



## **ECOLOGICAL SITE APPRAISAL REPORT**

### **STATE GOVERNMENT LAND MOONEY MOONEY PENINSULA WESTERN SITE**

**AUGUST 2013  
(REF: 3057a)**

[www.cegconsult.com](http://www.cegconsult.com)

Suite E, 78 York Street, East Gosford NSW 2250  
PO Box 4300, East Gosford NSW 2250

• Ph (02) 4324 7888 • Fax (02) 4324 7899

• Email [cegconsult@bigpond.com](mailto:cegconsult@bigpond.com)

ABN 62 274 841 042

**ECOLOGICAL SITE APPRAISAL REPORT**

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MOONEY MOONEY PENINSULA  
WESTERN SITE**

**Conacher Environmental Group**

Environmental and Land Management Consultants

Suite E, 78 York Street, East Gosford NSW  
PO Box 4300, East Gosford NSW  
Phone: 02 4324 7888 Fax: 02 43247899  
cegconsult@bigpond.com

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## PROJECT TEAM

PHILLIP ANTHONY CONACHER B.Sc.(Hons), Dip.Urb Reg Planning, M.Nat.Res.  
NPWS Scientific Licence Number: SL100361  
Director

JACOB MANNERS B.Sc.  
NPWS Scientific Licence Number: SL100361  
Senior Ecological Consultant

PAUL GERARD SHELLEY Grad. Cert. Appl. Sc  
NPWS Scientific Licence Number: SL100361  
Ecologist

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## DOCUMENT DETAILS

<b>Project Name</b>	Government Owned Land in Mooney Mooney (Western Site)
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<b>Project Manager</b>	Jacob Manners

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## EXECUTIVE SUMMARY

### **Project Background and Assessment Aims**

This report has been prepared to identify the ecological characteristics of land within Lot 2 DP 431999, Lot 2 DP 597504 and Lots 10 & 11 DP1157280 at Mooney Mooney, and provide an assessment of the potential for the future development and management of the site with regard to ecological considerations, as part of the due diligence investigations relating to the sale of the subject site

### **Identification of Biodiversity Present**

A review of available literature and database records for the study area was undertaken to obtain reference material and background information. Diurnal site inspections were undertaken to determine the extent and condition of the habitats and vegetation communities present and the potential for the site to provide known or suitable habitat for listed threatened species, populations and ecological communities and listed migratory species.

### **Biodiversity Characteristics of the Site**

The site encompasses an area of approximately 15.7 hectares and is located on the western side of the Mooney Mooney peninsula within the Gosford local government area in Sydney Basin bioregion.

The surveys undertaken identified the presence of the following vegetation communities within the site:

- Foothills Apple – Red Gum Forest (2.1 ha);
- Riverine Mangrove Scrub (0.8 ha);
- Estuarine Swamp Oak Forest (Canopy Vegetation With Exotic Understorey) (1.2 ha); and
- Cleared / Disturbed Land (11.6 ha).

The surveys undertaken identified the presence of the following broad fauna habitats within the site:

- Dry Sclerophyll Forest Habitats (2.1 ha);
- Forested and Saline Wetland Habitats (2 ha); and
- Cleared / Disturbed Land Habitats (11.6 ha).

One endangered ecological community (EEC), listed within the *TSC Act* (1995), Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions, was observed within the site. Within the site this EEC corresponds to the Estuarine Swamp Oak Forest (Canopy Vegetation with Exotic Understorey) vegetation community.

No threatened species or endangered populations listed within the *EP&BC Act* (1999) and/or the *TSC Act* (1995), were observed within the subject site during surveys, however the site provides potential habitat for the following listed threatened species:

#### Threatened Flora

- *Acacia bynoeana*
- *Ancistrachne maidenii*
- *Asterolasia elegans*
- *Astrotricha crassifolia*
- *Caladenia tessellata*
- *Callistemon linearifolius*
- *Darwinia peduncularis*
- *Epacris purpurascens* var. *purpurascens*
- *Genoplesium baueri*
- *Persoonia hirsuta*
- *Tetradlea glandulosa*
- *Zieria involucreta*

#### Threatened Fauna

- Giant Burrowing Frog
- Red-crowned Toadlet
- Rosenberg's Goanna
- Superb Fruit-Dove
- Australasian Bittern
- Black Bittern
- Little Eagle
- Eastern Osprey
- Bush Stone-curlew
- Pied Oystercatcher
- Gang-gang Cockatoo
- Glossy Black-Cockatoo

- Swift Parrot
- Turquoise Parrot
- Little Lorikeet
- Barking Owl
- Powerful Owl
- Masked Owl
- Varied Sittella
- Scarlet Robin
- Spotted-tailed Quoll
- Koala
- Eastern Pygmy-possum
- Squirrel Glider
- Long-nosed Potoroo
- New Holland Mouse
- Grey-headed Flying-fox
- Eastern Freetail-bat
- Eastern False Pipistrelle
- Little Bentwing-bat
- Eastern Bentwing-bat
- Southern Myotis
- Greater Broad-nosed Bat

One migratory species, listed within the *EP&BC Act* (1999), the White-bellied Sea-eagle, was observed adjacent to the subject site.

#### ***Principles for the Future Management of Biodiversity***

Suitable biodiversity management principles for the site were identified through a review of the matters provided for consideration under SREP 20. The following summary of the main principles is provided:

- Conserve and, where appropriate, enhance flora and fauna communities, particularly threatened species, populations and ecological communities, aquatic habitats, wetland flora, rare flora and fauna, riverine flora, flora with heritage value, habitats for indigenous and migratory species of fauna, and existing or potential fauna corridors.
- Protect wetlands (including upland wetlands) from future development and impacts of land use
- Locate structures where possible in areas which are already cleared or disturbed instead of clearing or disturbing further land.
- Minimise adverse environmental impacts, protect existing habitat and, where appropriate, restore habitat values by the use of management practices.
- Consider the range of flora and fauna inhabiting the site of the development concerned and the surrounding land, including threatened species and migratory species, and potential impacts of proposals on the survival of threatened species, populations and ecological communities, both in the short and longer terms.
- Consider the need to provide and manage buffers, adequate fire radiation zones and building setbacks from significant flora and fauna habitat areas.
- Minimise direct and indirect adverse impacts on land reserved or dedicated under the *National Parks and Wildlife Act 1974*
- Consideration should be given to the impact of developments on the water table and the formation of acid sulphate soils.
- Consider the need to control access to flora and fauna habitat areas.

#### ***Potential for Future Development***

The areas of the site which are of ecological value generally occur outside of areas which have been historically cleared for development. These areas contain one or more of the following:

- Endangered ecological communities;
- Intact naturally structured vegetation;
- Intact habitats suitable for threatened species;
- Vegetated areas which form buffers to a National Park;
- Vegetated areas which form buffers to riparian zones; and/or
- Wetland vegetation.

The extent of these areas within the site is generally limited and particularly concentrated to areas directly adjacent to the Hawkesbury River and the naturally forested land within the northern portion of the site (approximately 4.1 hectares). The remaining areas of the site generally consist of extensively cleared land occupied by buildings, roads and areas of managed exotic grassland (11.6 hectares). These disturbed and cleared areas present the most suitable positions for future development with regard to ecological considerations.

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## 1. INTRODUCTION

### 1.1 Background

*Conacher Environmental Group* has been engaged to prepare an Ecological Site Appraisal Report at Lot 2 DP 431999, Lot 2 DP 597504 and Lots 10 & 11 DP1157280, Pacific Highway, Mooney Mooney.

This report has been prepared to identify the ecological characteristics of the site and provide an assessment of the potential for the future development and management of the site with regard to ecological considerations, as part of the due diligence investigations relating to the sale of the subject site.

The ecological investigations undertaken are preliminary and are not intended to inform a development application.

### 1.2 Study Area

The planning and cadastral details of the subject site are provided in Table 1.1.

<b>TABLE 1.1 SITE DETAILS</b>	
<b>Location</b>	Lot 2 DP 431999, Lot 2 DP 597504 & Lots 10 & 11 DP1157280, Pacific Highway, Mooney Mooney
<b>Site Area</b>	Approximately 15.7 hectares
<b>Grid Reference</b>	332455E 6288645N
<b>Local Government Area</b>	Gosford
<b>Bioregion</b>	Sydney Basin
<b>Existing Land Use</b>	The site contains a mix of institution buildings including dormitory complexes and various detached cottages with supporting offices, amenity and services buildings.
<b>Current Zoning</b>	Part 5(a) Special Uses Mental Hospital and part unzoned land.



## 2. METHODOLOGY

### 2.1 Database Searches and Literature Reviews

A review of available literature for the area was undertaken to obtain reference material and background information for this study. The following main documents were accessed as part of the literature review for this study:

- Gosford City Council Biodiversity Strategy 2008;
- The Natural Vegetation of the Gosford Local Government Area, Central Coast, New South Wales. Revised and Updated (Bell 2009).

Database searches were conducted to provide background information and identify records of listed threatened and migratory species located within 10km of the site. The databases searched are listed in Table 2.1.

<b>Database Searched</b>	<b>Purpose of Search</b>	<b>Date Viewed</b>	<b>Reference</b>
Bionet Atlas of NSW Wildlife	Identify threatened species records within 10km of the site	2 July 2013	NSW OEH 2013a
EP&BC Protected Matters Search Tool	Identify threatened and migratory species records within 10km of the site	9 July 2013	SEWPAC 2013
OEH NSW Atlas of NSW Wildlife - Threatened Species Profile Database	Identify profiles for relevant threatened species	2 July 2013	NSW OEH 2013a

The locations of records threatened species identified within 10 km of the site from the Bionet Atlas of NSW Wildlife (NSW OEH 2013a) are shown in the following figures:

Figure 2.1: Threatened Flora Species Recorded within 10 km;

Figure 2.3: Threatened Amphibians, Reptiles and Invertebrate Species Recorded within 10 km;

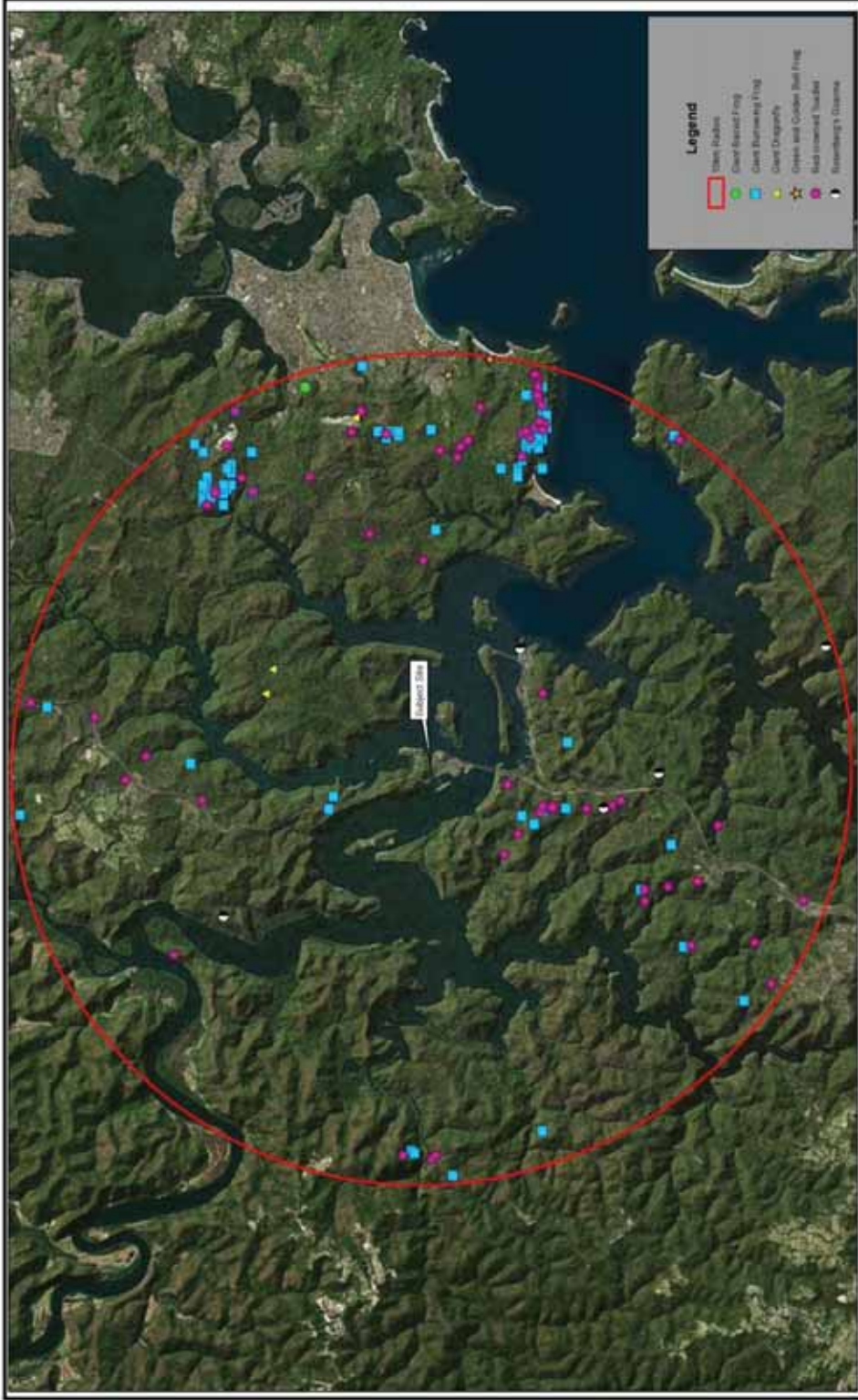
Figure 2.4: Threatened Bird Species Recorded within 10 km;


Figure 2.5: Threatened Mammal Species Recorded within 10 km.

The results of the *EP&BC Act* (1999) Protected Matters Search are provided as Appendix 1 to this report.








 ABN: 62 274 841 042  
 PO Box 4300  
 78 York Street  
 East Gosford NSW 2250  
 Ph: (02) 4324 7888  
 Fax: (02) 4324 7899  
 ce@conacher.com.au

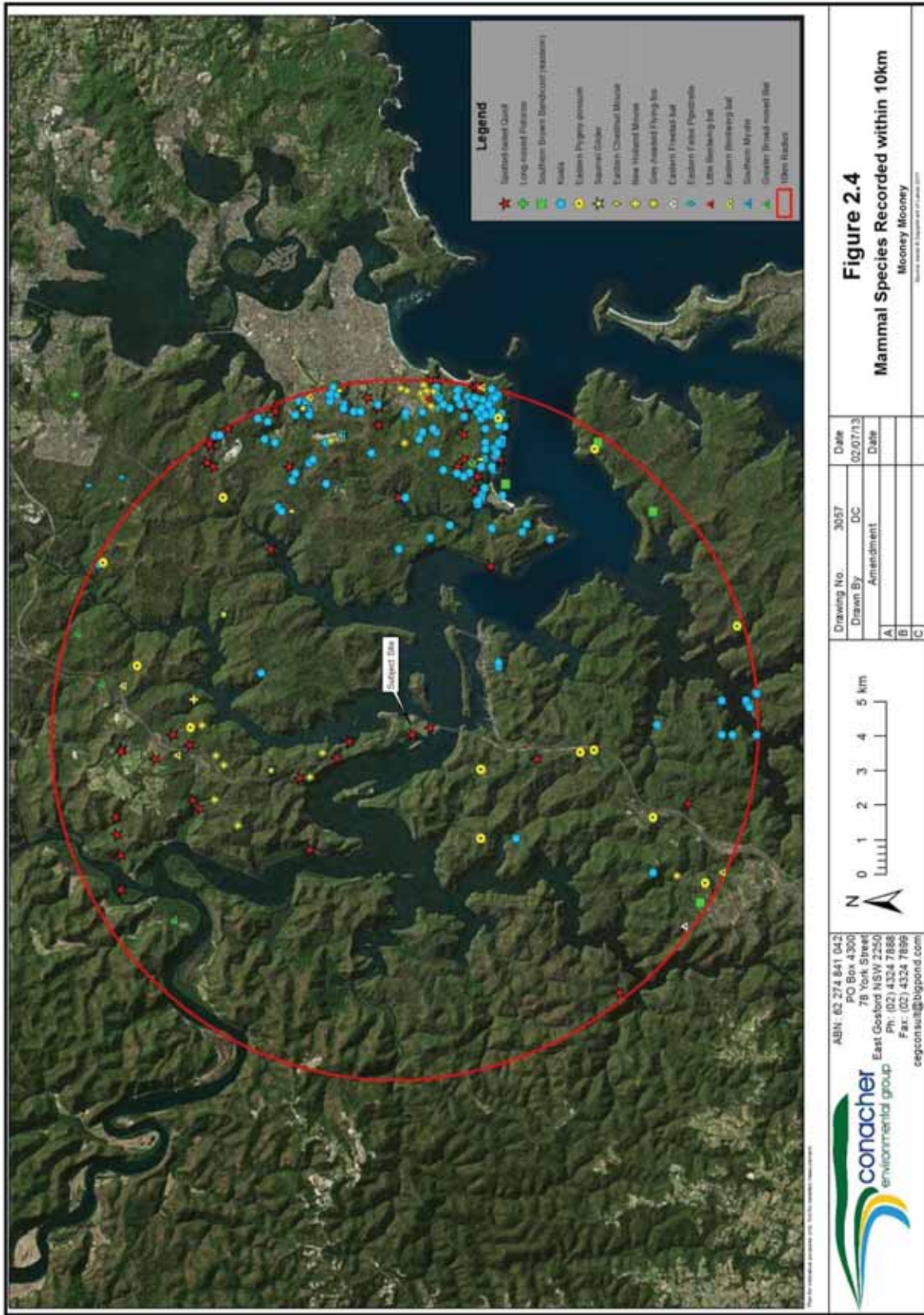
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**Figure 2.2**  
**Threatened Amphibian, Reptile and Invertebrate Species Recorded within 10km**  
 Mooney Mooney  
Mooney Mooney Peninsula Western Site







Ecological Site Appraisal Report – Mooney Mooney Peninsula Western Site (Ref: 3057a)  
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## 2.2 Field Surveys

### 2.2.1 Flora Field Surveys

To determine the likely and actual occurrence of flora species and plant communities on the subject site, field survey work was undertaken to supplement literature reviews and previous flora surveys of the area. The methods utilised for the flora survey are outlined as follows.

- Aerial photographs were utilised to identify the extent of vegetation with respect to the site and surrounding areas
- Meander searches were conducted on 26 June 2013 and 8 July 2013 across the site to enable targeted searches for rare and threatened flora species and to identify the extent, location and composition of vegetation communities across the site.
- Specimens of plants tentatively identified as threatened species are sent to the Sydney Royal Botanic Gardens for confirmation of the identification.
- All vascular plants were identified from local knowledge or by using the online keys and nomenclature of Royal Botanic Gardens and Domain Trust (2013).
- Vegetation communities were classified generally in accordance with the map units identified for the local government area by Bell (2009).
- Corresponding Endangered Ecological Communities listed on both the *TSC Act* (1995) and the *EP&BC Act* (1999) are also provided if relevant.

### 2.2.2 Fauna Field Surveys

Fauna surveys were undertaken which incorporated diurnal searches for threatened species and a targeted habitat assessment in accordance with the best practice field survey methods provided by NSW OEH (2013b). The surveys were undertaken on 26 June 2013 and 8 July 2013.

As part of the habitat assessment, searches were undertaken for the following fauna habitat features, as recommended in the NSW OEH Field Survey Methods (OEH 2013b):

- Hollow-bearing trees, including dead stags;
- Bush rock and rocky outcrops;
- Natural burrows;
- Large trees with basal cavities;
- Logs;
- Wetlands, streams, rivers, dams and other water bodies;
- Nests and roosts;
- Wombat burrows;
- Potential arboreal mammal den sites;
- Arboreal mammal sap feed trees;
- Distinctive scats (e.g. Those of the spotted-tailed quoll or koala)
- Latrine and den sites of the spotted-tailed quoll;
- *Allocasuarina* spp.;
- Flying-fox camps;
- Potential microchiropteran bat tree roosts;
- Potential microchiropteran bat subterranean roosts (caves, culverts, tunnels and disused mineshafts);
- Winter-flowering eucalypts;
- Permanent soaks and seepages; and
- Areas that can act as corridors for plant or animal species.

### **2.3 Survey Limitations**

The absence of a species during surveys does not necessarily mean a species does not inhabit the survey area. False absences may be a result of several factors including the survey method adopted, the number of site visits undertaken, the home range size of the target species or the prevailing seasonal, climatic or environmental conditions during which surveys were conducted.

The surveys undertaken were preliminary only and were limited to diurnal searches and habitat assessments. Parts of the study area were not thoroughly searched due to difficulty in accessing areas of steep densely vegetated terrain and the limited time available for undertaking detailed surveys.

To overcome potential survey limitations, database searches and an assessment of the habitats present were undertaken to provide an estimation of the full range of locally occurring threatened species which may utilise the site. This enabled a comprehensive assessment of the potential for locally occurring threatened species to occur within the site.

### 3. EXISTING ENVIRONMENT

#### 3.1 Landscape Context

The subject site consists of Peat Island located within the Hawkesbury River and a linear parcel of land on the western side of the Mooney Mooney Peninsula, characterised by flats and footslopes. The site is located within the Gosford Local Government area in the Sydney Basin bioregion, it has a generally west facing aspect and covers approximately 15.7 hectares. The site is located within the Hawkesbury River Catchment and drainage is via overland flow directly to the Hawkesbury River.

The site has undergone significant historical disturbances associated with historical broad scale vegetation clearing and the use of the site as an institutional facility.

The majority of the site occurs on the Erina Soil Landscape unit which is comprised of extensively cleared flats. Local relief is extremely to very low (0-10m) and slope gradients are gently inclined (5 to 10°). The underlying geology is the Terrigal Formation of the Narrabeen Group which consists of lithic and quartz sandstone and siltstone, minor sedimentary breccia, claystone and conglomerate (Chapman and Murphy 1989).

The northern corner of the site is mapped as the Watagan Soil Landscape which comprises the vegetated steeper land on footslopes. In this area local relief is very low to low (0 to 40m) and slope gradients are moderately inclined to steep (up to 20 to >30°). The underlying geology is the Narrabeen Group of sediments which is mostly interbedded laminite and shale with quartz to lithic sandstone and minor red claystones (Chapman and Murphy 1989).

#### 3.2 Vegetation Communities

The following vegetation communities were observed within the subject site during surveys:

- Footslopes Apple – Red Gum Forest;
- Estuarine Swamp Oak Forest (Canopy Vegetation With Exotic Understorey);
- Riverine Mangrove Scrub; and
- Cleared / Disturbed Land.

Vegetation community photographs are shown in Figures 3.1a – 3.1d. Descriptions of vegetation communities are provided below, and vegetation community locations are shown in Figure 3.1.

#### FOOTSLOPES APPLE – RED GUM FOREST

##### Structure:

<b>Trees:</b>	To 30 metres in height with 40% Projected Foliage Cover (PFC).
<b>Sub-canopy</b>	To 8 metres in height with 10% PFC.
<b>Shrubs:</b>	To 4 metres in height with 75% PFC.
<b>Groundlayer:</b>	To 1 metre in height with 30-60% PFC.

##### Floristics:

(Characteristic Species)

<b>Trees:</b>	<i>Eucalyptus punctata</i> (grey gum), <i>Angophora costata</i> (smooth-barked apple), <i>Eucalyptus piperita</i> (sydney peppermint) and <i>Eucalyptus tereticornis</i> (forest red gum).
<b>Sub-canopy:</b>	<i>Angophora floribunda</i> (rough-barked apple), <i>Elaeocarpus reticulatus</i> (Blueberry Ash), and <i>Allocasuarina torulosa</i> (forest oak).
<b>Shrubs:</b>	<i>Persoonia linearis</i> (narrow-leaved geebung), <i>Cissus hypoglauca</i> (water vine), <i>Astrotricha floccosa</i> (flannel leaf), <i>Persoonia levis</i> (Broad-leaved Geebung) and <i>Dodonaea triquetra</i> (hop bush).



**Groundlayer:** *Digitaria parviflora* (small-flowered finger grass), *Pteridium esculentum* (bracken), *Calochlaena dubia* (false bracken), *Dianella caerulea* (blue flax-lily), *Xanthorrhoea media* (forest grass-tree), *Lomandra longifolia* (spiky-headed mat-rush) and *Blechnum cartilagineum* (gristle fern).

**Weeds:** *Lantana camara* (lantana).

**Weed Invasion:**

Weed invasion is mostly low throughout this community, with moderate occurrences of lantana on lower slopes in the northern section of the site.

**Disturbance:**

Small patches of this community occur in highly disturbed areas of the site and have experienced edge effects including altered and simplified species composition and weed invasion.

**Variation:**

Where this community occurs in small remnant patches and regrowth areas the species composition includes high levels of *Kunzea ambigua* and *Imperata cylindrica* in the understorey.

**Location and Distribution:**

This community occurs predominantly in the northern sections of the subject site and occupies approximately 2.1 hectares as shown in Figure 3.1.

**Classification:**

This vegetation community corresponds to Map Unit 20 – Dharug Footslopes Apple-Redgum Forest (Riverine Variant) as mapped and described by Bell (2009).

This vegetation community does not correspond to any threatened ecological communities listed within the *TSC Act* (1995) or the *EP&BC Act* (1999).



**Figure 3.1a - Footslopes Apple – Red Gum Forest Vegetation**

## SWAMP OAK SEDGE FOREST (CANOPY VEGETATION WITH EXOTIC UNDERSTOREY)

### Structure:

- Trees:** To 25 metres in height with 5% PFC.
- Shrubs:** To 5 metres in height with 0-70% PFC.
- Groundlayer:** To 0.1 metre in height with 100% PFC.

### Floristics:

(Characteristic Species)

- Trees:** *Casuarina glauca*.
- Shrubs:** *Olea europaea* subsp. *cuspidata* (african olive).
- Groundlayer:** *Phragmites australis* (common reed), *Juncus acutus* (sharp rush), *Ageratina adenophora* (buffalo grass) and *Cynodon dactylon* (common couch).
- Weeds:** *Olea europaea* subsp. *cuspidata* (african olive), *Stenotaphrum secundatum* (buffalo grass) and *Cynodon dactylon* (common couch).

### Weed Invasion:

Weed invasion occurs where this community occurs within areas surrounded by Cleared / Disturbed Land.

### Disturbance:

Several patches of this community, particularly on the western side of Peat Island, occur on reclaimed land as regrowth vegetation. Other patches contain large trees which have either regrown over a long time scale or are remnant trees.

### Variation:

One patch of this community within the northern section of the site contains a partially native understorey vegetation of *Phragmites australis*. All other areas contain an understorey dominated by exotic grasses.

### Location and Distribution:

This community occurs as several scattered patches throughout the site as shown in Figure 3.1 and occupies approximately 0.8 hectares.

### Classification:

This vegetation community corresponds to a highly disturbed variant of Map Unit 41 – Swamp Oak Sedge Forest, as mapped and described by Bell (2009).

This vegetation community corresponds to the endangered ecological community Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions, listed within the *TSC Act* (1995).



**Figure 3.1b – Swamp Oak Sedge Forest (Canopy vegetation with exotic understorey) Vegetation**

#### **RIVERINE MANGROVE SCRUB**

##### **Structure:**

**Trees:** To 7 metres in height with 80% PFC.

**Shrubs & Groundlayer:** Nil.

##### **Floristics:**

(Characteristic Species)

**Trees:** *Aegiceras corniculatum* (river mangrove)

**Shrubs & Groundlayer:** Nil.

**Weeds:** Nil.

##### **Weed Invasion:**

No weeds were observed within this vegetation type.

##### **Disturbance:**

No disturbance was observed within areas containing this vegetation type, however the distribution of this community within the site is likely to have been historically reduced by land reclamation works.

##### **Variation:**

No significant variations were observed throughout this vegetation type.

##### **Location and Distribution:**

This vegetation community occurs within areas below the mean high water mark within the site. This community occupies approximately 1.2 hectares as shown in Figure 3.1.



**Classification:**

This vegetation community corresponds to Map Unit E47 Estuarine Mangrove Scrub as mapped and described by Bell (2009). This vegetation community does not correspond to any threatened ecological communities listed within the *TSC Act* (1995) or the *EP&BC Act* (1999).



**Figure 3.1c – Riverine Mangrove Scrub Vegetation**

## CLEARED / DISTURBED LAND

This vegetation type is present within the areas of the site which have been subject to extensive land clearing, soil disturbance and establishment of buildings and infrastructure and associated landscaping works.

Canopy vegetation consists mostly of various planted specimens including *Erythrina x sykesii* (coral tree), *Lophostemon confertus* (brush box), *Araucaria heterophylla* (norfolk island pine), *Cupressus* sp. (cypress), *Glochidion ferdinandi* (cheese tree), *Acer* sp. (maple) and *Schinus molle* (pepper tree).

Shrub vegetation is also mostly planted and consists of a variety of species including *Olea europaea* subsp. *cuspidata* (african olive), *Callistemon* sp. cultivar, *Campsis* sp. (trumpet creeper) and *Leptospermum polygalifolium* (tanton).

Groundlayer vegetation consists predominantly of managed lawn areas dominated by exotic grasses such as *Ageratina adenophora* (buffalo grass), *Cynodon dactylon* (common couch) and *Pennisetum clandestinum* (kikuyu).

Cleared / Disturbed Land occurs across approximately 11.6 hectares of the site as shown in Figure 3.1d.



Figure 3.1d – Cleared / Disturbed Land Vegetation





### 3.3 Fauna Habitats

The following broad fauna habitat types were identified within the site for fauna species:

- Dry Sclerophyll Forest Habitats;
- Forested and Saline Wetland Habitats; and
- Cleared / Disturbed Land Habitats.

The broad fauna habitat types identified are mapped in Figure 3.3. The following descriptions of the micro-habitat features provided within each of the identified broad habitat types identified are provided.

#### **Dry Sclerophyll Forest Habitats**

This vegetation formation contains the following fauna habitat features:

- Hollow-bearing trees, including dead stags;
- Bush rock and rocky outcrops;
- Large trees with basal cavities;
- Logs;
- An ephemeral watercourse;
- Potential nests and roost sites;
- Potential arboreal mammal den sites;
- Allocasuarina spp.;
- Potential microchiropteran bat tree roosts;
- Potential microchiropteran bat subterranean roosts (rock outcrops and crevices); and
- Winter-flowering eucalypts (*E. tereticornis*).

Specifically this vegetation formation provides a range of nectar, seed and fruit producing trees and shrubs which are likely to be utilised as a foraging resource for various bird, possum, glider and bat species. Dominant canopy tree species are *E. punctata* (grey gum), *E. piperita* (sydney peppermint) and *A. floribunda* (rough barked apple) *A. torulosa* (forest oak) is present in low densities as a sub-canopy tree and provides a potential seed and nectar foraging resource for bird species.

Several hollow bearing trees and stag (dead) trees were present which contain hollow entrance apertures of less than 5cm up to approximately 40cm in size. This range of hollow size classes support potentially suitable den and nesting sites for a range of locally occurring fauna species from tree frogs and reptiles to hollow dependant bird species, scansorial and arboreal mammals such as rodents, dasyurids, possums and gliders and microchiropteran bat species.

The shrub layer within the northern sections of this community contains a variety of shrub species which are generally densely covered in vines and climbers particularly *Cissus hypoglauca* (water vine). This dense cover provides shelter habitat for a range of terrestrial species.

Understorey habitats are well structured and contain fallen branches, logs and leaf litter and rock outcrops. These habitat features are likely to be utilised as shelter and foraging areas by a range of fauna species including reptiles, small birds and terrestrial mammals.

An ephemeral drainage line intersects this habitat type and provides suitable habitat for amphibian species and an occasional source of nourishment for other fauna species.

#### **Forested and Saline Wetland Habitats**

This vegetation formation contains the following fauna habitat features:

- Occasional hollow-bearing trees which provide potential microchiropteran bat tree roosts; and
- Wetlands / estuarine vegetation and habitats associated with the Hawkesbury River.

This vegetation consists of several small remnant linear patches of vegetation along the bank of the Hawkesbury River. The fauna habitat types provided include sub-tidal estuarine habitats, small hollows in mangrove vegetation which provide potential roost sites for microchiropteran bat species and foraging habitats for various bird species including shorebirds. This vegetation formation is restricted in extent through-out the study area and is likely to have been historically cleared within adjacent areas of the site.

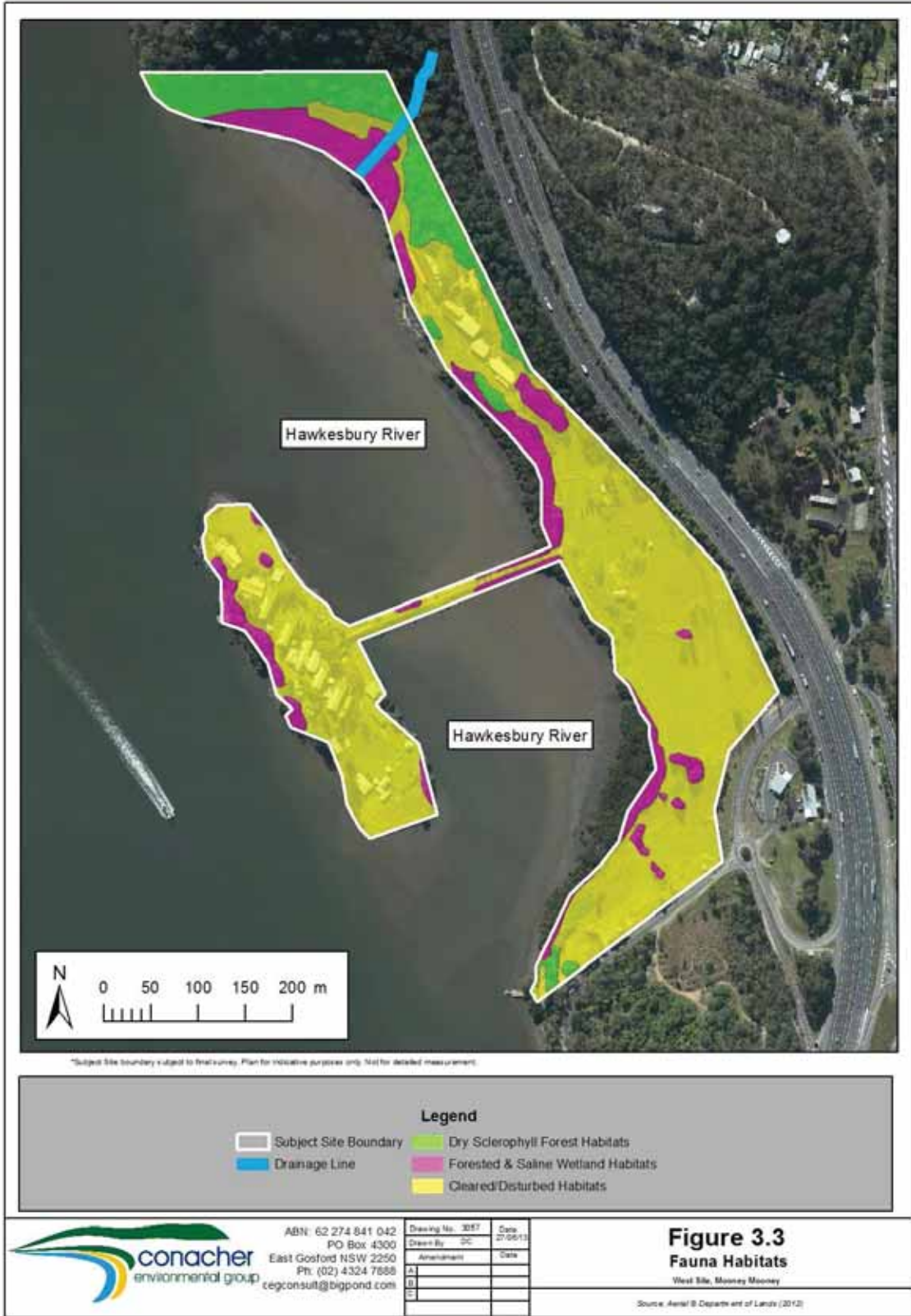
#### ***Cleared / Disturbed Land Habitats***

Cleared / Disturbed Land has resulted from significant site disturbances associated with clearing of native vegetation, the development of the site and the dumping of rubbish. Cleared / Disturbed Land may provide some supplementary habitat for fauna species present within adjoining areas of natural habitats and habitat for those species which are capable of utilising significantly modified areas.

The following habitat types have been identified within areas of Cleared Land / Disturbed Land habitats:

- Seed and nectar producing tree and shrub species;
- Potential microchiropteran bat tree roosts and aerial foraging areas;
- Potential microchiropteran bat subterranean roosts (culverts and disused old buildings);
- Managed exotic grassland areas.





### 3.4 Threatened Biodiversity

Details regarding the habitat attributes and indicative species for the threatened ecological communities known to be present in the local government area are provided in Table 3.1.

TABLE 3.1 THREATENED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	TSC Act	EP&BC Act	Habitat Requirements	Comments
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions (CS)	E	-	<b>Geology / Soils:</b> Estuarine mud flats. <b>Topography:</b> Intertidal zone on the shores of estuaries and lagoons. <b>Characteristic Species:</b> <i>Sarcocornia quinqueflora</i> , <i>Sporobolus virginicus</i> , <i>Juncus krausii</i> and <i>Baumea juncea</i> .	No suitable habitat present.
Coastal Upland Swamp in the Sydney Basin Bioregion (CUS)	E	-	<b>Geology / Soils:</b> Periodically waterlogged acidic soils on Hawkesbury Sandstone. <b>Topography:</b> Impermeable sandstone plateaus in the headwater valleys of streams and on sandstone benches with abundant moisture seepage. <b>Characteristic Species:</b> Highly diverse and variable, includes scrubs, heaths, sedgeland and fernlands.	No suitable habitat present.
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion (FWCF)	E	-	<b>Geology / Soils:</b> Silts, muds or humic loams. <b>Topography:</b> Depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. <b>Characteristic Species:</b> Composition is variable and dependent on water regime. May include amphibious grasses and sedges, emergent floating herbs and emergent tall sedges and floating and submerged aquatic herbs.	No suitable habitat present.
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion (KSGW)	CE	-	<b>Geology / Soils:</b> Terrigal Formation of the Narrabeen Group. Soils are characterised by Yellow Podzolic Soils and Yellow Earths of the Erina Soil Landscape. <b>Topography:</b> Footslopes, gently inclined crests and ridges.	No suitable habitat present.

TABLE 3.1 THREATENED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	TSC Act	EP&BC Act	Habitat Requirements	Comments
			<p><b>Characteristic Species:</b>  <i>Eucalyptus racemosa</i>,  <i>Angophora costata</i>, <i>Corymbia gummifera</i>, <i>Syncarpia glomulifera</i>, <i>Eucalyptus piperita</i> and <i>Allocasuarina littoralis</i>.</p>	
Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions (LR)	E	CE	<p><b>Geology / Soils:</b> Sand dunes and on soils derived from underlying rocks  <b>Topography:</b> Located near the seaoin coastal dunes, headland or riparian habitats.  <b>Characteristic Species:</b> Comprises the <i>Cupaniopsis anacardioides</i> - <i>Acmena</i> spp. alliance of Floyd (1990).</p>	No suitable habitat present.
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E	CE	<p><b>Geology / Soils:</b> High nutrient geological substrates, notably basalts and fine-grained sedimentary rocks.  <b>Topography:</b> Coastal plains and plateaux, footslopes and foothills up to 600m ASL and within the Sydney basin below 350m ALS  <b>Characteristic Species:</b> Principally encompasses the following groupings of Floyd (1990): <i>Argyrodendron trifoliatum</i> alliance (suballiances 1, 5 &amp; 6); <i>Dendrocnide excelsa</i> - <i>Ficus</i> spp. alliance (suballiances 14 &amp; 15); and <i>Drypetes australasica</i> – <i>Araucaria cunninghamii</i> alliance (suballiances 21 &amp; 22).</p>	No suitable habitat present.
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (PWSGF)	E	-	<p><b>Geology / Soils:</b> Shale-derived soils from Narrabeen series geology  <b>Topography:</b> Undulating to rolling hills.  <b>Characteristic Species:</b> <i>Corymbia maculata</i> and <i>Eucalyptus paniculata</i>.</p>	No suitable habitat present.
River-Flat Eucalypt Forest on Coastal Floodplains of the North Coast, Sydney basin and South East Corner bioregions (REFCF)	E	-	<p><b>Geology / Soils:</b> Silts, clay-loams and sandy loams.  <b>Topography:</b> Periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.  <b>Characteristic Species:</b> Eucalypt canopy with species</p>	No suitable habitat present.

TABLE 3.1 THREATENED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	TSC Act	EP&BC Act	Habitat Requirements	Comments
			belonging to the genus <i>Angophora</i> or the sections <i>Exsertaria</i> or <i>Transversaria</i> of the genus <i>Eucalyptus</i> . Has low abundance of <i>E. robusta</i> , <i>Casuarina</i> and <i>Melaleuca</i> species and a groundcover of soft-leaved forbs and grasses.	
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions (SOFF)	E	-	<b>Geology / Soils:</b> Waterlogged or periodically inundated grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline. <b>Topography:</b> Flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. <b>Characteristic Species:</b> <i>Casuarina glauca</i> .	Observed during surveys.  Corresponds to the Swamp Oak Sedge Forest vegetation community.
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (SSFCF)	E	-	<b>Geology / Soils:</b> Waterlogged or periodically inundated humic clay loams and sandy loams. <b>Topography:</b> Alluvial flats and drainage lines associated with coastal floodplains. <b>Characteristic Species:</b> <i>Eucalyptus robusta</i> , <i>E. longifolia</i> , <i>E. botryoides</i> , <i>Melaleuca quinquenervia</i> and <i>M. ericifolia</i> .	No suitable habitat present.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion (SFW)	E	-	<b>Geology / Soils:</b> Generally on the Warriewood and Tuggerah Soil Landscapes. <b>Topography:</b> Freshwater swamps in swales and depressions on sand dunes and low nutrient sandplain sites in coastal areas. <b>Characteristic Species:</b> <i>Eleocharis sphacelata</i> , <i>Baumea juncea</i> , <i>B. rubignosa</i> , <i>B. articulata</i> , <i>Gahnia sieberiana</i> , <i>Ludwigia peploides</i> and <i>Persicaria</i> sp.	No suitable habitat present.
Themeda Grasslands on Seacliffs and Coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions (TGSCH)	E	-	<b>Geology / Soils:</b> Found on a range of substrates including old sand dunes above cliffs and on basalt headlands, and less frequently on sandstone. <b>Topography:</b> Seacliffs and coastal headlands. <b>Characteristic Species:</b> <i>Themeda australis</i> .	No suitable habitat present.

TABLE 3.1 THREATENED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	TSC Act	EP&BC Act	Habitat Requirements	Comments
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion (UCSW)	E	-	<b>Geology / Soils:</b> Holocene sediments of coastal sand. Iron podzols on the Woy Woy Soil Landscape. <b>Topography:</b> Sandplains on the Woy Woy Peninsula at Umina and Pearl Beach. <b>Characteristic Species:</b> <i>Eucalyptus botryoides</i> and <i>Angophora floribunda</i> with a diverse understorey of sclerophyllous shrubs.	No suitable habitat present.
V = vulnerable    E = endangered    CE = critically endangered				

The endangered ecological community (EEC), Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions, occurs within the subject site and corresponds to the Swamp Oak Sedge Forest vegetation community shown in Figure 3.1.

### Endangered Populations

Details of the endangered populations known to occur within the local government area are provided in Table 3.2.

TABLE 3.2 ENDANGERED POPULATIONS OF THE AREA		
Endangered Population	Habitat Requirements	Comments
<i>Posidonia australis</i> in Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie.	Coarse sandy to fine silty sediments between the low tide line and approximately 10 m depth in salt and estuarine waters.	No suitable habitat present.

No endangered populations were observed within the subject site.

### Threatened Flora Species

A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2013a) was undertaken to identify records of threatened flora species located within 10km of the site, these records are shown in Figure 2.1. This allowed for a specific search for threatened flora to be undertaken determining if any threatened flora species were present within the subject site. Details on threatened flora species *TSC Act* (1995), *FM Act* (1994) and the *EP&BC Act* (1999), with a known or possible occurrence within the local area are provided in Table 3.3.

TABLE 3.3 THREATENED FLORA SPECIES OF THE AREA				
Scientific Name	TSC Act	EP&BC Act	Growth Form And Habitat Requirements	Habitat Suitability
<i>Acacia bynoeana</i>	E	V	Erect or spreading shrub growing in heath and dry sclerophyll open forest on sand and sandy clay soils, often with ironstone gravels. Suitable soils are usually very infertile and well-drained. Often associated with disturbed areas such as roadsides.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Acacia terminalis</i> subsp. <i>terminalis</i>	E	E	Erect or spreading. Grows in Coastal scrub and dry sclerophyll woodland on sandy soils. Limited distribution, mainly in near-coastal areas from the northern shores of Sydney Harbour S to Botany Bay.	No suitable habitat present.
<i>Ancistrachne maidenii</i>	V	-	Decumbent grass. Restricted to areas associated with a transitional geology between the Hawkesbury and Watagan soil landscapes. Grows in sandstone-derived soils.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Asterolasia elegans</i>	E	E	Erect shrub 1-3 m high growing in sheltered moist sclerophyll forests on Hawkesbury sandstone on mid-to lower slopes and valleys.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Astrotricha crassifolia</i>	V	V	Shrub to 2.4 m high. Grows in dry sclerophyll woodland on sandstone.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Baloskion longipes</i>	V	-	Dioecious perennial herb to 1.5m high growing in swamps or depressions in sandy alluvium.	No suitable habitat present.
<i>Boronia umbellata</i>	V	V	Grows as an understorey shrub in and around gullies in wet open forest. Found between Glenreagh and Lower Bucca, north of Coffs Harbour.	No suitable habitat present.
<i>Caladenia tessellata</i>	E	V	Terrestrial orchid. Preferred habitat is grassy dry sclerophyll woodland on clay loam or sandy soils and less commonly in heathland on sandy loam soils.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Callistemon linearifolius</i>	V	-	Shrub to 4m high. Grows in Sclerophyll Forest in moist gullies on coast and adjacent ranges.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Chamaesyce psammogeton</i>	E	-	Prostrate herb. Grows on coastal dunes.	No suitable habitat present.
<i>Cryptostylis hunteriana</i>	V	V	Saprophytic orchid. Grows in moist sandy soil in heath and sedgeland and coastal forest communities of Scribbly Gum, Bloodwood, Brown Stringy Bark and Smooth-barked Apple in moist to dry clay loam.	No suitable habitat present.



TABLE 3.3 THREATENED FLORA SPECIES OF THE AREA				
Scientific Name	TSC Act	EP&BC Act	Growth Form And Habitat Requirements	Habitat Suitability
<i>Darwinia biflora</i>	V	V	Erect or spreading shrub to 80cm high. Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Grows in woodland, open forest and scrub-heath habitats.	No suitable habitat present.
<i>Darwinia glaucophylla</i>	V	-	Spreading prostrate shrub. Occurs in heath and woodlands associated with sandstone rock platforms.	No suitable habitat present.
<i>Darwinia peduncularis</i>	V	-	Associated with Open Forest and Woodlands on rocky hillsides. Locally this species has been recorded on sandy soils on upper slope, bench and gully topographies and on creek banks.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Diuris bracteata</i>	E	Ext	Terrestrial orchid. Grows in dry sclerophyll woodland. Flowers September. Known only from one extant population north-west of Gosford in the Sydney Basin Bioregion.	No suitable habitat present.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	V	-	Occurs in Sydney Sandstone Gully Forest and scrub with periodically poorly drained clay soil on sandstone or shale.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Eucalyptus camfieldii</i>	V	V	Stringybark to 10 m high. Grows in exposed coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone.	No suitable habitat present.
<i>Eucalyptus nicholii</i>	V	-	Tree to 18m high, grows in grassy or sclerophyll woodland on shallow relatively infertile soils on shales and slates; a member of the peppermints.	No suitable habitat present.
<i>Genoplesium baueri</i>	E	-	An orchid which prefers sparse sclerophyll forest and moss gardens over sandstone. Flowers from December to March.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Grammitis stenophylla</i>	E	-	Small colonial fern. Grows in moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	No suitable habitat present.
<i>Grevillea parviflora</i> subsp. <i>supplicans</i>	E	-	Low spreading shrub. Occurs in heathy woodland associations on skeletal sandy soils over massive sandstones. Also observed on clay-capped ridges of the Lucas Heights and Faulconbridge soil landscapes in areas of yellow clays with periodically impeded drainage.	No suitable habitat present.

TABLE 3.3 THREATENED FLORA SPECIES OF THE AREA				
Scientific Name	TSC Act	EP&BC Act	Growth Form And Habitat Requirements	Habitat Suitability
<i>Grevillea shiressii</i>	V	-	Shrub 2-5 m high. Flowers mainly spring. Grows along creek banks in wet sclerophyll forest in sandy soil on Hawkesbury sandstone.	No suitable habitat present.
<i>Haloragis exalata</i> <i>subsp. exalata</i>	V	E	A shrub to 1.5m. Grows in damp places near watercourses.	No suitable habitat present.
<i>Hibbertia procumbens</i>	E	-	Prostrate shrub with linear leaves which occurs in heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits.	No suitable habitat present.
<i>Hibbertia puberula</i>	E	-	Occurs on sandy soil often associated with sandstone. Has not been seen for over 40 years. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. Flowering time is October to November.	No suitable habitat present.
<i>Kunzea rupestris</i>	V	V	Grows in shallow depressions on large flat sandstone rock outcrops in short to tall shrubland or heathland habitats. Restricted distribution.	No suitable habitat present.
<i>Lasiopetalum joyceae</i>	V	V	Associated with heath on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River.	No suitable habitat present.
<i>Leptospermum deanei</i>	V	V	Associated with woodland on lower slopes or near creeks on sandy alluvial or sandy soils.	No suitable habitat present.
<i>Maundia triglochinooides</i>	V	-	A perennial rhizomatous herb growing in swamp, creek and wetland habitats on deep heavy low nutrient clays soils.	No suitable habitat present.
<i>Melaleuca deanei</i>	V	V	This species is strongly associated with low nutrient sandy loam soils, sometimes with ironstone present. Most frequently recorded in Coastal Sandstone Ridgetop Woodland vegetation.	No suitable habitat present.
<i>Micromyrtus blakelyi</i>	V	V	Low erect shrub. Occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms.	No suitable habitat present.
<i>Microtis angusii</i>	E	E	Occurs in open woodland habitats on edges of wetlands. Known from a single population in the Warringah/Pittwater area.	No suitable habitat present.



TABLE 3.3 THREATENED FLORA SPECIES OF THE AREA				
Scientific Name	TSC Act	EP&BC Act	Growth Form And Habitat Requirements	Habitat Suitability
<i>Persoonia hirsuta</i>	E	E	Spreading to decumbent shrub. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone and occasionally shale.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Persoonia mollis</i> subsp. <i>maxima</i>	E	E	Associated with open forest to creek side scrub on sheltered hillsides, moist gullies and flood prone areas along creeks on sandy soils.	No suitable habitat present.
<i>Pimelea curviflora</i> var. <i>curviflora</i>	V	V	A small shrub. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.	No suitable habitat present.
<i>Prostanthera junonis</i>	E	E	Small shrub. Grows in sclerophyll forest and heath in shallow soil on sandstone on the Somersby Plateau.	No suitable habitat present.
<i>Syzygium paniculatum</i>	E	V	Small tree. Subtropical and littoral rainforest on sandy soil.	No suitable habitat present.
<i>Tetratheca glandulosa</i>	V	V	Spreading shrub to 0.2 m high. Strongly associated with areas of shale-sandstone transition habitat.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<i>Zieria involucrata</i>	E	V	Tall erect shrub to 2m high. Tall erect shrub to 2m high. Predominantly found in sclerophyll forest on mid to low sheltered slopes on Hawkesbury and Narrabeen sandstone in shallow sandy soils or on quaternary alluvium.	Suitable habitat present within Footslopes Apple – Red Gum Forest community.
<b>Key to TSC Act and EP&amp;BC Act Status</b>				
Ext = Extinct   P. Ext = Presumed Extinct   CE = Critically Endangered   E = Endangered V = Vulnerable Species   * = Preliminary determination				

No threatened flora species were observed within the subject site during preliminary surveys.

### Threatened Fauna Species

A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2013a) was undertaken to identify records of threatened fauna species located within 10km of the site. These records are shown in Figures 2.2, 2.3 and 2.4.

This allowed for a specific search for threatened fauna to be undertaken determining if any threatened fauna species were present within the subject site. Details on threatened fauna species as listed in the *TSC Act* (1995), *FM Act* (1994) and the *EP&BC Act* (1999) with a known or possible occurrence within the local area and an assessment of the suitability of the habitats present within the subject site for these species and the likelihood that these species may utilise the site is also provided in Table 3.4.

**TABLE 3.4  
THREATENED FAUNA SPECIES OF THE AREA  
AND ASSESSMENT OF HABITAT SUITABILITY**

<b>Common Name Scientific Name</b>	<b>TSC Act</b>	<b>EP&amp;BC Act</b>	<b>Preferred Habitat</b>	<b>Habitat Suitability and Likelihood of Occurrence</b>
Giant Barred Frog <i>Mixophyes iteratus</i>	E	E	Forages and shelters in deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest near permanent flowing water.	<ul style="list-style-type: none"> <li>No suitable habitats are present.</li> <li>Species is unlikely to occur within the site.</li> </ul>
Giant Burrowing Frog <i>Heleioporus australiacus</i>	V	V	Found around sandstone plateaux mostly associated with hanging sandstone shelves and the upper laterals.	<ul style="list-style-type: none"> <li>Suitable habitat is present within Dry Sclerophyll Forest areas, particularly near the ephemeral watercourse.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Red-crowned Toadlet <i>Pseudophryne australis</i>	V	-	Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Shelters under logs and rocks in non-breeding periods.	<ul style="list-style-type: none"> <li>Suitable habitat is present within Dry Sclerophyll Forest areas, particularly near the ephemeral watercourse.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Green and Golden Bell Frog <i>Litoria aurea</i>	E	V	Breeding habitat consists of shallow (<1m) ponds or slowly moving waterways which undergo disturbance regimes such as fluctuating water flow or inflow of saline water with both areas of open water and dense low vegetation (White and Pyke 2010).	<ul style="list-style-type: none"> <li>No suitable habitats are present.</li> <li>Species is unlikely to occur within the site.</li> </ul>
Rosenberg's Goanna <i>Varanus rosenbergi</i>	V	-	Hawkesbury sandstone outcrop specialist. Inhabits woodlands, dry open forests and heathland sheltering in burrows, hollow logs, rock crevices and outcrops.	<ul style="list-style-type: none"> <li>Suitable habitat is present within Dry Sclerophyll Forest habitats, particularly near the watercourse area.</li> <li>High likelihood of occurrence.</li> </ul>
Superb Fruit-Dove <i>Ptilinopus superbus</i>	V	-	Rainforests, adjacent mangroves, eucalypt forests, scrublands with native fruits.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest and Forested and Saline Wetland Vegetation areas.</li> <li>Low likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Australasian Bittern <i>Botaurus poiciloptilus</i>	E	E	Inhabits shallow freshwater or brackish wetlands with tall dense beds of reeds, sedges or rush species and swamp edges. Distribution Limit - N-North of Lismore. S- Eden.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Forested and Saline Wetland Vegetation areas.</li> <li>Low to moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>

TABLE 3.4 THREATENED FAUNA SPECIES OF THE AREA AND ASSESSMENT OF HABITAT SUITABILITY				
Common Name Scientific Name	TSC Act	EP&BC Act	Preferred Habitat	Habitat Suitability and Likelihood of Occurrence
Black Bittern <i>Ixobrychus flavicollis</i>	V	-	Prefers permanent freshwater wetlands with tall, dense vegetation.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Forested and Saline Wetland Vegetation areas.</li> <li>Species may utilise the site on occasion.</li> </ul>
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Inhabits a variety of habitats including woodland open forest, partially cleared areas, along watercourses and around wetlands.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate to high likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Eastern Osprey <i>Pandion cristatus</i>	V	-	Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding.	<ul style="list-style-type: none"> <li>Suitable roosting and nesting habitats are present throughout the site.</li> <li>High likelihood of occurrence.</li> <li>Species may utilise the site on occasion</li> </ul>
Bush Stone-curlew <i>Burhinus grallarius</i>	E	-	Utilises open forests, savannah woodlands, dune scrub, savannah and mangrove fringes.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Low likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Pied Oystercatcher <i>Haematopus longirostris</i>	E	-	Inhabits coastal beaches and estuarine flats.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Forested and Saline Wetland Vegetation areas.</li> <li>Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	V	-	Prefers wetter forests and woodlands from sea level to > 2000m on Divide, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmland and suburban gardens.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Glossy Black-Cockatoo <i>Calyptorhynchus lathamii</i>	V	-	Open forests with <i>Allocasuarina</i> species and hollows for nesting.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Moderate to high likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Swift Parrot <i>Lathamus discolor</i>	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas.</li> <li>Low likelihood occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>

TABLE 3.4 THREATENED FAUNA SPECIES OF THE AREA AND ASSESSMENT OF HABITAT SUITABILITY				
Common Name Scientific Name	TSC Act	EP&BC Act	Preferred Habitat	Habitat Suitability and Likelihood of Occurrence
Turquoise Parrot <i>Neophema pulchella</i>	V	-	Inhabits coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands.	<ul style="list-style-type: none"> <li>• Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas.</li> <li>• Low likelihood occurrence.</li> <li>• Species may utilise the site on occasion.</li> </ul>
Little Lorikeet <i>Glossopsitta pusilla</i>	V	-	Inhabits forests and woodlands feeding mostly on nectar and pollen particularly in profusely-flowering eucalypts.	<ul style="list-style-type: none"> <li>• Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas.</li> <li>• Moderate likelihood of occurrence.</li> <li>• Species may utilise the site on occasion.</li> </ul>
Barking Owl <i>Ninox connivens</i>	V	-	Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting.	<ul style="list-style-type: none"> <li>• Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas.</li> <li>• Moderate likelihood of occurrence.</li> <li>• Species may utilise the site on occasion.</li> </ul>
Powerful Owl <i>Ninox strenua</i>	V	-	Mature forests containing large hollows for breeding & densely vegetated gullies for roosting.	<ul style="list-style-type: none"> <li>• Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>• Moderate likelihood of occurrence.</li> <li>• Species may utilise the site on occasion.</li> </ul>
Masked Owl <i>Tyto novaehollandiae</i>	V	-	Open forest & woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting.	<ul style="list-style-type: none"> <li>• Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas.</li> <li>• Moderate likelihood of occurrence.</li> <li>• Species may utilise the site on occasion.</li> </ul>
Sooty Owl <i>Tyto tenebricosa</i>	V	-	Tall, dense, wet forests containing trees with very large hollows for roosting and breeding.	<ul style="list-style-type: none"> <li>• No suitable habitats are present.</li> <li>• Species is unlikely to occur within the site.</li> </ul>
Regent Honeyeater <i>Anthochaera phrygia</i>	CE	E	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts.	<ul style="list-style-type: none"> <li>• No suitable habitats are present.</li> <li>• Species is unlikely to occur within the site.</li> </ul>

TABLE 3.4 THREATENED FAUNA SPECIES OF THE AREA AND ASSESSMENT OF HABITAT SUITABILITY				
Common Name Scientific Name	TSC Act	EP&BC Act	Preferred Habitat	Habitat Suitability and Likelihood of Occurrence
Black-chinned Honeyeater (eastern subspecies) <i>Melithreptus gularis gularis</i>	V	-	Found in woodlands containing box-ironbark associations and River Red Gums, also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence.	<ul style="list-style-type: none"> <li>No suitable habitats are present.</li> <li>Species is unlikely to occur within the site.</li> </ul>
Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>	V	-	Found in dry open forests, woodland scrubland, and farmland with isolated trees. Occurs mostly west of the Great Divide except Hunter Valley.	<ul style="list-style-type: none"> <li>Subject site is located outside of species known range.</li> <li>Species is unlikely to occur within the site.</li> </ul>
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	Prefers open eucalypt woodlands and forests, mallee, inland acacia, coastal tee-tree scrubs, parks and gardens.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>High to moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Scarlet Robin <i>Petroica boodang</i>	V	-	Dry eucalypt forest and woodlands with open understorey during breeding season, dispersing during autumn–winter into open habitats including urban areas.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas.</li> <li>Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Inhabits a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Shelters in hollow-bearing trees, fallen logs, small caves and rock crevices.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Low to Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Southern Brown Bandicoot (eastern) <i>Isodon obesulus obesulus</i>	E	E	Utilises a range of habitats containing thick ground cover - open forest, woodland, heath, cleared land, urbanised areas and regenerating bushland.	<ul style="list-style-type: none"> <li>Subject site is located outside of species known range.</li> <li>Species is unlikely to occur within the site.</li> </ul>
Koala <i>Phascolarctos cinereus</i>	V	V	Inhabits both wet & dry eucalypt forest on high nutrient soils containing preferred feed trees.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Low to Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>

**TABLE 3.4  
THREATENED FAUNA SPECIES OF THE AREA  
AND ASSESSMENT OF HABITAT SUITABILITY**

<b>Common Name Scientific Name</b>	<b>TSC Act</b>	<b>EP&amp;BC Act</b>	<b>Preferred Habitat</b>	<b>Habitat Suitability and Likelihood of Occurrence</b>
Eastern Pygmy-possum <i>Cercartetus nanus</i>	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.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Squirrel Glider <i>Petaurus norfolcensis</i>	V	-	The Squirrel Glider inhabits dry sclerophyll forest and woodland nesting in small tree hollows.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Low to Moderate likelihood of occurrence.</li> </ul>
Long-nosed Potoroo <i>Potorous tridactylus</i>	V	V	Coastal heath and dry and wet sclerophyll forests with a dense understorey.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Moderate likelihood of occurrence.</li> </ul>
Eastern Chestnut Mouse <i>Pseudomys gracilicaudatus</i>	V	-	Inhabits heathland including dense wet heath and swampy areas, occasionally in woodland with grassy understorey.	<ul style="list-style-type: none"> <li>No suitable habitats are present.</li> <li>Species is unlikely to occur within the site.</li> </ul>
New Holland Mouse <i>Pseudomys novaehollandiae</i>	-	V	Within NSW occurs in a variety of structural vegetation types including heathland and woodland, dry sclerophyll forest with a dense shrub layer and on vegetated sand dunes (Wilson and Laidlaw 2003).	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Low to Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	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.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the forested areas of the site.</li> <li>High likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Eastern Freetail-bat <i>Mormopterus norfolkensis</i>	V	-	Inhabits eucalypt forest and woodland on the coastal side of the Great Dividing Range. Roosts in tree hollows, under bark and in various man-made structures.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	V	-	Inhabits wet sclerophyll forest, open forest, rainforest and coastal mallee. Roosts mostly in roosts in hollow trunks of eucalypts but also in caves and man-made structures.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>



TABLE 3.4 THREATENED FAUNA SPECIES OF THE AREA AND ASSESSMENT OF HABITAT SUITABILITY				
Common Name Scientific Name	TSC Act	EP&BC Act	Preferred Habitat	Habitat Suitability and Likelihood of Occurrence
Little Bentwing-bat <i>Miniopterus australis</i>	V	-	Inhabits rainforest, vine thicket, wet and dry melaleuca swamps and coastal forests. Roosts in caves, man-made structures such as abandoned mines and buildings and occasionally banana trees and tree hollows.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Eastern Bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	V	-	Inhabits rainforest, wet and dry sclerophyll forest, open woodland, Melaleuca forests and open grassland. Roosts in caves and man-made structures.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Southern Myotis <i>Myotis macropus</i>	V	-	Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	V	-	Inhabits moist gullies in mature coastal forest, rainforest, open woodland, Melaleuca swamp woodland, wet and dry sclerophyll forest, cleared areas with remnant trees and tree-lined creeks in open areas. Roosts in tree hollows, cracks and fissures in trunks and dead branches, under exfoliating bark, and in man-made structures.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate to high likelihood of occurrence.</li> </ul>
Giant Dragonfly <i>Petalura gigantea</i>	E	-	Inhabits permanent swamps and bogs with some free water and open vegetation.	<ul style="list-style-type: none"> <li>No suitable habitats are present.</li> <li>Species is unlikely to occur within the site.</li> </ul>
<b>Key to TSC Act and EP&amp;BC Act Status</b> Ext = Extinct   P. Ext = Presumed Extinct   CE = Critically Endangered   E = Endangered V = Vulnerable Species				

No threatened fauna species were observed within the subject site during preliminary surveys.

### 3.5 Critical Habitats

The subject site does not contain or adjoin an area classed as critical habitat within the provisions of the *Threatened Species Conservation Act (1995)*.

### 3.6 Listed Migratory Species

A search of the EP&BC Act Protected Matters Search Tool (SEWPaC 2013) was conducted for migratory fauna listed within the *EP&BC Act (1999)* recorded within 10 km of the subject site. This revealed a number of listed migratory species that may be present in the area. Details on migratory fauna species with a known or possible occurrence within the local area are provided in Table 3.5.

TABLE 3.5 LISTED MIGRATORY TERRESTRIAL FAUNA SPECIES OF THE AREA		
Common Name Scientific Name	Preferred Habitat	Comments
Fork-tailed Swift ( <i>Apus pacificus</i> )	Almost exclusively aerial.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate likelihood of occurrence.</li> </ul>
Great Egret ( <i>Ardea modesta</i> )	Wetland and estuarine habitats.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Forested and Saline Wetland Vegetation areas.</li> <li>Low likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Cattle Egret ( <i>Ardea ibis</i> )	Grazing lands and wetland habitats.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Cleared / Disturbed Land areas.</li> <li>Low likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
White-bellied Sea-eagle ( <i>Haliaeetus leucogaster</i> )	Coastal areas and inland rivers and water bodies.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the forested areas.</li> <li>High likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> <li>Observed during surveys.</li> </ul>
White-throated Needletail ( <i>Hirundapus caudacutus</i> )	Almost exclusively aerial.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Rainbow Bee-eater ( <i>Merops ornatus</i> )	Open, cleared or lightly timbered areas particularly in close proximity to water bodies.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Moderate likelihood of occurrence.</li> </ul>



TABLE 3.5 LISTED MIGRATORY TERRESTRIAL FAUNA SPECIES OF THE AREA		
Common Name Scientific Name	Preferred Habitat	Comments
		<ul style="list-style-type: none"> <li>Species may utilise the site on occasion.</li> </ul>
Black-faced Monarch ( <i>Monarcha melanopsis</i> )	Wet sclerophyll and rainforest vegetation.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Spectacled Monarch ( <i>Monarcha trivirgatus</i> )	Inhabits rainforest, wet sclerophyll forest and mangrove vegetation. North distributional limit is Central Coast NSW.	<ul style="list-style-type: none"> <li>No suitable habitat present.</li> <li>Species not likely to utilise the site.</li> </ul>
Satin Flycatcher ( <i>Myiagra cyanoleuca</i> )	Heavily vegetated forests. When migrating may be found in more open coastal habitats.	<ul style="list-style-type: none"> <li>Suitable habitats are present throughout the site.</li> <li>Low to moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Rufous Fantail ( <i>Rhipidura rufifrons</i> )	Wet sclerophyll and rainforest vegetation.	<ul style="list-style-type: none"> <li>Suitable habitats are present within the Dry Sclerophyll Forest areas.</li> <li>Moderate likelihood of occurrence.</li> <li>Species may utilise the site on occasion.</li> </ul>
Latham's Snipe ( <i>Gallinago hardwickii</i> )	Low dense vegetation within and surrounding freshwater wetlands.	<ul style="list-style-type: none"> <li>No suitable habitat present.</li> <li>Species not likely to utilise the site.</li> </ul>

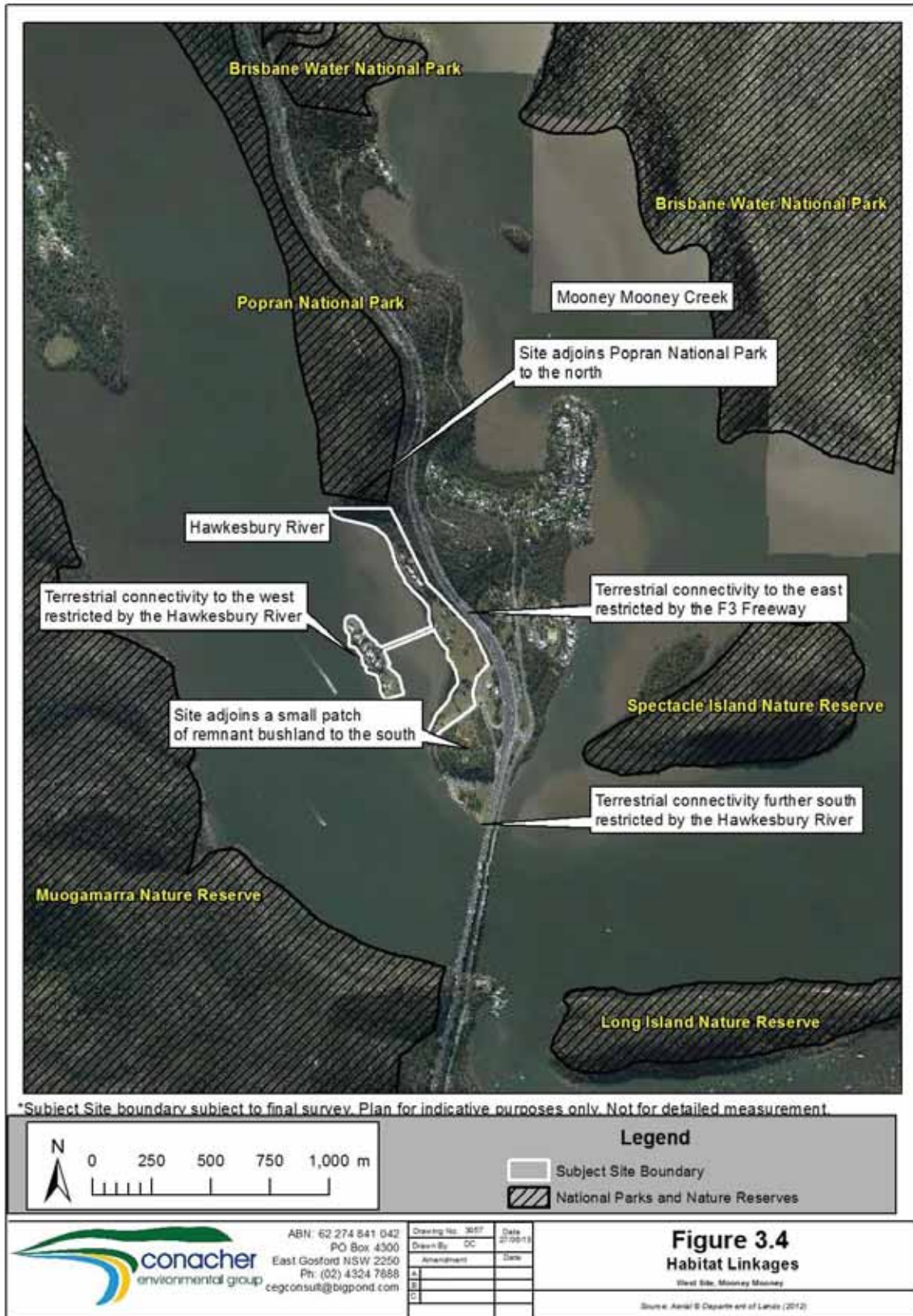
One listed migratory species, the White-bellied Sea-eagle was observed adjacent to the subject site during preliminary surveys.

### 3.7 Habitat Linkages

The site is located on the western side of the Mooney Mooney peninsula. The site has connectivity to larger areas of vegetation predominantly to the north. This area extends from Cabbage Point into Popran National Park which contains an expanse of intact native vegetation and habitats.

Wildlife linkages through the site are limited by the F3 Freeway which adjoins the site to the east, mostly cleared land and a small remnant of bushland on Mooney Mooney Point to the south and the Hawkesbury River to the west.

The habitat linkages present between the site and locality are shown in Figure 3.4.



### **3.8 Aquatic and Riparian Habitats**

The site lies on the eastern bank of the Hawkesbury River and contains one minor mapped watercourse, shown in Figure 3.3, which intersects the northern section of the site.

The NSW DPI (2013) Policy and Guidelines for Fish Habitat Conservation and Management provide a classification system for classifying the likely fish habitats provided by a watercourse based on watercourse characteristics (referred to as TYPE) and a classification system for identifying key fish habitat and associated sensitivity class (referred to as CLASS).

Hawkesbury River is a greater than fourth order watercourse. It constitutes TYPE 1 Highly Sensitive Fish Habitat and CLASS 1 Major key Fish Habitat in accordance with NSW DPI (2013).

The minor watercourse which intersects the site is a first order watercourse, of approximately 120 metres in length which drains to the Hawkesbury River. In accordance with NSW DPI (2013) this minor watercourse provides CLASS 4 unlikely fish habitat and TYPE 3 Minimally Sensitive Key Fish Habitat due to the ephemeral nature of the watercourse and lack of free standing water and lack native aquatic or wetland vegetation.

## 4. CONSIDERATION OF BIODIVERSITY MATTERS FOR FUTURE DEVELOPMENT

### 4.1 Biodiversity Planning Considerations

#### i. **Environment Protection & Biodiversity Conservation Act (1999)**

The *Environment Protection and Biodiversity Conservation Act* (1999) (EP&BC Act) is a nationally applicable act administered by the Australian Government. The Act provides a legal framework to protect matters of National Environmental Significance. These include:-

- World heritage sites;
- National heritage places;
- Wetlands of international importance;
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- Nuclear actions.

Under the *EP&BC Act* (1999) an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

The following summary is provided with regard to threatened species, threatened ecological communities and migratory species listed within the EP&BC Act (1999).

#### **Wetlands of International Importance**

No wetlands of international importance listed within the EP&BC Act (1999), occur within 10km of the subject site.

#### **EP&BC Act Listed Threatened Species**

No threatened flora or fauna species as listed within the *EP&BC Act* (1999) were observed within the subject site during surveys. The subject site contains suitable habitat for the following species listed within the EP&BC Act (1999), previously recorded within 10km of the subject site:

##### **Threatened Flora Species**

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• <i>Acacia bynoeana</i></li><li>• <i>Ancistrachne maidenii</i></li><li>• <i>Asterolasia elegans</i></li><li>• <i>Astrotricha crassifolia</i></li><li>• <i>Caladenia tessellata</i></li><li>• <i>Callistemon linearifolius</i></li></ul> | <ul style="list-style-type: none"><li>• <i>Darwinia peduncularis</i></li><li>• <i>Epacris purpurascens</i> var. <i>purpurascens</i></li><li>• <i>Genoplesium baueri</i></li><li>• <i>Persoonia hirsuta</i></li><li>• <i>Tetradthea glandulosa</i></li><li>• <i>Zieria involucreta</i></li></ul> |
|--|---|

##### **Threatened Fauna Species**

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Giant Burrowing Frog</li><li>• Australasian Bittern</li><li>• Swift Parrot</li><li>• Spotted-tailed Quoll</li></ul> | <ul style="list-style-type: none"><li>• Koala</li><li>• Long-nosed Potoroo</li><li>• New Holland Mouse</li><li>• Grey-headed Flying-fox</li></ul> |
|---|---|

#### **EP&BC Act Listed Threatened Ecological Communities**

No threatened ecological communities as listed within the *EP&BC Act* (1999) were observed within the subject site during surveys.

#### **EP&BC Act Listed Migratory Species**

One migratory fauna species, the White-bellied Sea-eagle, as listed within the *EP&BC Act* (1999) was observed adjacent to the subject site during surveys. The subject site also provides suitable habitat for the following additional listed migratory species that were not observed during surveys:

- Fork-tailed Swift;
- Great Egret;
- Cattle Egret;
- White-throated Needletail;
- Rainbow Bee-eater;
- Black-faced Monarch;
- Satin Flycatcher; and
- Rufous Fantail.

## ii. **Threatened Species Conservation Act (1995)**

The *Threatened Species Conservation Act (1995)* (*TSC Act 1995*) protects threatened flora and fauna species, populations and ecological communities and their habitats in NSW (excluding fish and marine plants which are protected by the *Fisheries Management Act 1994*). The Act also lists declared critical habitat, key threatening processes and allows for the preparation of Recovery Plans and Threat Abatement Plans.

The TSC Act (1995) sets out the content required to be addressed in Species Impact Statements for developments which are likely to significantly affect threatened species, populations or ecological community's or their habitats, including critical habitats, makes legislative provision for the Biodiversity Certification of land and the Biodiversity Banking and offsets scheme.

The objects of this Act, are as follows:

- To conserve biological diversity and promote ecologically sustainable development, and
- To prevent the extinction and promote the recovery of threatened species, populations and ecological communities, and
- To protect the critical habitat of those threatened species, populations and ecological communities that are endangered, and
- To eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities, and
- To ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed, and
- To encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

### **Threatened Ecological Communities**

One endangered ecological community (EEC), listed within the *TSC Act (1995)*, Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions was observed within the subject site. This EEC corresponds to the Swamp Oak Sedge Forest (Canopy only vegetation with exotic understorey) community shown in Figure 3.2. This EEC generally consists of highly disturbed remnant and regrowth stands of vegetation.

### **Threatened Populations**

No threatened populations, listed within the *TSC Act (1995)*, were observed or have suitable habitat present within the subject site.

### **Threatened Species**

No threatened species, listed within the *TSC Act (1995)*, were observed within the subject site during preliminary surveys, however it is considered that overall the subject site contains suitable habitats for the following threatened species:

### **Threatened Flora**

- *Acacia bynoeana*
- *Ancistrachne maidenii*
- *Asterolasia elegans*
- *Astrotricha crassifolia*
- *Caladenia tessellata*
- *Callistemon linearifolius*
- *Darwinia peduncularis*
- *Epacris purpurascens* var. *purpurascens*
- *Genoplesium baueri*
- *Persoonia hirsuta*
- *Tetratheca glandulosa*
- *Zieria involuocrata*



### Threatened Fauna

- Giant Burrowing Frog
- Red-crowned Toadlet
- Rosenberg's Goanna
- Superb Fruit-Dove
- Australasian Bittern
- Black Bittern
- Little Eagle
- Eastern Osprey
- Bush Stone-curlew
- Pied Oystercatcher
- Gang-gang Cockatoo
- Glossy Black-Cockatoo
- Swift Parrot
- Turquoise Parrot
- Little Lorikeet
- Barking Owl
- Powerful Owl
- Masked Owl
- Varied Sittella
- Scarlet Robin
- Spotted-tailed Quoll
- Koala
- Eastern Pygmy-possum
- Squirrel Glider
- Long-nosed Potoroo
- New Holland Mouse
- Grey-headed Flying-fox
- Eastern Freetail-bat
- Eastern False Pipistrelle
- Little Bentwing-bat
- Eastern Bentwing-bat
- Southern Myotis
- Greater Broad-nosed Bat

### iii. Fisheries Management Act (1994)

The objects of the *Fisheries Management Act* (1994) include ensuring that the impact of any action affecting threatened species, populations and ecological communities of fish and marine vegetation is properly assessed and

While the site is unlikely to provide suitable habitat for threatened species listed within the *FM Act* (1994), marine vegetation is present (Riverine Mangrove Scrub). Removal of marine vegetation, such as mangroves, would require a permit.

### iv. Water Management Act (2000)

A controlled activity approval under the *Water Management Act 2000* (WM Act) is required for certain types of developments and activities that are carried out within 40 metres of a river, lake or estuary.

Under the *Water Management Act* (2000), a controlled activity is defined as:

- a. the erection of a building or the carrying out of a work (within the meaning of the *Environmental Planning and Assessment Act 1979*), or
- b. the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
- c. the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- d. the carrying out of any other activity that affects the quantity or flow of water in a water source.

Future controlled activities may require the establishment of Vegetated Riparian Zones (VRZs). VRZ widths recommended by the NSW Office of Water are based on watercourse order as classified under the Strahler System of ordering watercourses and using current 1:25 000 topographic maps. The corresponding VRZ width for the Hawkesbury River is 40 metres from the top of bank and the VRZ recommended for the watercourse within the northern section of the site is 10 metres from the top of bank.

A VRZ of 40 metres is unlikely to be achievable for several areas of the site, due to the presence of existing buildings less than 40 metres from top of bank of the Hawkesbury River, particularly on Peat Island. The retention of areas containing Estuarine Mangrove Scrub and Disturbed Estuarine Swamp Oak Forest vegetation within 40 metres of the top of bank of the Hawkesbury River would ensure that the existing areas of riparian vegetation were maintained, and if a controlled activity application were required for future development, the establishment of an adequate vegetated riparian corridor would need be assessed on a merits basis.

### v. State Regional Environmental Plan No 20 – Hawkesbury – Nepean River

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Ecological Site Appraisal Report – Mooney Mooney Peninsula Western Site (Ref: 3057a)  
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The aim of this plan is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.

The site is located within the area covered by Sydney Regional Environmental Plan No 20 and the general planning considerations set out in clause 5, and the specific planning policies and related recommended strategies set out in clause 6 which are applicable, are required to be addressed for development within the site and for the preparation of environmental planning instruments and development control plans where this plan applies. Included are the following strategies for Environmentally Sensitive Areas and Flora and Fauna, including Wetlands:

#### **Environmentally Sensitive Areas**

With regard to environmentally sensitive areas the following specific planning policies and related recommended strategies set out in clause 6 of the Plan.

**Policy:** The environmental quality of environmentally sensitive areas must be protected and enhanced through careful control of future land use changes and through management and (where necessary) remediation of existing uses.

**Note.** Environmentally sensitive areas in the Hawkesbury-Nepean catchment are: the river, riparian land, escarpments and other scenic areas, conservation area subcatchments, national parks and nature reserves, wetlands, other significant floral and faunal habitats and corridors, and known and potential acid sulphate soils.

#### **Strategies:**

- (a) Rehabilitate parts of the riverine corridor from which sand, gravel or soil are extracted so that attached aquatic plant beds are replaced and water quality and faunal habitats improved.
- (b) Minimise adverse impacts on water quality, aquatic habitats, riverine vegetation and bank stability.
- (c) Minimise direct and indirect adverse impacts on land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916* and conservation area sub-catchments in order to protect water quality and biodiversity.
- (d) Protect wetlands (including upland wetlands) from future development and from the impacts of land use within their catchments.
- (e) Consider the need to include buffer zones (such as adequate fire radiation zones) for proposals on land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916*.
- (f) Consider the views of the Director-General of National Parks and Wildlife about proposals for land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974*.
- (g) Consideration should be given to the impact of the development concerned on the water table and the formation of acid sulphate soils.
- (h) New development in conservation area sub-catchments should be located in areas that are already cleared.

#### **Flora and Fauna**

With regard to flora and fauna the following specific planning policies and related recommended strategies set out in clause 6 of the Plan.

**Policy:** Manage flora and fauna communities so that the diversity of species and genetics within the catchment is conserved and enhanced.

#### **Strategies, generally:**

- (a) Conserve and, where appropriate, enhance flora and fauna communities, particularly threatened species, populations and ecological communities, aquatic habitats, wetland flora, rare flora and fauna, riverine flora, flora with heritage value, habitats for indigenous and migratory species of fauna, and existing or potential fauna corridors.

- (b) Locate structures where possible in areas which are already cleared or disturbed instead of clearing or disturbing further land.
- (c) Minimise adverse environmental impacts, protect existing habitat and, where appropriate, restore habitat values by the use of management practices.
- (d) Consider the impact on ecological processes, such as waste assimilation and nutrient cycling.
- (e) Consider the range of flora and fauna inhabiting the site of the development concerned and the surrounding land, including threatened species and migratory species, and the impact of the proposal on the survival of threatened species, populations and ecological communities, both in the short and longer terms.
- (f) Consider the need to provide and manage buffers, adequate fire radiation zones and building setbacks from significant flora and fauna habitat areas.
- (g) Consider the need to control access to flora and fauna habitat areas.
- (h) Consider the need to maintain corridors for fish passage, and protect spawning grounds and gravel beds.

**Strategies for wetlands:**

- (i) Maintain the ability of wetlands to improve the quality of water entering the river through the filtering of sediments and the absorption of nutrients.
- (j) Maintain the ability of wetlands to stabilise soils and reduce bank erosion.
- (k) Maintain the ability of wetlands to reduce the impact of flooding downstream through the retention of floodwaters.
- (l) Maintain a variety of wetland flora and fauna species in the region and consider the scarcity of particular species on a national basis.
- (m) Encourage the appropriate management of wetlands, including monitoring and weed control.
- (n) Provide opportunities for recreation, scientific research and education where they are compatible with the conservation of wetlands.
- (o) Consider the need to protect and improve the quality and quantity of surface water and groundwater entering wetlands by controlling development in the catchment of wetlands.
- (p) Consider the desirability of protecting any wetlands of local significance which are not included on the map.
- (q) Consider the desirability of protecting or, if necessary, actively managing, constructed wetlands if they have significant conservation values or make a significant contribution to improvements in water quality.

**vi. State Environmental Planning Policy No 14 – Coastal Wetlands**

The subject site is not included within an area mapped as a wetland in SEPP 14.

**vii. State Environmental Planning Policy No 26 – Littoral Rainforests**

The subject site is not included within any area mapped as a littoral rainforest in SEPP 26. The vegetation on-site does not correspond to Littoral Rainforest with respect to species composition and substrate.

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

The subject site was assessed for activity by Koalas using the following methods:

Ecological Site Appraisal Report – Mooney Mooney Peninsula Western Site (Ref: 3057a)

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The Bionet Atlas of NSW Wildlife (OEH 2013a) was searched for historical records of Koalas within the vicinity of the subject site.

Identification and assessment of the density of tree species listed as Koala food trees in State Environmental Planning Policy No. 44 - Koala Habitat Protection was undertaken across the site.

<b>TABLE 4.1</b>			
<b>SEPP-44 KOALA FEED TREE SPECIES</b>			
<b>(From SEPP-44 Schedule 2)</b>			
<b>Scientific Name</b>	<b>Common Name</b>	<b>Observed On Site</b>	<b>Percentage within survey plots</b>
<i>Eucalyptus tereticornis</i>	Forest Red Gum	Yes	<15%
<i>Eucalyptus microcorys</i>	Tallowwood	No	0%
<i>Eucalyptus punctata</i>	Grey Gum	Yes	>15%
<i>Eucalyptus viminalis</i>	Ribbon or Manna Gum	No	0%
<i>Eucalyptus camaldulensis</i>	River Red Gum	No	0%
<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	No	0%
<i>Eucalyptus signata</i>	Scribbly Gum	No	0%
<i>Eucalyptus albens</i>	White Box	No	0%
<i>Eucalyptus populnea</i>	Bimble Box or Poplar Box	No	0%
<i>Eucalyptus robusta</i>	Swamp Mahogany	No	0%

The Koala food tree species, *Eucalyptus punctata* and *Eucalyptus tereticornis*, as listed on Schedule 2 of State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44), constitute more than 15% of the total number of trees within the area of native vegetation within the forested areas of the subject site. Therefore the subject site is considered to contain potential koala habitat as defined by SEPP 44.

No historical records for Koalas were obtained from the Bionet Atlas of NSW Wildlife within the immediate vicinity of the subject site. Further surveys would be required to determine whether the site contains core Koala habitat as defined by this policy.

#### **ix. State Environmental Planning Policy No 71 – Coastal Protection**

The site is located within the area covered by SEPP 71. The matters for consideration set out in Clause 8 of the policy are required to be taken into account by Council with regard to the preparation of draft local environmental plans and by a consent authority when determining development applications within the site.

#### **4.2 Identification of Areas of Ecological Value**

Areas of ecological value which should be considered for retention generally contain one or more of the following attributes:

- Endangered ecological communities;
- Intact naturally structured vegetation;
- Intact habitats suitable for threatened species;
- Vegetated areas which form buffers to a National Park;
- Vegetated areas which form buffers to riparian zones; and/or
- Wetland vegetation.

The extents of these areas within the site are mapped in Figure 3.3 as Dry Sclerophyll Forest and Forested and Saline Wetland habitats and occupy approximately 4.1 hectares within the site.

Several small remnants of native vegetation, some of which include EEC vegetation / Saline Wetland Habitats are present within the site. These areas generally contain low conservation value due to poor condition and may be required to be removed, subject to approvals, to enable the future development of the site.

### 4.3 Identification of Principles for Future Management of Biodiversity

Suitable biodiversity management principles for the site are outlined under SREP 20. The following summary of the main principles is provided:

- Conserve and, where appropriate, enhance flora and fauna communities, particularly threatened species, populations and ecological communities, aquatic habitats, wetland flora, rare flora and fauna, riverine flora, flora with heritage value, habitats for indigenous and migratory species of fauna, and existing or potential fauna corridors.
- Protect wetlands (including upland wetlands) from future development and impacts of land use.
- Locate structures where possible in areas which are already cleared or disturbed instead of clearing or disturbing further land.
- Minimise adverse environmental impacts, protect existing habitat and, where appropriate, restore habitat values by the use of management practices.
- Consider the range of flora and fauna inhabiting the site of the development concerned and the surrounding land, including threatened species and migratory species, and potential impacts of proposals on the survival of threatened species, populations and ecological communities, both in the short and longer terms.
- Consider the need to provide and manage buffers, adequate fire radiation zones and building setbacks from significant flora and fauna habitat areas.
- Minimise direct and indirect adverse impacts on land reserved or dedicated under the *National Parks and Wildlife Act 1974*.
- Consideration should be given to the impact of developments on the water table and the formation of acid sulphate soils.
- Consider the need to control access to flora and fauna habitat areas.

## 5. CONCLUDING COMMENTS

The areas of the site which are of ecological value generally occur outside of areas which have been historically cleared for development. These areas contain one or more of the following attributes:

- Endangered ecological communities, particularly intact habitats;
- Intact naturally structured vegetation;
- Intact habitats suitable for threatened species;
- Vegetated areas which form buffers to a National Park;
- Vegetated areas which form buffers to riparian zones; and/or
- Wetland vegetation.

The extent of these areas within the site is generally limited and particularly concentrated to the areas of the site directly adjacent to the Hawkesbury River and the naturally forested land within the northern portion of the site (approximately 4.1 hectares).

The remaining areas of the site generally consist of extensive cleared areas occupied by buildings, roads and areas of managed exotic grassland (11.6 hectares). These disturbed and cleared areas present the most suitable positions for future development with regard to ecological considerations. Included within these areas are several small remnants of native vegetation, some of which include EEC vegetation which are of low conservation value due to poor condition and may be required to be removed, subject to approvals, to enable the future development of the site.

## 6. REFERENCES

- Antsis, M., 2002. *Tadpoles of South-eastern Australia a Guide with Keys*. Reed New Holland.
- Australian Government Department of Sustainability, Environment, Water, Populations and Communities 2013. *Protected Matters Search Tool*. [Online]. Available from: <http://www.environment.gov.au/epbc/pmst/index.html>
- Bell, S.A.J. 2001. *Notes on population size and habitat of the vulnerable *Cryptostylis hunteriana* (Orchidaceae) from the Central Coast of New South Wales*. *Cunninghamia* 7(2) P195-204.
- Bell, S.A.J. 2009. *The natural vegetation of the Gosford Local Government Area, Central Coast, New South Wales: Revised and Updated. Report to Gosford City Council*. Eastcoast Flora Survey.
- Bishop A. 2000. *Field guide to Orchids of New South Wales and Victoria*. 2nd Edition. University of New South Wales Press.
- Churchill, S. 2008. *"Australian Bats"* (Second edition) Allen and Unwin, Crows Nest, NSW.
- Cogger, H.G., 2000. *Reptiles and Amphibians of Australia*. (6th Edition) Reed New Holland, Frenchs Forest NSW.
- Courtney J, Debus SJS. 2006. *Breeding habits and conservation status of the Musk Lorikeet *Glossopsitta concinna* and Little Lorikeet *G. pusilla* in Northern New South Wales*. *Australian Field Ornithology* 23, 109-124.
- Cropper, S.C. 1993. *Management of Endangered Plants*. CSIRO Publications, East Melbourne.
- Department of Environment and Climate Change 2005. *Threatened Species Profile Database*, Website: [http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/search\\_simpleform.aspx](http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/search_simpleform.aspx).
- Environment Protection and Biodiversity Conservation Act 1999. Commonwealth Government.
- Environmental Planning and Assessment Act 1979. New South Wales Government.
- Fairley, A. & Moore, P. 1995. *Native Plants of the Sydney District*, Kangaroo Press.
- Fox, B. J. 1988. *Eastern Chestnut Mouse (*Pseudomys gracilicaudatus*)*. In *The Australian Museum Complete Book of Australian Mammals*. R. Strahan (Ed.). Angus and Robertson Publishers, Sydney.
- Higgins, P.J. (Ed. 1999. *Handbook of Australian, New Zealand and Antarctic Birds. Volume 4: Parrots to Dollarbird*. Oxford University Press, Melbourne.
- Higgins, P.J., & J.M.Peter. (Eds) 2002. *Handbook of Australian New Zealand and Antarctic Birds. Volume 6: Pardalotes to shrike-thrushes*. Oxford University Press, Melbourne.
- Higgins, P.J., & S.J.J.F. Davies. (Eds) 1996. *Handbook of Australian New Zealand & Antarctic Birds. Volume 3: Snipe to Pigeons*. Oxford University Press, Melbourne.
- Higgins, P.J., J.M. Peter & W.K. Steel. (Eds) 2001. *Handbook of Australian New Zealand and Antarctic Birds. Volume 5: Tyrant-flycatchers to Chats*. Oxford University Press, Melbourne.
- Keith, D. 2004. *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT*. Department of Environment and Conservation, Hurstville.
- Lindsey, T. R. 1992. *Encyclopædia of Australian Animals - Birds*. Angus and Robertson Publishers, Sydney.

- Marchant, S., & P.J. Higgins (Eds) 1993. *Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings*. Oxford University Press, Melbourne.
- Marchant, S., & P.J. Higgins (Eds) 1998. *Handbook of Australian, New Zealand and Antarctic Birds. Volume 1 Ratite's to Ducks Part A Ratite's to Petrels*. Oxford University Press, Melbourne.
- Murphy, C.L. Ed. 1993. *Soil Landscapes of the Gosford/Lake Macquarie 1:100,000 sheet*, Soil Conservation Service of NSW.
- Murray, M., Bell, S., Hoye, G. 2002. *Flora and fauna survey Guidelines: Lower Hunter Central Coast Region 2002*. Lower Hunter & Central Coast Regional Environmental Management Strategy, NSW.
- NPWS (2002). *Epacris purpurascens var purpurascens Threatened Species Information*, Hurstville.
- NSW National Parks and Wildlife Service 1999. *Acacia bynoeana Threatened Species Information*. NPWS Hurstville NSW.
- NSW National Parks and Wildlife Service 1999. *Green and Golden Bell Frog (Litoria aurea) Threatened Species Information*. NPWS Hurstville NSW.
- NSW National Parks And Wildlife Service 1999. *Spotted-tailed Quoll (Dasyurus maculatus) Threatened Species Information*. NPWS Hurstville NSW.
- NSW National Parks and Wildlife Service 2001. *Giant Burrowing Frog Heleioporus australiacus Environmental Impact Assessment Guideline*, Hurstville NSW.
- NSW Office of Environment and Heritage 2013a. *BioNet Atlas of NSW Wildlife*. [Online]. Available from: <http://www.bionet.nsw.gov.au/>
- NSW Office of Environment and Heritage 2013b. *Guidelines for carrying out a survey*. [Online]. Available from: <http://www.environment.nsw.gov.au/surveys/GuidelinesForCarryingOutASurvey.htm>
- Reed, P.C., Lunney, D. and Walker, P. 1991. *A 1986-1987 survey of the Koala Phascolarctos cinereus (Goldfuss) in New South Wales and an ecological interpretation of its distribution*. In: *Biology of the Koala*. A. K. Lee, K. A. Handasyde and G. D. Sanson, (Eds). Surrey Beatty and Sons, Chipping Norton, Sydney. Pp. 55-73.
- Royal Botanic Gardens and Domain Trust 2013. *New South Wales Flora Online*: [Online]. Available from: <http://plantnet.rbgsyd.nsw.gov.au/>
- Saunders, D.L. and Tzaros, C.L. 2011. *National Recovery Plan for the Swift Parrot Lathamus discolor*, Birds Australia, Melbourne.
- Seebeck, J. H., Bennett, A.F., and Scotts, D.J. 1989. *Ecology of the Potoroidae - a review*. In *"Kangaroos, Wallabies and Rat-kangaroos"*. (Eds G. Grigg, P. Jarman and I. Hume). pp 67-88. Surrey Beatty and Sons Sydney.
- Specht, R.L., Specht, A., Whelan, M.B., and Hegarty, E.E. 1995. *Conservation Atlas of Plant Communities in Australia*. Southern Cross University Press, Lismore.
- Suckling, G.C. 1995. *Squirrel Glider (Petaurus norfolcensis)*. In *The Mammals of Australia*. R. Strahan (Ed.). Reed Books, Chatswood.
- Threatened Species Conservation Act 1995. New South Wales Government.
- Tidemann, C. 1995. *"The Mammals of Australia"*. (R. Strahan (Ed)). New Holland Publishers Pty. Ltd. Melbourne.
- Turner, V & Ward, S.J.. 1995. in *The Mammals of Australia The Australian Museum*, Sydney.

Walker, J. and Hopkins, M.S. 1990. *Vegetation. In Australian soil and land survey field handbook second edition* McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J. and Hopkins, M.S. Inkata Press, Melbourne.

**APPENDIX 1**

**EP&BC ACT PROTECTED MATTERS SEARCH REPORT**

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## EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 09/07/13 15:37:28

### [Summary](#)

### [Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

### [Caveat](#)

### [Acknowledgements](#)



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[Coordinates](#)  
Buffer: 10.0Km



## Summary

### Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Areas:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	1
<a href="#">Listed Threatened Species:</a>	74
<a href="#">Listed Migratory Species:</a>	41

### Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	3
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	58
<a href="#">Whales and Other Cetaceans:</a>	10
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<u>Place on the RNE:</u>	15
<u>State and Territory Reserves:</u>	8
<u>Regional Forest Agreements:</u>	1
<u>Invasive Species:</u>	52
<u>Nationally Important Wetlands:</u>	None
<u>Key Ecological Features (Marine)</u>	None

## Details

### Matters of National Environmental Significance

National Heritage Properties		[ Resource Information ]
Name	State	Status
<b>Natural</b>		
<a href="#">Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves</a>	NSW	Listed place

Listed Threatened Ecological Communities		[ Resource Information ]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
<a href="#">Littoral Rainforest and Coastal Vine Thickets of Eastern Australia</a>	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Endangered	Species or species habitat known to occur within area
<a href="#">Botaurus poicilophilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
<a href="#">Diomedea exulans antipodensis</a> Antipodean Albatross [82269]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans exulans</a> Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area
<a href="#">Diomedea exulans gibsoni</a> Gibson's Albatross [82271]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans (sensu lato)</a> Wandering Albatross [1073]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence related behaviour likely to occur within area
<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Fregatta grallaria grallaria</a> White-bellied Storm-Petrel (Tasman Sea), White- bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pterodroma neglecta neglecta</a> Kermadec Petrel (western) [64450]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross [64460]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta cauta</a> Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta salvini</a> Salvin's Albatross [82343]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta steadi</a> White-capped Albatross [82344]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris impavida</a> Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
<b>Fish</b>		
<a href="#">Epinephelus daemeli</a> Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macquaria australasica</a> Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
<a href="#">Prototroctes maraena</a> Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
<b>Frogs</b>		
<a href="#">Heleioporus australiacus</a> Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Litoria aurea</a> Green and Golden Bell Frog [1670]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Litoria littlejohni</a> Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
<a href="#">Mixophyes balbus</a> Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat likely to occur within area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
<a href="#">Isaodon obesulus obesulus</a> Southern Brown Bandicoot (Eastern) [68050]	Endangered	Species or species habitat known to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Petrogale penicillata</a> Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Potorous tridactylus tridactylus</a> Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pseudomys novaehollandiae</a> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#">Acacia hynoeana</a> Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Allocastrum glareicola</a> [21932]	Endangered	Species or species habitat may occur within area
<a href="#">Asterolasia elegans</a> [56780]	Endangered	Species or species habitat known to occur within area
<a href="#">Astrotricha crassifolia</a> Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Caladenia tessellata</a> Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur



Name	Status	Type of Presence within area
<a href="#">Cryptostylis hunteriana</a> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Darwinia biflora</a> [14619]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Eucalyptus camfieldii</a> Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Eucalyptus nicholii</a> Narrow-leaved Peppermint, Narrow-leaved Black Peppermint [20992]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Grevillea shiressii</a> [19186]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Haloragodendron lucasii</a> Hal [6480]	Endangered	Species or species habitat likely to occur within area
<a href="#">Kunzea rupestris</a> [8798]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Lasiopetalum joyceae</a> [20311]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Leptospermum deanei</a> Deane's Tea-tree [21777]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Melaleuca biconvexa</a> Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
<a href="#">Melaleuca deanei</a> Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Micromyrtus blakelyi</a> [6870]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Olearia cordata</a> [6710]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pelargonium sp. Striatellum (G.W.Carr 10345)</a> Omeo Stork's-bill [84065]	Endangered	Species or species habitat may occur within area
<a href="#">Persoonia hirsuta</a> [19006]	Endangered	Species or species habitat likely to occur within area
<a href="#">Pimelea curviflora var. curviflora</a> [4182]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Prostanthera junonis</a> Somersby Mintbush [64960]	Endangered	Species or species habitat likely to occur within area
<a href="#">Rhizanthella slateri</a> Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area



Name	Status	Type of Presence
<u><a href="#">Streblus pendulinus</a></u> Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
<u><a href="#">Syzygium paniculatum</a></u> Magenta Lilly Pilly, Magenta Cherry, Pocket-less Brush Cherry, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
<u><a href="#">Tetratheca glandulosa</a></u> Glandular Pink-bell [2350]	Vulnerable	Species or species habitat known to occur within area
<u><a href="#">Zieria involucreta</a></u> [3087]	Vulnerable	Species or species habitat likely to occur within area
<b>Reptiles</b>		
<u><a href="#">Caretta caretta</a></u> Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
<u><a href="#">Chelonia mydas</a></u> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<u><a href="#">Dermochelys coriacea</a></u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<u><a href="#">Eretmochelys imbricata</a></u> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<u><a href="#">Hoplocephalus bungaroides</a></u> Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
<u><a href="#">Natator depressus</a></u> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Sharks</b>		
<u><a href="#">Carcharias taurus (east coast population)</a></u> Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat may occur within area
<u><a href="#">Carcharodon carcharias</a></u> Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<u><a href="#">Pristis zijsron</a></u> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat may occur within area
<u><a href="#">Rhincodon typus</a></u> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<b>Listed Migratory Species</b>		<b>[ Resource Information ]</b>
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
<b>Migratory Marine Birds</b>		
<u><a href="#">Apus pacificus</a></u> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<u><a href="#">Diomedea antipodensis</a></u> Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Diomedea dabbenena</a> Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
<a href="#">Diomedea exulans (sensu lato)</a> Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea gibsoni</a> Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Puffinus carneipes</a> Flesh-footed Shearwater, Flesh-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Sterna albifrons</a> Little Tern [813]		Species or species habitat may occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross [64460]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta (sensu stricto)</a> Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*	Species or species habitat may occur within area
<b>Migratory Marine Species</b>		
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Xanthomyza phoenicea</a> Regent Honeyeater [430]	Endangered*	Species or species habitat known to occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

#### Other Matters Protected by the EPBC Act

##### Commonwealth Land [\[ Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Commonwealth Land - Australian Telecommunications Commission Commonwealth Land - Telstra Corporation Limited

##### Listed Marine Species [\[ Resource Information \]](#)

\* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea dabbenena</a> Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
<a href="#">Diomedea exulans (sensu lato)</a> Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea gibsoni</a> Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Puffinus carneipes</a> Flesh-footed Shearwater, Flesh-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
<a href="#">Sterna albifrons</a> Little Tern [813]		Species or species habitat may occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross [64460]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta (sensu stricto)</a> Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable*	Species or species habitat may occur within area



Name	Threatened	Type of Presence
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*	Species or species habitat may occur within area
<b>Fish</b>		
<a href="#">Acentronura tentaculata</a> Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
<a href="#">Festucalex cinctus</a> Girdled Pipefish [66214]		Species or species habitat may occur within area
<a href="#">Filocampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area
<a href="#">Heraldia nocturna</a> Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus abdominalis</a> Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
<a href="#">Hippocampus whitei</a> White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
<a href="#">Histiogamphelus briggsii</a> Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
<a href="#">Lissocampus runa</a> Javelin Pipefish [66251]		Species or species habitat may occur within area
<a href="#">Maroubra perserrata</a> Sawtooth Pipefish [66252]		Species or species habitat may occur within area
<a href="#">Noliocampus ruber</a> Red Pipefish [66265]		Species or species habitat may occur within area
<a href="#">Phyllopteryx taeniolatus</a> Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
<a href="#">Solenastus spinosissimus</a> Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Solenostomus paegnius</a> Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
<a href="#">Solenostomus paradoxus</a> Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Stigmatopora nigra</a> Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Urocampus carinirostris</a> Hairy Pipefish [66282]		Species or species habitat may occur within area
<a href="#">Vanacampus margaritifer</a> Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Arctocephalus forsteri</a> New Zealand Fur-seal [20]		Species or species habitat may occur within area
<a href="#">Arctocephalus pusillus</a> Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat may occur within area
<b>Reptiles</b>		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area
<b>Whales and other Cetaceans</b>		
		<a href="#">[ Resource Information ]</a>
Name	Status	Type of Presence
<b>Mammals</b>		
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Species or species habitat may occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Name	Status	Type of Presence area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area

#### Extra Information

##### Places on the RNE [\[ Resource Information \]](#)

Note that not all Indigenous sites may be listed.

Name	State	Status
<b>Natural</b>		
<a href="#">Hawkesbury Reserve (former)</a>	NSW	Indicative Place
<a href="#">Marramarra National Park</a>	NSW	Indicative Place
<a href="#">Big Bay Marramarra Creek Area</a>	NSW	Registered
<a href="#">Brisbane Water National Park (1981 boundary)</a>	NSW	Registered
<a href="#">Dharug National Park (1978 boundary)</a>	NSW	Registered
<a href="#">Ku-ring-gai Chase National Park (1980 boundary)</a>	NSW	Registered
<a href="#">Long Island Nature Reserve</a>	NSW	Registered
<a href="#">Muogamarra Nature Reserve</a>	NSW	Registered
<a href="#">Spectacle Island Nature Reserve</a>	NSW	Registered
<b>Indigenous</b>		
<a href="#">The Whale Feast Engraving Site</a>	NSW	Registered
<b>Historic</b>		
<a href="#">Bar Island Cemetery Precinct</a>	NSW	Indicative Place
<a href="#">Broken Bay Entrance Foreshores</a>	NSW	Indicative Place
<a href="#">Cottages</a>	NSW	Indicative Place
<a href="#">Lone grave of Frances Peat</a>	NSW	Indicative Place
<a href="#">Hawkesbury River Rail Bridge</a>	NSW	Registered

##### State and Territory Reserves [\[ Resource Information \]](#)

Name	State
Brisbane Water	NSW
Dharug	NSW
Ku-ring-gai Chase	NSW
Long Island	NSW
Marramarra	NSW
Muogamarra	NSW
Popran	NSW
Spectacle Island	NSW

**Regional Forest Agreements** [ Resource Information ]

Note that all areas with completed RFAs have been included.

Name	State
<a href="#">North East NSW RFA</a>	New South Wales

**Invasive Species** [ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Acridotheres tristis</a> Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
<a href="#">Alauda arvensis</a> Skylark [656]		Species or species habitat likely to occur within area
<a href="#">Anas platyrhynchos</a> Mallard [974]		Species or species habitat likely to occur within area
<a href="#">Carduelis carduelis</a> European Goldfinch [403]		Species or species habitat likely to occur within area
<a href="#">Carduelis chloris</a> European Greenfinch [404]		Species or species habitat likely to occur within area
<a href="#">Columba livia</a> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<a href="#">Lonchura punctulata</a> Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
<a href="#">Passer domesticus</a> House Sparrow [405]		Species or species habitat likely to occur within area
<a href="#">Passer montanus</a> Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
<a href="#">Pycnonotus jocosus</a> Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
<a href="#">Streptopelia chinensis</a> Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
<a href="#">Sturnus vulgaris</a> Common Starling [389]		Species or species habitat likely to occur within area
<a href="#">Turdus merula</a> Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
<b>Frogs</b>		
<a href="#">Bufo marinus</a> Cane Toad [1772]		Species or species habitat likely to occur within area
<a href="#">Rhinella marina</a> Cane Toad [83218]		Species or species

Name	Status	Type of Presence
<b>Mammals</b>		
<a href="#"><u>Bos taurus</u></a> Domestic Cattle [16]		Species or species habitat likely to occur within area
<a href="#"><u>Canis lupus familiaris</u></a> Domestic Dog [82654]		Species or species habitat likely to occur within area
<a href="#"><u>Felis catus</u></a> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<a href="#"><u>Feral deer</u></a> Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
<a href="#"><u>Lepus capensis</u></a> Brown Hare [127]		Species or species habitat likely to occur within area
<a href="#"><u>Mus musculus</u></a> House Mouse [120]		Species or species habitat likely to occur within area
<a href="#"><u>Oryctolagus cuniculus</u></a> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<a href="#"><u>Rattus norvegicus</u></a> Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
<a href="#"><u>Rattus rattus</u></a> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<a href="#"><u>Vulpes vulpes</u></a> Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
<a href="#"><u>Alternanthera philoxeroides</u></a> Alligator Weed [11620]		Species or species habitat likely to occur within area
<a href="#"><u>Anredera cordifolia</u></a> Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
<a href="#"><u>Asparagus aethiopicus</u></a> Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
<a href="#"><u>Asparagus asparagoides</u></a> Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
<a href="#"><u>Asparagus plumosus</u></a> Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
<a href="#"><u>Asparagus scandens</u></a> Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
<a href="#"><u>Cabomba caroliniana</u></a> Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area



Name	Status	Type of Presence
<a href="#">Chrysanthemoides monilifera</a> Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
<a href="#">Chrysanthemoides monilifera subsp. monilifera</a> Boneseed [16905]		Species or species habitat likely to occur within area
<a href="#">Chrysanthemoides monilifera subsp. rotundata</a> Bitou Bush [16332]		Species or species habitat likely to occur within area
<a href="#">Cytisus scoparius</a> Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
<a href="#">Dolichandra unguis-cati</a> Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
<a href="#">Eichhornia crassipes</a> Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
<a href="#">Genista monspessulana</a> Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
<a href="#">Genista sp. X Genista monspessulana</a> Broom [67538]		Species or species habitat may occur within area
<a href="#">Lantana camara</a> Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
<a href="#">Lycium ferocissimum</a> African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
<a href="#">Nassella neesiana</a> Chilean Needle grass [67699]		Species or species habitat likely to occur within area
<a href="#">Opuntia spp.</a> Prickly Pears [82753]		Species or species habitat likely to occur within area
<a href="#">Pinus radiata</a> Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
<a href="#">Protasparagus plumosus</a> Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
<a href="#">Rubus fruticosus aggregate</a> Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
<a href="#">Sagittaria platyphylla</a> Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
<a href="#">Salix spp. except S. babylonica, S. x calodendron &amp; S. x reichardtii</a> Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
<a href="#">Salvinia molesta</a> Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<u>Senecio madagascariensis</u> Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
<u>Ulex europaeus</u> Gorse, Furze [7693]		Species or species habitat likely to occur within area

## Coordinates

-33.52891 151.19618

## Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- [Natural history museums of Australia](#)
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Department of Sustainability, Environment, Water, Population and Communities  
GPO Box 787  
Canberra ACT 2601 Australia  
+61 2 6274 1111