);
  - North Tuncurry Targeted Flora Surveys (ERM, 2005b);
- map, aerial photograph and Geographic Information System (GIS) interpretations;
- the NSW Department of Environment and Climate Change (DECC) Atlas of NSW Wildlife database (2008a); and
- the Department of Environment, Water, Heritage and the Arts (DEWHA) on-line search tool for matters of national environmental significance as listed under the EPBC Act.

Desktop habitat assessments were conducted for threatened species that were previously recorded within a 10 kilometre (km) radius of the site (referred to in this report as “the locality”) and included an evaluation of the likelihood of those species to inhabit or utilise the site.

## 2.2

## CURRENT FIELD SURVEYS

Field surveys were conducted on the 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> November 2008. These investigations supplemented previous field surveys that were conducted in October and November 2005 (refer *Section 2.3*). The weather during the current survey period is described in *Table 2.1*.



**Table 2.1 Weather Observations, Tuncurry NSW**

Date	General Weather Description	Temperature (°C)		Rainfall (mm)
		Maximum	Minimum	
4 <sup>th</sup> November 2008	light shower, some cloud and light breeze	15	21.5	0.4
5 <sup>th</sup> November 2008	fine with some cloud and light breeze	12.4	20.5	0
6 <sup>th</sup> November 2008	fine with some cloud and light breeze	10.5	25	0
7 <sup>th</sup> November 2008	fine with some cloud and light breeze	14.5	26.5	0

Source: BOM, 2008

All flora and fauna species identified within the site during the surveys were recorded. Details of flora and fauna survey methods are outlined below.

### 2.2.1 *Flora*

Vegetation surveys were conducted on the 5<sup>th</sup> and 6<sup>th</sup> November 2008 and involved assessment of community structure and composition using 20 metre (m) by 20m sampling quadrats. The locations of these quadrats are shown on *Figure 2.1*. Any additional flora species encountered outside the sampling quadrats were also recorded opportunistically.

Vegetation communities were determined based on structure, floristic composition, topography and soil type. Community boundaries were delineated using both aerial photography interpretation and ground-truthing. The conservation status of these communities was assessed based on condition, occurrence of threatened flora and assessment of the distribution of the community.

The likelihood of Endangered Ecological Communities (EECs) occurring was determined by considering the dominant plant species that comprise the vegetation communities, topography and the dominant soils present.

### 2.2.2 *Fauna*

An assessment of the native fauna species known to be present and species that may potentially be present on site was undertaken based on database records, previous reports, vegetation mapping and the habitat requirements of threatened species recorded within the locality. Targeted fauna surveys were also conducted.

#### *Terrestrial Elliott Trapping and Hair Tube Survey*

Elliott trapping was conducted for terrestrial mammals using type “A” Elliott traps. Forty Elliott A traps were baited with peanut butter, honey and rolled



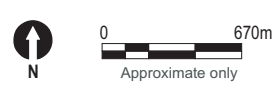
**Legend**

- Site
- Hair Tube Transects
- Spotlighting Transects
- Terrestrial Elliott Traps
- Arboreal Elliott Traps
- Bird Survey Transects
- Owl Call Playback
- Dusk Census
- Vegetation Quadrat
- Squirrel Glider
- Grey-headed Flying-fox
- Brush-tailed Phascogale
- Osprey Record

**Figure 2.1**  
**Survey Locations**

Client:	Landcom
Project:	North Tuncurry
Drawing No:	0092575hv_ecol_02
Date:	12/1/2010
Drawn by:	SP
Source:	Image © 2008 DigitalGlobe
Scale:	Refer to Scale Bar

Drawing size:	A4
Reviewed by:	NB
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oats and placed along five transects (refer *Figure 2.1*) to target small mammals. Traps were placed at approximately 10m intervals, depending on the nature of the ground cover and were placed in potential runways in undergrowth near fallen logs where available. Sampling was conducted in the heathland and open forest communities identified on the site with 20 traps placed in each community. The traps were set for three consecutive nights giving a total of 120 trap nights and were checked early each morning with any captures being identified and released immediately. Traps were reset and re-baited as required.

Fifty hair tubes (Faunatech) were placed on the ground across the site for ten consecutive nights. Sampling primarily concentrated on the heathland community and traps remained on site for a total of 500 trap nights. Traps were baited with peanut butter, honey and rolled oats and secured to the ground in five transects. Hairs collected from the tubes were sent to Barbara Triggs for identification.

#### *Arboreal Elliott Trapping*

Twenty Elliott B traps targeting small to medium sized arboreal mammals were placed in four transects and mounted on trees on brackets positioned approximately two metres above the ground.

The traps were baited with peanut butter, honey and rolled oats and a honey and water mixture was sprayed on the main trunks above the traps to attract arboreal fauna and mask the smell of humans. The traps were set for three consecutive nights in dry forest habitat, a total of 60 trap nights. The traps were checked early each morning with any captures being identified and in the case of nocturnal species such as the Squirrel Glider (*Petaurus norfolcensis*), retained in a cool, quiet place for the day before releasing the species at dusk. Traps were reset and re-baited as required.

#### *Spotlighting and Dusk Census*

Spotlighting was undertaken by two Ecologists using handheld spotlights and involved walking two transects at a rate of approximately one kilometre per hour whilst inspecting areas of potential habitat for a total of six person hours. Transects were repeated during the survey period.

Dusk censuses were also conducted. This involved arriving at areas of potential habitat prior to dusk and counting and identifying animals as they emerge for a period of approximately 40 minutes following dusk. The locations of dusk censuses are indicated on *Figure 2.1*.

#### *Diurnal Bird Surveys*

Diurnal bird surveys were conducted at the site for three mornings during periods of increased bird activity. These surveys involved walking transects

and recording bird species via visual identification, with the aid of binoculars, or by call interpretation. The location of bird survey transects are indicated on *Figure 2.1*. Birds that were recorded outside these periods were documented as 'opportunistic' observations.

#### *Owl Call Playback*

Nocturnal call playback surveys were conducted at the site to illicit response calls from the Masked, Powerful, Barking and Grass Owls. Call playback was conducted at two locations on non-consecutive nights (refer *Figure 2.1*).

Pre-recorded calls of each species were played through a mega phone for periods of five minutes with a listening period of two minutes for each species and repeated three times. Spotlighting was also conducted after each call playback to detect any owl species that may have flown into the area during the survey period.

#### *Ultrasonic Bat Detection*

An Anabat echolocation call detector was used to record bat calls over three nights for a total of 7.5 person hours. The Anabat unit was carried during the dusk censuses, spotlighting surveys and owl call playback, the locations of which are indicated on *Figure 2.1*. Calls were analysed using the Analook program and comparison with Pennay *et al* (2004).

#### *Amphibian Survey*

Frog species were recorded opportunistically in areas of suitable habitat and involved identifying frog species via call interpretation.

#### *Opportunistic Sightings*

Fauna species not recorded during targeted surveys were recorded opportunistically as encountered. Any evidence of fauna such as tracks, scats, diggings, scratches on and around trees and any potential habitat features were also noted during the survey. Predator scats were forwarded to a recognised expert for further analysis.

### 2.2.3

#### *Threatened Species*

Mapping, aerial photographs and field surveys were used to identify and assess the distribution of potential habitat types within the site. An assessment of the potential habitat for threatened species was undertaken using the following criteria:

- the presence of nesting/sheltering/basking sites such as tree hollows, litter, fallen timber and logs, caves and rocks;
- the cover/abundance of ground, shrub and canopy layers;
- drainage and the presence of freshwater or estuarine aquatic habitats such as streams, swamps and pools, noting their permanency (i.e. permanent, semi-permanent or ephemeral);
- connectivity to adjacent areas of habitat;
- the extent and nature of previous disturbances, including the presence of fire scars and dieback;
- vegetation assemblage and structure; and
- soil type and topography.

Targeted searches were conducted for threatened fauna thought to have potentially suitable habitat on site including the Squirrel Glider.

#### *State Environmental Planning Policy No. 44 – Koala Habitat Protection*

A Koala (*Phascolarctos cinereus*) habitat assessment was conducted to determine whether the site provided *core* or *potential* Koala habitat as defined under *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44). This involved identifying Koala feed trees as listed under Schedule 2 of the Policy and determining whether they constitute greater than 15% of the tree cover on-site.

### 2.3

#### *PREVIOUS SITE INVESTIGATIONS*

Previous ecology investigations on this site have been undertaken by ERM in October 2005 and November 2005 including:

- confirmation of vegetation mapping by Great Lakes Council;
- fauna habitat assessment;
- targeted fauna surveys in October 2005 including:
  - microchiropteran bat call detection surveys (four person hours);

- spotlighting surveys (six person hours);
- owl call playback broadcast (one night); and
- targeted flora surveys in November 2005 for Leafless Tongue Orchid (*Cryptostylis hunteriana*), Dwarf Heath Casuarina (*Allocasuarina defungens*), Nubiaca Casuarina (*Allocasuarina simulans*) and Noah's False Chickweed (*Lindernia alsinoides*).

The Tuncurry Midge Orchid (*Genoplesium littorale*) is listed as Critically Endangered under the *TSC Act*. The optimum survey period for this species is from March to May during the flowering period. As the current survey was conducted in early November, targeted surveys for the Tuncurry Midge Orchid were undertaken between March and May. The results of that survey are provided in a separate report to Landcom.

### 3.1 FLORA

A total of 66 flora species were identified during field investigations, seven (11%) of these were exotic. A list of these species is provided in *Table A.1 Annex A*.

#### 3.1.1 *Vegetation Communities*

The following vegetation communities were identified within the site:

- Blackbutt open forest;
- Banksia woodland; and
- heathland.

The majority of the site was comprised of heathland (refer *Photo 1*) with Blackbutt open forest (refer *Photo 2*) occurring in the northern and western parts of the site and in scattered patches throughout. Stands of Slash Pine (*Pinus elliottii*) were also scattered throughout the site (refer *Figure 3.1*).

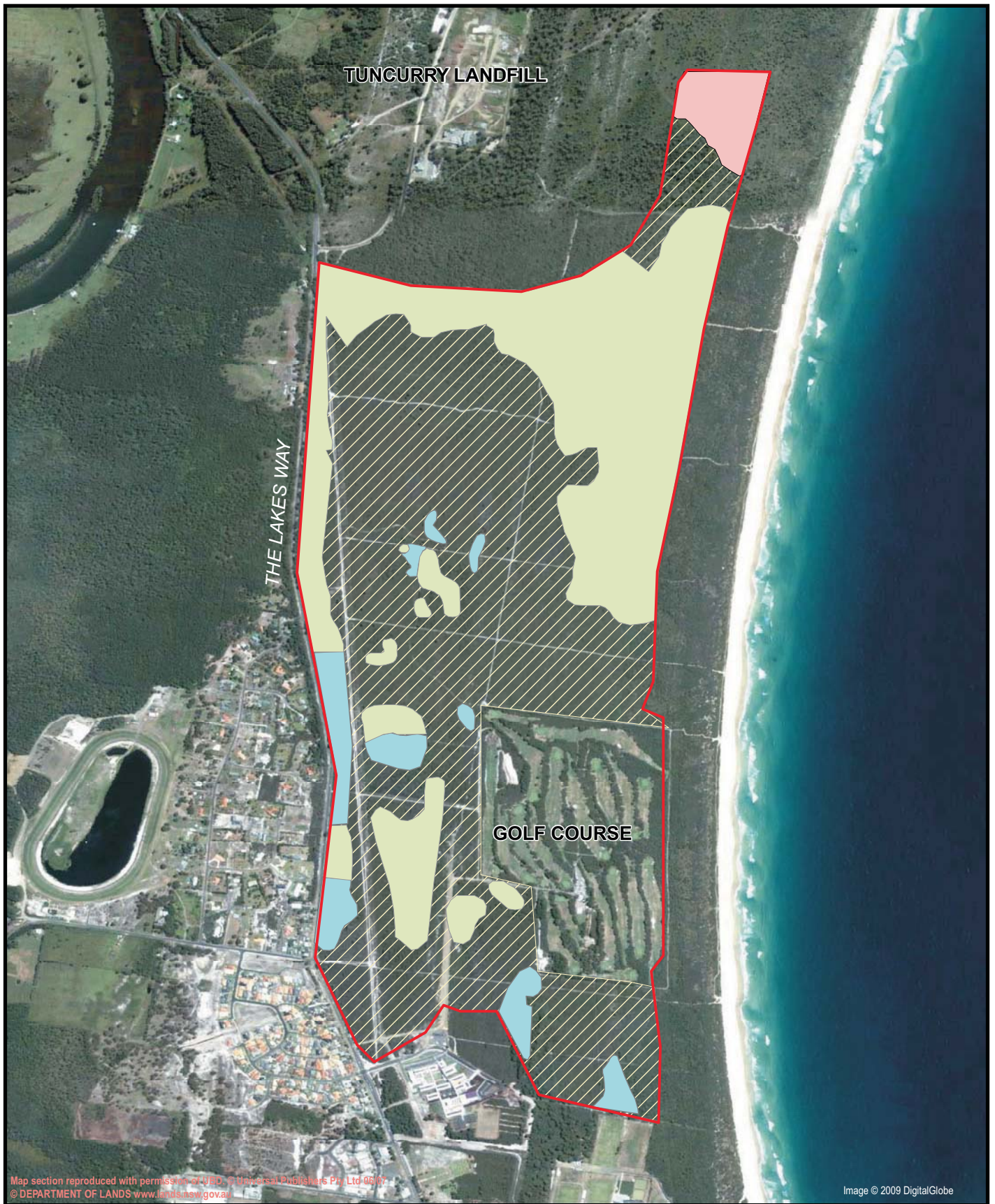
Disturbances on the site include rubbish dumping, tracks and weed invasion. Although the site has been subjected to a number of disturbances over the years as a result of past and present land use, very few weed species were identified within the vegetation communities and were mainly restricted to road edges.

##### *Blackbutt Open Forest*

Blackbutt (*Eucalyptus pilularis*) to 18m was the dominant tree within this community with Old-man Banksia (*Banksia serrata*) to 8m dominating the mid-storey. A shrub layer approximately 2m high was also present and was dominated by *Leucopogon lanceolatus* and Tooton (*Leptospermum polygalifolium*). Ground cover was dominated by Bracken (*Pteridium esculentum*) and Spiny-headed Mat-rush (*Lomandra longifolia*). Other species commonly encountered within this community included Variable Bossiaea (*Bossiaea heterophylla*), Sweet Wattle (*Acacia suaveolens*), Blue Flax-lily (*Dianella caerulea*), Blady Grass (*Imperata cylindrica*), Kangaroo Grass (*Themeda australis*), Pomax umbellata, Appleberry (*Billardiera scandens*) and Wonga Wonga Vine (*Pandorea pandorana*).

More mature patches of this community were located along the western site boundary adjacent to The Lakes Way with younger patches occurring in the north and in patches throughout the site. Weed invasion was minimal though





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**Legend**

- Site Boundary
- Blackbutt Open Forest
- Banksia Woodland
- Conifer Stands
- Heathland

**Source:**  
 © 2007 Google TM

Client:	Landcom
Project:	North Tuncurry Ecology
Drawing No:	0092575Orchid_GIS01
Date:	01/05/2009
Drawn by:	TH
Scale:	Refer to Scale Bar



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**Figure 3.1**  
**Vegetation Communities**

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**Photograph 1**

Blackbutt Open Forest



**Photograph 2**

Heathland

greatest in areas closest to road verges. Rubbish dumping was also noted near tracks that run through the site.

#### *Banksia Woodland*

In the north of the site there is woodland dominated by Old-man Banksia (*Banksia serrata*) up to five metres in height, with an open grassy and low heath understorey at the rear of the dunes. The understorey had been recently burnt and was dominated by Bracken, Blady Grass, Kangaroo Grass, Spiny-headed Mat-rush, Knobby Club-rush (*Ficinia nodosa*), and *Gonocarpus tetragynus*.

#### *Heathland*

Within this community, Wallum Banksia (*Banksia aemula*) to approximately three metres was the dominant species in the upper stratum with Prickly Tea-tree (*Leptospermum juniperinum*) to two metres dominant within the mid-stratum. *Caustis recurvata* was the dominant species within the lower stratum. Other species commonly encountered within this community included *Ochrosperma lineare*, *Leptospermum polygalifolium*, Wedding Bush (*Ricinocarpos pinifolius*), *Dillwynia retorta*, *Boronia pinnata*, *Leucopogon lanceolatus*, *Bossiaea rhombifolia*, *Bossiaea heterophylla*, *Astroloma pinifolium*, *Conospermum taxifolium* and Flannel Flower (*Actinotus helianthi*).

The heathland community is in good condition with minimal disturbance from tracks and rubbish dumping, and low occurrence of weeds. The condition of this community is relatively uniform across the entire site with slight changes in species composition throughout. In the south of the south especially along the access road to the golf course, Coastal Tea-tree (*Leptospermum laevigatum*) and Sydney Golden Wattle (*Acacia longifolia*) dominate the edges of the heath possibly as a result of disturbance. Weed invasion was minimal though rubbish dumping adjacent to tracks was noted. Stands of Slash Pine remnants of past forestry operations are also scattered throughout the site and are indicated on *Figure 3.1*.

### **3.1.2 *Endangered Ecological Communities***

A number of EECs have been identified as potentially occurring within the *Bulahdelah 1:100,000 Map Sheet* (DECC, 2008a). These EECs are listed in *Table 3.1*.

**Table 3.1** *Endangered Ecological Communities Potentially Occurring within the Site*

<b>Endangered Ecological Communities</b>	<b>Bioregions</b>
Swamp Oak Floodplain Forest	NSW North Coast, Sydney Basin and South East Corner
Littoral Rainforest	NSW North Coast, Sydney Basin and South East Corner
Montane Peatlands and Swamps	New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps
Subtropical Coastal Floodplain Forest	NSW North Coast
Lowland Rainforest	NSW North Coast and Sydney Basin
Freshwater Wetlands on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
Themeda Grassland on Seaciffs and Coastal Headlands	NSW North Coast, Sydney Basin and South East Corner
Swamp Sclerophyll Forest on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
White Box Yellow Box Blakely's Red Gum Woodland	
River-Flat Eucalypt Forest on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
Lowland Rainforest on Floodplains	NSW North Coast
Coastal Saltmarsh	NSW North Coast, Sydney Basin and South East Corner
Hunter Lowland Redgum Forest	Sydney Basin, NSW North Coast

Source: DECC, 2008a

Assessment shows that the vegetation communities within the site do not form part of any EECs as listed under NSW or Commonwealth legislation.

The heathland community identified on site is considered to be of regional conservation significance in the Great Lakes Local Government Area (LGA) based on natural rarity and historical extent of clearing (Great Lakes Council, 2003).

### **3.1.3** *Threatened Flora*

Seven threatened flora species have previously been recorded within a 10km radius of the site (DECC, 2008a) and an additional two threatened flora species were considered to potentially occur within a 10km radius of the site based on known habitat requirements (DEWHA, 2008) (refer *Table 3.2*).

**Table 3.2 Threatened Flora within 10km Radius of the Site**

Scientific Name Common Name	Legal Status		Recorded within a 10km Radius of the Site <sup>1</sup>	Considered to Potentially Occur within a 10km Radius of the Site <sup>2</sup>
	EPBC Act	TSC Act		
<i>Allocasuarina defungens</i> Dwarf Heath Casuarina	E	E	Y	Y
<i>Allocasuarina simulans</i> Nabiac Casuarina	V	V	Y	Y
<i>Asperula asthenes</i> Trailing Woodruff	V	V	Y	Y
<i>Cryptostylis hunteriana</i> Leafless Tongue Orchid	V	V	N	Y
<i>Cynanchum elegans</i> White-flowered Wax Plant	E	E	Y	Y
<i>Lindernia alsinoides</i> Noah's False Chickweed	-	E	Y	-
<i>Maundia triglochinooides</i>	-	V	Y	-
<i>Senna acclinis</i> Rainforest Cassia	-	E	Y	-
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	V	V	N	Y

1. DECC, 2008a  
2. DEWHA, 2008

A habitat assessment was undertaken for these species and the results presented in *Annex B*. Habitat assessment showed that potential habitat is available within the site for the Dwarf Heath Casuarina (*Allocasuarina defungens*), Nabiac Casuarina (*Allocasuarina simulans*), Leafless Tongue Orchid (*Cryptostylis hunteriana*) and Noah's False Chickweed (*Lindernia alsinoides*). However, targeted flora surveys conducted in November 2005 (ERM, 2005b) did not reveal the presence of threatened flora species on the site.

As discussed in *Section 2.3*, targeted surveys are required for the Tuncurry Midge Orchid between March and May as advised by the DECC.

### 3.2 FAUNA

All fauna species identified within the site are listed in *Annex A*. A total of five amphibians, one reptile, 57 birds and 17 mammals were recorded during field investigations. Of these species, five were exotic. The majority of species recorded are characteristically common and widespread species across similar environs. A number of threatened species were also recorded (refer *Section 3.2.3*). The results of targeted fauna surveys are summarised as follows.

### *Terrestrial Elliott Trapping and Hair Tube Survey*

Terrestrial mammal trapping and the hair tube survey recorded the presence of the Yellow-footed Antechinus (*Antechinus flavipes*) and the introduced Black Rat (*Rattus rattus*).

### *Arboreal Elliott Trapping*

The Squirrel Glider was trapped during the survey period. This species is listed as Vulnerable under the *TSC Act*. No other species were trapped during the survey.

### *Spotlighting and Dusk Census*

The Squirrel Glider, Brush-tailed Phascogale (*Phascogale tapoatafa*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) were identified during spotlighting and dusk census. These species are listed as Vulnerable under the NSW *TSC Act* and the Grey-headed Flying-fox is also listed as Vulnerable under the Commonwealth *EPBC Act*.

Other species recorded during spotlighting included the Sugar Glider (*Petaurus breviceps*), Common Ringtail Possum (*Pseudocheirus peregrinus*), Short-beaked Echidna (*Tachyglossus aculeatus*) and the introduced Fox (*Vulpes vulpes*).

### *Diurnal Bird Surveys*

A total of 57 bird species were recorded during the survey period (refer *Annex A*). Commonly encountered species included the Little Wattlebird (*Anthochaera chrysoptera*), White-cheeked Honeyeater (*Phylidonyris niger*), Variegated Fairy-wren (*Malurus lamberti*), Sacred Kingfisher (*Todiramphus sanctus*) and Rainbow Bee-eater (*Merops ornatus*). None of the species identified are listed as threatened under NSW or Commonwealth legislation. The Rainbow Bee-eater is listed as migratory under the *EPBC Act*.

### *Owl Call Playback*

No owls or nocturnal birds were identified during the owl call playback.

### *Ultrasonic Bat Detection*

Gould's Wattle Bat (*Chalinolobus gouldii*), Eastern Forest Bat (*Vespadelus pumilus*), Eastern Freetail-bat (*Mormopterus norfolkensis*) and the Greater Broad-nosed Bat (*Scoteanax rueppellii*) were recorded via call analysis during the survey period. The Eastern Freetail-bat and Greater Broad-nosed Bat are

listed as Vulnerable under the TSC Act. The White-striped Freetail-bat (*Tadarida australis*) was also recorded opportunistically during the survey.

#### *Amphibian Survey*

The Eastern Dwarf Tree Frog (*Litoria fallax*), Peron's Tree Frog (*Litoria peronii*), Revealed Frog (*Litoria revelata*), Tyler's Tree Frog (*Litoria tyleri*) and Common Eastern Froglet (*Crinia signifera*) were recorded adjacent to the dam within the golf course during the survey period.

#### *Opportunistic Sightings*

A number of diggings observed on the site suggest the presence of the Bandicoots on the site although none were observed during the survey period. Scat and track analysis also revealed the presence of the Swamp Wallaby (*Wallabia bicolor*) on site.

### **3.2.2 Fauna Habitat**

Field investigations revealed that potentially suitable fauna habitat exists within the site in the form of:

- dry sclerophyll open forest; and
- heathland.

These communities provide a number of sheltering, breeding and foraging habitat resources for native fauna. Within the site, the following habitat features were identified during field investigations:

- fallen timber, leaf litter and rubbish – provides suitable cover for reptiles and hollow-bearing logs provide habitat for small terrestrial mammals;
- myrtaceous tree and shrub species (e.g. Blackbutt and *Leptospermum* spp.) and Banksias – provide a suitable foraging resource for nectivorous birds and arboreal mammals;
- shrubby understorey and heathland – provides suitable foraging/nesting habitat for small bird species and cover for macropods and small ground-dwelling mammals;
- hollow-bearing trees within the open forest – provide shelter and breeding for birds and arboreal mammals;
- grassy understorey – provides seed and stem resources granivorous and herbivorous species;
- sandy soil – provides burrowing and foraging habitat for terrestrial mammals; and
- dam within the golf course – provides a foraging resource for aquatic birds and habitat for frogs.



Few tree hollows were identified within the site during the field survey with the majority of those hollows present with entrances of less than five centimetres in diameter.

### *Key Habitats and Regional Corridors*

According to mapping by the NSW DECC, the site is recognised as a key fauna habitat and is part of a regional fauna corridor (Scotts, 2003). Regional fauna corridors are primary landscape connections between larger important areas of habitat that are generally substantial in width and provide for fauna habitat and dispersal of species (DEC, 2004).

### 3.2.3 *Threatened Fauna*

Thirty-seven threatened fauna species have previously been recorded within a 10km radius of the site (DECC, 2008a) and an additional 27 threatened fauna species were considered to potentially occur within a 10km radius of the site based on known habitat requirements (DEWHA, 2008) (refer Table 3.3).

**Table 3.3** *Threatened Fauna within 10km Radius of the Site*

Common Name	Scientific Name	Legal Status		Recorded within 10km Radius of the Site <sup>1</sup>	Considered to Potentially Occur within 10km Radius of the Site <sup>2</sup>
		EPBC Act	TSC Act		
<b>Amphibians</b>					
Green and Golden Bell Frog	<i>Litoria aurea</i>	V	E	N	Y
Southern Barred Frog	<i>Mixophyes iteratus</i>	E	E	N	Y
Stuttering Frog	<i>Mixophyes balbus</i>	V	E	N	Y
Wallum Froglet	<i>Crinia tinnula</i>	-	V	Y	-
<b>Reptiles</b>					
Green Turtle	<i>Chelonia mydas</i>	V	V	Y	Y
Leathery Turtle	<i>Dermochelys coriacea</i>	V	V	Y	Y
<b>Birds</b>					
Amsterdam Albatross	<i>Diomedea amsterdamensis</i>	E	-	N	Y
Antipodean Albatross	<i>Diomedea antipodensis</i>	V	V	N	Y
Australian Painted Snipe	<i>Rostratula australis</i>	V	E	N	Y
Barking Owl	<i>Ninox connivens</i>	-	V	Y	-
Beach Stone-curlew	<i>Esacus neglectus</i>	-	E	Y	-
Black Bittern	<i>Ixobrychus flavicollis</i>	-	V	Y	-
Black-browed Albatross	<i>Thalassarche melanophris</i>	V	V	N	Y
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	-	E	Y	-
Black-tailed	<i>Limosa limosa</i>	-	V	Y	-

Common Name	Scientific Name	Legal Status		Recorded within 10km Radius of the Site <sup>1</sup>	Considered to Potentially Occur within 10km Radius of the Site <sup>2</sup>
		EPBC Act	TSC Act		
Godwit					
Buller's Albatross	<i>Thalassarche bulleri</i>	V	-	N	Y
Campbell Albatross	<i>Thalassarche impavida</i>	V	-	N	Y
Flesh-footed Shearwater	<i>Puffinus carneipes</i>	-	V	Y	-
Gibson's Albatross	<i>Diomedea gibsoni</i>	V	V	N	Y
Glossy Black-Cockatoo	<i>Calyptorhynchus lathamii</i>	-	V	Y	-
	<i>Pterodroma</i>				
Gould's Petrel	<i>leucoptera</i>	E	E	N	Y
	<i>leucoptera</i>				
Grass Owl	<i>Tyto capensis</i>	-	V	Y	-
	<i>Calidris</i>				
Great Knot	<i>tenuirostris</i>	-	V	Y	-
	<i>Pterodroma</i>				
Kermadec Petrel	<i>neglecta neglecta</i>	V	V	N	Y
	<i>Charadrius</i>				
Lesser Sand-plover	<i>mongolus</i>	-	V	Y	-
Little Tern	<i>Sterna albifrons</i>	-	E	Y	-
	<i>Tyto</i>				
Masked Owl	<i>novaehollandiae</i>	-	V	Y	-
	<i>Macronectes halli</i>				
Northern Giant-Petrel		V	V	N	Y
Osprey	<i>Pandion haliaetus</i>	-	V	Y	-
	<i>Haematopus</i>				
Pied Oystercatcher	<i>longirostris</i>	-	V	Y	-
Powerful Owl	<i>Ninox strenua</i>	-	V	Y	-
Regent Honeyeater	<i>Xanthomyza phrygia</i>	E	E	N	Y
Salvin's Albatross	<i>Thalassarche salvini</i>	V	-	N	Y
Shy Albatross	<i>Thalassarche cauta</i>	V	V	N	Y
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	-	V	Y	-
	<i>Macronectes giganteus</i>				
Southern Giant-Petrel		E	E	N	Y
Square-tailed Kite	<i>Lophoictinia isura</i>	-	V	Y	-
Swift Parrot	<i>Lathamus discolor</i>	E	E	Y	Y
Terek Sandpiper	<i>Xenus cinereus</i>	-	V	Y	-
	<i>Diomedea dabbenena</i>				
Tristan Albatross		E	-	N	Y
Wandering Albatross	<i>Diomedea exulans</i>	V	E	Y	Y
White-capped Albatross	<i>Thalassarche steadi</i>	V	-	N	Y
<b>Mammals</b>					
Blue Whale	<i>Balaenoptera musculus</i>	E	E	N	Y
Brush-tailed	<i>Phascogale</i>	-	V	Y	-

Common Name	Scientific Name	Legal Status		Recorded within 10km Radius of the Site <sup>1</sup>	Considered to Potentially Occur within 10km Radius of the Site <sup>2</sup>
		EPBC Act	TSC Act		
Phascogale	<i>tapoatafa</i>				
Common Blossom-bat	<i>Syconycteris australis</i>	-	V	Y	-
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	-	V	Y	-
Eastern Cave Bat	<i>Vespadelus trouhntoni</i>	-	V	Y	-
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	-	V	Y	-
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	-	V	Y	-
Great White Shark	<i>Carcharodon carcharias</i>	V	-	N	Y
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	-	V	Y	-
Green Sawfish	<i>Pristis zijsron</i>	V	-	N	Y
Grey Nurse Shark	<i>Carcharias taurus</i>	CE	-	N	Y
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V	V	Y	Y
Humpback Whale	<i>Megaptera novaeangliae</i>	V	V	Y	Y
Koala	<i>Phascolarctos cinereus</i>	-	V	Y	-
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	N	Y
Large-footed Myotis	<i>Myotis adversus</i>	-	V	Y	-
Little Bentwing-bat	<i>Miniopterus australis</i>	-	V	Y	-
Long-nosed Potoroo	<i>Potorous tridactylus tridactylus</i>	V	V	N	Y
Southern Right Whale	<i>Eubalaena australis</i>	E	V	N	Y
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	E	V	Y	Y
Squirrel Glider	<i>Petaurus norfolcensis</i>	-	V	Y	-
Whale Shark	<i>Rhincodon typus</i>	V	-	N	Y

1. DECC, 2008a

2. DEWHA, 2008

A habitat assessment was undertaken for these species and the results presented in *Annex B*. Habitat assessment showed that potential foraging, sheltering and/or nesting habitat is available on site for a number of threatened species and the current and previous surveys revealed the presence of the following threatened species:

- Brush-tailed Phascogale;
- Eastern Freetail-bat;
- Greater Broad-nosed Bat;
- Grey-headed Flying-fox;
- Osprey; and
- Squirrel Glider.

The locations where the Brush-tailed Phascogale, Grey-headed Flying-fox, Osprey and Squirrel Glider species were recorded in are indicated on *Figure 2.1*. The Eastern Freetail-bat and Greater Broad-nosed Bat were detected via analysis of Anabat data. The Anabat detector was carried whilst conducting dusk census, spotlighting and owl call playback and the locations of these surveys are also indicated on *Figure 2.1*.

In coastal areas, Squirrel Gliders are known to inhabit Blackbutt-Bloodwood forest with heath understorey and rely on tree hollows for refuge and nesting (DECC, 2008b). Brush-tailed Phascogales are known to inhabit heath and also rely on tree hollows for refuge and nesting. The Squirrel Glider and Brush-tailed Phascogale were recorded within the Blackbutt open forest community and it is likely that this community provides suitable foraging, sheltering and breeding habitat for these species. The heathland community is also likely to provide a suitable foraging resource for these species.

The Osprey tends to favour coastal areas especially near the mouth of large rivers, lakes and lagoons and nests high up on the crowns of dead trees or dead crowns of large live trees, usually within one kilometre of the sea (DECC, 2008b). An Osprey was opportunistically recorded during previous field investigations (ERM, 2005b) perching on the transmission lines located in the western portion of the site. No nests or suitable nesting habitat were identified during field investigations although it is possible that suitable nesting habitat occurs within the vicinity of the site.

The Grey-headed Flying-fox was recorded as an overfly species whilst conducting owl call playback surveys. The Grey-headed Flying-fox forages on nectar and pollen of native trees, particularly Eucalypts, Melaleucas and Banksias, and fruits of rainforest, garden and cultivated trees and roosts in camps commonly found in gullies, close to water and in vegetation with a dense canopy (DECC, 2008b). The open forest and heath habitat within the site provides potential foraging habitat for this species although the lack of suitable roosting habitat precludes this species from utilising the site as a potential sheltering or breeding resource.

The Eastern Freetail-bat and Greater Broad-nosed Bat are known to occur within forests and woodlands east of the Great Dividing Range where they roost in tree hollows and under bark (DECC, 2008b). The open forest habitat

within the site provides a foraging resource for these species and may also provide potential roosting habitat in the form of tree hollows. Tracks on the site also provide clearways that may be commonly used by these species during hunting.

*State Environmental Planning Policy No. 44 – Koala Habitat Protection*

No Koala feed trees as listed under *SEPP 44* or Koalas were identified on-site during the survey. Consequently the site does not provide ‘potential’ or ‘core’ Koala habitat as defined by *SEPP 44*. However, Koalas are also known to browse upon Blackbutt trees and it is possible that Koalas may occasionally utilise the site as part of their home range given the number of recorded sightings within the locality.

**3.2.4 Migratory Species**

A search of the DEWHA database for MNES (2008) showed that 12 migratory terrestrial and wetland bird species have been identified as occurring or having the potential to occur within the locality (see *Table 3.4*).

**Table 3.4 Migratory Species Considered to Potentially Occur within 10km Radius of the Site**

Common Name	Scientific Name
Black-faced Monarch	<i>Monarcha melanopsis</i>
Cattle Egret	<i>Ardea ibis</i>
Great Egret	<i>Ardea alba</i>
Latham’s Snipe	<i>Gallinago hardwickii</i>
Painted Snipe	<i>Rostratula benghalensis</i>
Rainbow Bee-eater	<i>Merops ornatus</i>
Regent Honeyeater	<i>Xanthomyza Phrygia</i>
Rufous Fantail	<i>Rhipidura rufifrons</i>
Satin Flycatcher	<i>Myiagra cyanoleuca</i>
Spectacled Monarch	<i>Monarcha trivirgatus</i>
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>
White-throated Needletail	<i>Hirundapus caudacutus</i>

Source: DEWHA, 2008

Of these species the Rainbow Bee-eater was identified within the site during field investigations. This species is considered to be relatively common within similar environs.

ERM were engaged by Landcom to provide a preliminary ecological assessment of a large parcel of Crown Land at North Tuncurry. Field investigations included fauna sampling using direct and indirect survey methodologies and flora surveys.

The site is dominated by heathland with Blackbutt open forest occurring in the northern and western parts of the site and in scattered patches throughout the heathland to the west of the golf course, and a Banksia woodland in the north east. Review of historical aerial photography of the site indicates that parts of the site were previously cleared for forestry. Historical records show that all State Forest Dedications relating to the site were revoked in accordance with Gazettal Notices and that all plantation operations were ceased on the site by 1976 (Whelans, 2007). The previous use of the site as a pine plantation explains the presence of Slash Pine stands throughout the site (particularly in the southern portion of the site) and may explain the restricted distribution of the Blackbutt open forest community which was probably cleared to some extent to accommodate the plantation. It is uncertain what vegetation community occurred on the site prior to forestry operations. However, the limited patches of Blackbutt open forest regrowth amongst the heath in the last 30 years since dedications were revoked, and the predominance of regrowth of a diversity of heath species and Wallum Banksia suggests that the site was predominantly heathland prior to clearing and operation of the site as a pine plantation.

The heathland is in good condition and the condition of the community is relatively uniform across the site. However, it is noted that the heathland near the access road to the golf course and vehicular tracks around the golf course are dominated by Coastal Tea-tree (*Leptospermum laevigatum*). This is likely to be the result of past disturbance. Weed invasion was minimal within the site though greatest adjacent to roads and tracks that occur within the site, particularly in areas of greatest use near the golf course. Rubbish dumping was also noted adjacent to tracks within the site.

The ecological value of the site has been summarised in *Table 4.1* and is based on the regional conservation value and intrinsic habitat value of the community as assessed by Great Lakes Council (2003). It should be noted that the Banksia woodland is not recognised as a separate community in the Council Vegetation Strategy as it was mapped as heathland. This community would have moderate to high habitat value providing foraging resource for birds, arboreal mammals such as gliders, microbats and fruit eating bats. This community is closely aligned to the Blackbutt Open Forest which is representative of Coastal Dune Dry Sclerophyll Forest of New South Wales. It has therefore been attributed the same conservation value.

**Table 4.1 Ecological Values of the Site**

Habitat Type	Conservation Value	Habitat Value
Heath	Moderate to High	High
Banksia woodland	Moderate to High	Moderate to High
Blackbutt Open Forest	Moderate to High	Moderate to High

Assessments for Heath and Blackbutt Open Forest from Great Lakes Council (2003).

Heathland has been identified as having a moderate to high conservation value, based on the natural rarity and historical extent of clearing of this community within the region (Great Lakes Council 2003). This dry heathland community occurs on beach ridges from the Central Coast into south-western Queensland (Griffith and Wilson 2007, Griffith *et al* 2003). Within the region Blackbutt open forest is identified as having a moderate to high conservation value (Great Lakes Council, 2003).

The heathland is considered to have high habitat value for birds, reptiles and small ground dwelling mammals while the Blackbutt Open Forest is considered to have moderate to high habitat value (Great Lakes Council 2003). It was noted that hollow-bearing trees occur in the west and the north of the site with the majority of mature trees associated with the corridor of open forest along The Lakes Way. *Banksia serrata* in the open forest in the north also provide small hollows that appear to be utilised by the gliders. This habitat feature was not noted in the western corridor.

Six threatened fauna species have been recorded on the site during field investigations. These species are listed as Vulnerable under the NSW *TSC Act* and the Grey-headed Flying-fox is also listed as Vulnerable under the Commonwealth *EPBC Act*. The heathland and Blackbutt open forest communities provide a valuable foraging resource for threatened species identified within the site. Hollows identified within the open forest community in the north and western areas of the site provide sheltering and nesting habitat for the Squirrel Glider, Brush-tailed Phascogale and potentially the Eastern Free-tail Bat and Greater Broad-nosed Bat. Although the Grey-headed Flying-fox utilises the site as a foraging resource, it is unlikely that it would roost on the site due to the absence of preferred habitat features.

The threatened Tuncurry Midge Orchid occurs on site and targeted surveys for this species have been undertaken by ERM in 2009 and are discussed in a separate letter report to Landcom.

In summary, while the heathland on site has been disturbed by past land use and is bisected by tracks it is considered to have a moderate to high conservation value and high habitat value with disturbance most evident in the south of the site in particular near the golf course. The Banksia woodland and Blackbutt open forest are considered to have moderate to high conservation value, moderate to high habitat value and high value as a corridor for fauna movement.



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Annex A

## Species Lists

**Table A.1 Flora Species Recorded within the Study Area**

Family	Scientific Name	Common Name
APIACEAE	<i>Actinotus helianthi</i>	Flannel Flower
ASTERACEAE	<i>Bidens pilosa*</i>	Cobbler's Pegs
ASTERACEAE	<i>Conyza bonariensis*</i>	Flaxleaf Fleabane
ASTERACEAE	<i>Hypochaeris radicata*</i>	Catsear
ASTERACEAE	<i>Ozothamnus diosmifolius</i>	White Dogwood
BIGNONIACEAE	<i>Pandorea pandorana</i>	Wonga Wonga Vine
CASUARINACEAE	<i>Allocasuarina littoralis</i>	Black Sheoak
CASUARINACEAE	<i>Casuarina glauca</i>	Swamp Oak
CYPERACEAE	<i>Caustis recurvata</i>	-
CYPERACEAE	<i>Ficinia nodosa</i>	Knobby Club-rush
DENNSTAEDTIACEAE	<i>Pteridium esculentum</i>	Bracken
DILLENiaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower
DILLENiaceae	<i>Hibbertia dentata</i>	Twining Guinea Flower
DILLENiaceae	<i>Hibbertia obtusifolia</i>	Hoary guinea flower
DILLENiaceae	<i>Hibbertia scandens</i>	Climbing Guinea Flower
ERICACEAE	<i>Astroloma pinifolium</i>	Pine Heath
ERICACEAE	<i>Leucopogon lanceolatus</i>	-
ERICACEAE	<i>Monotoca elliptica</i>	Tree Broom-heath
EUPHORBIACEAE	<i>Ricinocarpos pinifolius</i>	Wedding Bush
FABACEAE (FABOIDEAE)	<i>Bossiaea heterophylla</i>	Variable Bossiaea
FABACEAE (FABOIDEAE)	<i>Bossiaea rhombifolia</i>	-
FABACEAE (FABOIDEAE)	<i>Dillwynia retorta</i>	-
FABACEAE (FABOIDEAE)	<i>Kennedia rubicunda</i>	Red Kennedy Pea
FABACEAE (MIMOSOIDEAE)	<i>Acacia longifolia</i>	Sydney Golden Wattle
FABACEAE (MIMOSOIDEAE)	<i>Acacia sophorae</i>	Coastal Wattle
FABACEAE (MIMOSOIDEAE)	<i>Acacia suaveolens</i>	Sweet Wattle
HALORAGACEAE	<i>Gonocarpus tetragynus</i>	-
IRIDACEAE	<i>Patersonia spp.</i>	Purple Flag
LOMANDRACEAE	<i>Lomandra glauca</i>	Pale Mat-rush
LOMANDRACEAE	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
MALVACEAE	<i>Sida rhombifolia*</i>	Paddy's lucerne
MENISPERMACEAE	<i>Stephania japonica</i>	Snake Vine
MYRTACEAE	<i>Angophora costata</i>	Smooth-barked Apple
MYRTACEAE	<i>Corymbia gummifera</i>	Red Bloodwood
MYRTACEAE	<i>Corymbia intermedia</i>	Pink Bloodwood
MYRTACEAE	<i>Eucalyptus pilularis</i>	Blackbutt
MYRTACEAE	<i>Ochrosperma lineare</i>	-
MYRTACEAE	<i>Leptospermum juniperinum</i>	Prickly Tea-tree
MYRTACEAE	<i>Leptospermum laevigatum</i>	Coastal Tea-tree
MYRTACEAE	<i>Leptospermum polygalifolium</i>	Tantoon
ORCHIDACEAE	<i>Caleana major</i>	Large Duck Orchid
PHORMIACEAE	<i>Dianella caerulea</i>	Blue Flax-lily
PITTOSPORACEAE	<i>Billardiera scandens</i>	Appleberry
POACEAE	<i>Andropogon virginicus*</i>	Whisky Grass
POACEAE	<i>Austrodanthonia tenuior</i>	Wallaby Grass
POACEAE	<i>Briza maxima*</i>	Quaking Grass
POACEAE	<i>Cynodon dactylon</i>	Common Couch
POACEAE	<i>Entolasia marginata</i>	Bordered Panic
POACEAE	<i>Imperata cylindrica</i>	Blady Grass
POACEAE	<i>Melinis repens*</i>	Red Natal Grass
POACEAE	<i>Microlaena stipoides</i>	Weeping Grass
POACEAE	<i>Panicum simile</i>	Two-colour Panic
POACEAE	<i>Poa labillardierei</i>	Tussock Grass
POACEAE	<i>Themeda australis</i>	Kangaroo Grass
POLYGALACEAE	<i>Comesperma ericinum</i>	-

Family	Scientific Name	Common Name
PROTEACEAE	<i>Banksia aemula</i>	Wallum Banksia
PROTEACEAE	<i>Banksia integrifolia</i>	Coast Banksia
PROTEACEAE	<i>Banksia serrata</i>	Old-man Banksia
PROTEACEAE	<i>Conospermum taxifolium</i>	-
PROTEACEAE	<i>Persoonia lanceolata</i>	Lance Leaf Geebung
PROTEACEAE	<i>Persoonia linearis</i>	Narrow-leaved Geebung
PROTEACEAE	<i>Petrophile pulchella</i>	Conesticks
RUBIACEAE	<i>Pomax umbellata</i>	-
RUTACEAE	<i>Boronia pinnata</i>	-
RUTACEAE	<i>Eriostemon australasius</i>	Wax Flower
RUTACEAE	<i>Phebalium squamulosum</i>	Scaly Phebalium
RUTACEAE	<i>Zieria smithii</i>	Sandfly Zieria
SAPINDACEAE	<i>Dodonaea triquetra</i>	Large-leaf Hop-bush
SCROPHULARIACEAE	<i>Veronica plebeia</i>	Trailing Speedwell
XANTHORRHOEACEAE	<i>Xanthorrea spp.</i>	Grass Tree

\* denotes introduced species

**Table A.2 Fauna Species Recorded within the Site**

FAMILY	Scientific Name	Common Name
<b>AMPHIBIANS</b>		
HYLIDAE	<i>Litoria fallax</i>	Eastern Dwarf Tree Frog
HYLIDAE	<i>Litoria peronii</i>	Peron's Tree Frog
HYLIDAE	<i>Litoria revelata</i>	Revealed Frog
HYLIDAE	<i>Litoria tyleri</i>	Tyler's Tree Frog
MYOBATRACHIDAE	<i>Crinia signifera</i>	Common Eastern Froglet
<b>REPTILES</b>		
AGAMIDAE	<i>Amphibolurus muricatus</i>	Jacky Lizard
<b>BIRDS</b>		
ACANTHIZIDAE	<i>Acanthiza pusilla</i>	Brown Thornbill
ACANTHIZIDAE	<i>Gerygone mouki</i>	Brown Gerygone
ACANTHIZIDAE	<i>Sericornis frontalis</i>	White-browed Scrubwren
ALCEDINIDAE	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
ALCEDINIDAE	<i>Todiramphus sanctus</i>	Sacred Kingfisher
ANATIDAE	<i>Anas superciliosa</i>	Pacific Black Duck
ANATIDAE	<i>Chenonetta jubata</i>	Australian Wood Duck
ARTAMIDAE	<i>Cracticus nigrogularis</i>	Pied Butcherbird
ARTAMIDAE	<i>Cracticus torquatus</i>	Grey Butcherbird
ARTAMIDAE	<i>Gymnorhina tibicen</i>	Australian Magpie
ARTAMIDAE	<i>Strepera graculina</i>	Pied Currawong
CACATUIDAE	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo
CAMPEPHAGIDAE	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
CENTROPODIDAE	<i>Centropus phasianinus</i>	Pheasant Coucal
COLUMBIDAE	<i>Columba leucomela</i>	White-headed Pigeon
COLUMBIDAE	<i>Geopelia humeralis</i>	Bar-shouldered Dove
COLUMBIDAE	<i>Macropygia amboinensis</i>	Brown Cuckoo-Dove
COLUMBIDAE	<i>Ocyphaps lophotes</i>	Crested Pigeon
COLUMBIDAE	<i>Phaps chalcoptera</i>	Common Bronzewing
COLUMBIDAE	<i>Streptopelia chinensis*</i>	Spotted Turtle-dove
CORACIIDAE	<i>Eurystomus orientalis</i>	Dollarbird
CORVIDAE	<i>Corvus coronoides</i>	Australian Raven
CUCULIDAE	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo
CUCULIDAE	<i>Chalcites basalus</i>	Horsfield's Bronze-Cuckoo
DICRURIDAE	<i>Dicrurus bracteatus</i>	Spangled Drongo
DICRURIDAE	<i>Grallina cyanoleuca</i>	Magpie-lark

FAMILY	Scientific Name	Common Name
DICRURIDAE	<i>Rhipidura albiscapa</i>	Grey Fantail
DICRURIDAE	<i>Rhipidura leucophrys</i>	Willie Wagtail
ESTRILDIDAE	<i>Neochmia temporalis</i>	Red-browed Finch
EUPETIDAE	<i>Psophodes olivaceus</i>	Eastern Whipbird
FALCONIDAE	<i>Falco berigora</i>	Brown Falcon
HIRUNDINIDAE	<i>Hirundo neoxena</i>	Welcome Swallow
MALURIDAE	<i>Malurus cyaneus</i>	Superb Fairy-wren
MALURIDAE	<i>Malurus lamberti</i>	Variegated Fairy-wren
MELIPHAGIDAE	<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill
MELIPHAGIDAE	<i>Anthochaera carunculata</i>	Red Wattlebird
MELIPHAGIDAE	<i>Anthochaera chrysoptera</i>	Little Wattlebird
MELIPHAGIDAE	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater
MELIPHAGIDAE	<i>Lichmera indistincta</i>	Brown Honeyeater
MELIPHAGIDAE	<i>Manorina melanocephala</i>	Noisy Miner
MELIPHAGIDAE	<i>Meliphaga lewinii</i>	Lewin's Honeyeater
MELIPHAGIDAE	<i>Myzomela sanguinolenta</i>	Scarlet Honeyeater
MELIPHAGIDAE	<i>Philemon corniculatus</i>	Noisy Friarbird
MELIPHAGIDAE	<i>Phylidonyris niger</i>	White-cheeked Honeyeater
MELIPHAGIDAE	<i>Plectorhyncha lanceolata</i>	Striped Honeyeater
MEROPIDAE	<i>Merops ornatus</i>	Rainbow Bee-eater
ORIOOLIDAE	<i>Oriolus sagittatus</i>	Olive-backed Oriole
PACHYCEPHALIDAE	<i>Colluricincla harmonica</i>	Grey Shrike-thrush
PACHYCEPHALIDAE	<i>Pachycephala pectoralis</i>	Golden Whistler
PELECANIDAE	<i>Pelecanus conspicillatus</i>	Australian Pelican
PETROICIDAE	<i>Eopsaltria australis</i>	Eastern Yellow Robin
PSITTACIDAE	<i>Platycercus eximius</i>	Eastern Rosella
PSITTACIDAE	<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet
PSITTACIDAE	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
PTILONORHYNCHIDAE	<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird
STURNIDAE	<i>Acridotheres tristis*</i>	Common Myna
ZOSTEROPIDAE	<i>Zosterops lateralis</i>	Silvereye
<b>MAMMALS</b>		
CANIDAE	<i>Canis Lupus*</i>	Dog
CANIDAE	<i>Vulpes vulpes*</i>	Fox
DASYURIDAE	<i>Antechinus flavipes</i>	Yellow-footed Antechinus
<b>DASYURIDAE</b>	<b><i>Phascogale tapoatafa</i></b>	<b>Brush-tailed Phascogale</b>
MACROPODIDAE	<i>Wallabia bicolor</i>	Swamp Wallaby
<b>MOLOSSIDAE</b>	<b><i>Mormopterus norfolkensis</i></b>	<b>Eastern Freetail-bat</b>
MOLOSSIDAE	<i>Tadarida australis</i>	White-striped Freetail-bat
MURIDAE	<i>Rattus rattus*</i>	Black Rat
PETAURIDAE	<i>Petaurus breviceps</i>	Sugar Glider
<b>PETAURIDAE</b>	<b><i>Petaurus norfolcensis</i></b>	<b>Squirrel Glider</b>
PSEUDOCHEIRIDAE	<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum
<b>PTEROPODIDAE</b>	<b><i>Pteropus poliocephalus</i></b>	<b>Grey-headed Flying-fox</b>
TACHYGLOSSIDAE	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna
VESPERTILIONIDAE	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
<b>VESPERTILIONIDAE</b>	<b><i>Scoteanax rueppellii</i></b>	<b>Greater Broad-nosed Bat</b>
VESPERTILIONIDAE	<i>Vespadelus pumilus</i>	Eastern Forest Bat

\* Denotes Introduced Species; Bold Text Denotes Threatened Species.

Annex B

## Threatened Species Habitat Assessment

**Table B.1 Threatened Species Habitat Assessment**

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<b>Plants</b>					
<i>Allocasuarina defungens</i>	Dwarf Heath Casuarina	E	E	Grows mainly in tall heath on sand, but can also occur on clay soils and sandstone. Also extends onto exposed nearby-coastal hills or headlands adjacent to sandplains (DECC, 2008b).	Potential habitat available within the site. Not identified during targeted surveys.
<i>Allocasuarina simulans</i>	Nabiatic Casuarina	V	V	Restricted to the mid-north coast of NSW, from Nabiatic to Forster where it grows in heathland on coastal sands (DECC, 2008b).	Potential habitat available within the site. Not identified during targeted surveys.
<i>Asperula asthenes</i>	Trailing Woodruff	V	V	This small herb occurs only in NSW where it has been recorded in scattered locations from Bulahdelah to near Kempsey. Occurs in damp sites, often along river banks (DECC, 2008b).	Low – no suitable habitat available within the site.
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	Known from a range of communities, including swamp-heath and woodland. Typically found in woodland dominated by Scribbly Gum ( <i>Eucalyptus sclerophylla</i> ), Silvertop Ash ( <i>E. sieberi</i> ), Red Bloodwood ( <i>Corymbia gummifera</i> ) and Black She-oak ( <i>Allocasuarina littoralis</i> ); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid ( <i>C. subulata</i> ) and the Tartan Tongue Orchid ( <i>C. erecta</i> ) (DECC, 2008b).	Potential habitat available within the site. Not identified during targeted surveys.
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. Usually occurs on the edge of dry rainforest vegetation though may be associated with other vegetation types including littoral rainforest; Coastal Tea-tree ( <i>Leptospermum laevigatum</i> ) – Coastal Banksia ( <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> ) coastal scrub; Forest Red Gum ( <i>Eucalyptus tereticornis</i> ) aligned open forest and woodland; Spotted Gum ( <i>Corymbia maculata</i> ) aligned open forest and woodland; and Bracelet Honey myrtle ( <i>Melaleuca armillaris</i> ) scrub to open scrub (DECC, 2008b).	Low – no suitable habitat available within the site.
<i>Lindernia alsinoides</i>	Noah's False	-	E	Recorded north from Bulahdelah where it grows in swampy sites in sclerophyll forest	Potential habitat available

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
	Chickweed			and coastal heath (DECC, 2008b).	within the site. Not identified during targeted surveys.
<i>Maundia triglochinoidea</i>	-	-	V	Restricted to coastal NSW and extending into southern Queensland north from Wyong. Grows in swamps, creeks or shallow freshwater 30-60cm deep on heavy clay with low nutrients. Associated with wetland species e.g. <i>Triglochin procerum</i> (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Senna acclinis</i>	Rainforest Cassia	-	E	Grows in or on the edges of subtropical and dry rainforest (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	V	Occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities (DECC, 2008b).	Low - no suitable habitat available within the site.
<b>Amphibians</b>					
<i>Crinia tinnula</i>	Wallum Froglet	-	V	Found only in acid paperbark swamps and sedge swamps of the coastal 'wallum' country (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	E	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes ( <i>Typha spp.</i> ) or spikerushes ( <i>Eleocharis spp.</i> ). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow ( <i>Gambusia holbrooki</i> ), have a grassy area nearby and diurnal sheltering sites available (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Mixophyes balbus</i>	Stuttering Frog	V	E	Occur along the east coast of Australia from southern Queensland to the north-eastern Victoria where they are found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Mixophyes iteratus</i>	Southern Barred Frog	E	E	Forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000m. They breed around shallow, flowing rocky streams from late spring to summer (DECC, 2008b).	Low - no suitable habitat available within the site.



Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<b>Reptiles</b>					
<i>Chelonia mydas</i>	Green Turtle	V	V	Ocean-dwelling species spending most of its life at sea. Eggs laid in holes dug in beaches throughout their range (DECC, 2008b).	No suitable habitat available within the site.
<i>Dermochelys coriacea</i>	Leathery Turtle	V	V	Occurs in inshore and offshore marine waters. Rarely breeds in Australia. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW (DECC, 2008b).	No suitable habitat available within the site.
<b>Birds</b>					
<i>Calidris tenuirostris</i>	Great Knot	-	V	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms (DECC, 2008b).	Low - no suitable habitat within the study area.
<i>Calyptorhynchus lathamii</i>	Glossy Black-cockatoo	-	V	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000m in which stands of She-oak species, particularly Black She-oak ( <i>Allocasuarina littoralis</i> ), Forest She-oak ( <i>A. torulosa</i> ) or Drooping She-oak ( <i>A. verticillata</i> ) occur. Dependent on large hollow-bearing eucalypts for nest sites (DECC, 2008b).	Low - preferred foraging resources not supported within the site.
<i>Charadrius mongolus</i>	Lesser Sand-plover	-	V	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats. Occasionally occurs on sandy beaches, coral reefs and rock platforms (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Diomedea amsterdamensis</i>	Amsterdam Albatross	E	-	Marine. Breeds biennially on Amsterdam Island in areas of open, marshy ground.	No suitable habitat available within the site.
<i>Diomedea antipodensis</i>	Antipodean Albatross	V	V	Marine. Breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks. Feeds pelagically on squid, fish and crustaceans (DECC, 2008b).	No suitable habitat available within the site.
<i>Diomedea dabbenena</i>	Tristan Albatross	E	-	Marine. Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation.	No suitable habitat available within the site.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<i>Diomedea exulans</i>	Wandering Albatross	V	E	Spends the majority of their time in flight, soaring over the southern oceans. Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation (DECC, 2008b).	No suitable habitat available within the site.
<i>Diomedea gibsoni</i>	Gibson's Albatross	V	V	Marine. Breeds biennially in colonies among grass tussocks on isolated subantarctic islands. Feeds pelagically on squid, fish and crustaceans (DECC, 2008b).	No suitable habitat available within the site.
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	-	E	Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters and adjacent grasslands and savannah woodlands. Can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Esacus neglectus</i>	Beach Stone-curlew	-	E	Rarely recorded on ocean beaches in NSW. Occurs on open, undisturbed beaches, islands, reefs, and estuarine intertidal sandflats and mudflats; beaches with estuaries or mangroves nearby are preferred; may also frequent river mouths, offshore sandbars and rock platforms. Nests on sandbanks, spits or islands in estuaries, among mangroves, or in sand surrounded by short grasses and scattered casuarinas (DECC, 2008b).	Low - no suitable habitat within the study area.
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	-	V	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Haematopus longirostris</i>	Pied Oystercatcher	-	V	Favours intertidal flats of inlets and bays, open beaches and sandbanks (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Ixobrychus flavicollis</i>	Black Bittern	-	V	Inhabits terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. May occur in flooded grassland, forest, woodland, rainforest and mangroves (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Lathamus discolor</i>	Swift Parrot	E	E	Migrates to the Australian south-east mainland between March and October where they are found in areas where winter flowering eucalypts are blossoming profusely or where there are abundant lerp infestations (DECC, 2008b).	Potential foraging habitat available within the site.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<i>Limosa limosa</i>	Black-tailed Godwit	-	V	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10cm deep, around muddy lakes and swamps (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Lophoictinia isura</i>	Square-tailed Kite	-	V	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses (DECC, 2008b).	Potential foraging habitat available within the site.
<i>Macronectes giganteus</i>	Southern Giant-Petrel	E	E	Marine. Over summer nests in small colonies amongst open vegetation on Antarctic and subantarctic islands (DECC, 2008b).	No suitable habitat available within the site.
<i>Macronectes halli</i>	Northern Giant-Petrel	V	V	Marine. Breeding in Australian territory is limited to Macquarie Island during spring and summer (DECC, 2008b).	No suitable habitat available within the site.
<i>Ninox connivens</i>	Barking Owl	-	V	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Roost along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large Eucalypts. Rarely recorded in the coastal and escarpment forests of NSW (DECC, 2008b).	Potential foraging habitat available within the site. No roosting habitat available.
<i>Ninox strenua</i>	Powerful Owl	-	V	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. Roosts by day in dense vegetation comprising species such as Turpentine ( <i>Syncarpia glomulifera</i> ), Black She-oak ( <i>Allocasuarina littoralis</i> ), Blackwood ( <i>Acacia melanoxylon</i> ), Rough-barked Apple ( <i>Angorophora floribunda</i> ), Cherry Ballart ( <i>Exocarpus cupressiformis</i> ) and a number of eucalypt species. Nest in large tree hollows (at least 0.5m deep) in large eucalypts (diameter at breast height 80-240cm) that are at least 150 years old (DECC, 2008b).	Isolated areas of potential foraging habitat available within the site. No suitable nesting hollows identified within the site.
<i>Pandion haliaetus</i>	Osprey	-	V	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Nests are made high up in dead trees or in dead crowns of live trees, usually within 1km of the sea (DECC, 2008b).	<b>Species recorded on-site. No suitable nesting habitat available at the site.</b>

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel	E	E	Marine. Breeds on both Cabbage Tree Island, 1.4km offshore from Port Stephens and on nearby Boondelbah island (DECC, 2008b).	No suitable habitat available within the site.
<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel	V	V	Marine. In Australia, it breeds on Ball's Pyramid and Phillip Island (near Norfolk Island) (DECC, 2008b).	No suitable habitat available within the site.
<i>Puffinus carneipes</i>	Flesh-footed Shearwater	-	V	Marine. Nest on Lord Howe Island in forests on sandy soils (DECC, 2008b).	No suitable habitat available within the site.
<i>Rostratula australis</i>	Painted Snipe	V	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water (DECC, 2008b).	Low - no suitable habitat available within the site.
Salvin's Albatross	Salvin's Albatross	V	-	Marine. Breeds on offshore islands.	No suitable habitat available within the site.
<i>Sterna albifrons</i>	Little Tern	-	E	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands (DECC, 2008b).	Low - no suitable habitat available within the site.
<i>Thalassarche bulleri</i>	Buller's Albatross	V	-	Marine. Breeds on offshore islands nesting on cliffs and coastal terraces.	No suitable habitat available within the site.
<i>Thalassarche cauta</i>	Shy Albatross	V	V	Marine. Occasionally occurs in continental shelf waters, in bays and harbours (DECC, 2008b).	No suitable habitat available within the site.
<i>Thalassarche impavida</i>	Campbell Albatross	V	-	Marine. Occasionally occurs in continental shelf waters, in bays and harbours.	No suitable habitat available within the site.
<i>Thalassarche melanophris</i>	Black-browed Albatross	V	V	Marine. Spends most of its time at sea, breeding on small isolated islands where it nests on a mound of soil and vegetation, on the cliffs or steep slopes of vegetated Antarctic and subantarctic islands. Feeds on fish, crustaceans, offal and squid and often forages in flocks with other seabirds (DECC, 2008b).	No suitable habitat available within the site.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<i>Thalassarche steadi</i>	White-capped Albatross	V	-	Marine. Breeds on subantarctic islands.	No suitable habitat available within the site.
<i>Tyto capensis</i>	Grass Owl	-	V	Tall grass, including grass tussocks in swampy areas, grassy plains, swampy heath and cane grass or sedges on flood plains. Rest by day in a 'form' - a trampled platform in a large tussock or other heavy growth (DECC, 2008b).	Potential habitat available within the site.
<i>Tyto novaehollandiae</i>	Masked Owl	-	V	Lives in dry eucalypt forests and woodlands from sea level to 1100m. A forest owl, but often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting (DECC, 2008b).	Potential foraging habitat available within the site. No suitable nesting or roosting habitat identified.
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	E	Mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Often found in Box-Ironbark woodland and riparian forests of River She-oak which support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes (DECC, 2008b).	Low - limited suitable habitat available within the site.
<i>Xenus cinereus</i>	Terek Sandpiper	-	V	Recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species (DECC, 2008b).	Low - no suitable habitat available within the site.
<b>Mammals</b>					
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin ( <i>Hirundo ariel</i> ), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies (DECC, 2008b).	Potential foraging habitat available within the site.

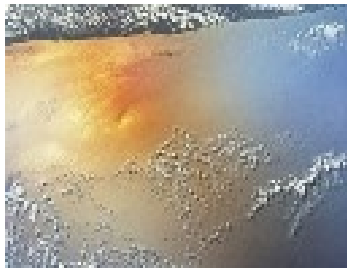
Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<i>Dasyurus maculatus</i>	Spotted-tail Quoll	E	V	Range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites (DECC, 2008b).	Potential foraging habitat available within the site. No suitable nesting habitat.
<i>Falsistrellus tasmaniensis</i>	Eastern False Pispistrelle	-	V	Prefers moist habitats, with trees taller than 20m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy (DECC, 2008b).	Low – limited suitable habitat within the study area.
<i>Miniopterus australis</i>	Little Bentwing-bat	-	V	Moist eucalypt forest, rainforest or dense coastal Banksia scrub. Roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats (DECC, 2008b).	Potential foraging habitat available within the site.
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	-	V	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas (DECC, 2008b).	Potential foraging habitat available within the site.
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	-	V	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures (DECC, 2008b).	<b>Habitat available within the site. Species recorded on-site.</b>
<i>Myotis macropus</i>	Large-footed Myotis	-	V	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools (DECC, 2008b).	Low – no suitable habitat within the site.
<i>Petaurus norfolcensis</i>	Squirrel Glider	-	V	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Require abundant tree hollows for refuge and nest sites (DECC, 2008b).	<b>Habitat available within the site. Species recorded on-site.</b>

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	-	V	In NSW, it is more frequently found in forest on the Great Dividing Range in the north-east and south-east of the State and prefers dry sclerophyll open forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabits heath, swamps, rainforest and wet sclerophyll forest. Nests and shelters in tree hollows with entrances 2.5 - 4cm wide (DECC, 2008b).	<b>Habitat available within the study area. Species recorded on-site.</b>
<i>Phascolarctos cinereus</i>	Koala	-	V	Inhabit Eucalypt woodlands and forests. Feed on the foliage of more than 70 Eucalypt species and 30 non-Eucalypt species, but in any one area will select preferred browse species (DECC, 2008b).	No SEPP 44 feed trees identified within the site. Blackbutt trees provide limited potential foraging habitat within the site.
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	V	In NSW, generally restricted to coastal heaths and forests east of the Great Dividing Range with an annual rainfall exceeding 760mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature (DECC, 2008b).	Potential habitat available within the site.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy (DECC, 2008b).	<b>Suitable foraging habitat available within the site. Species recorded on-site.</b>
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	-	V	Utilises a variety of habitats from woodland through to moist and dry Eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings (DECC, 2008b).	<b>Habitat available within the site. Species recorded on-site.</b>
<i>Syconycteris australis</i>	Common Blossom-bat	-	V	Roost in littoral rainforest and feed on flowers in adjacent heathland and paperbark swamps (DECC, 2008b).	Potential foraging habitat available within the site.
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	-	V	A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings,	Low - no suitable habitat within the site.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		EPBC Act	TSC Act		
				occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest (DECC, 2008b).	
V = Vulnerable; E = Endangered; CE = Critically Endangered.					
Bold text indicates species recorded on site.					
Note: Fish and marine mammals were excluded from assessment.					



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