



ECOLOGICAL SITE APPRAISAL REPORT

STATE GOVERNMENT LAND MOONEY MOONEY PENINSULA EASTERN SITE

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

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

ABN 62 274 841 042

www.cegconsult.com

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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

DOCUMENT DETAILS

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Project Manager	Jacob Manners

EXECUTIVE SUMMARY

Project Background and Assessment Aims

This report has been prepared to identify the ecological characteristics of land within Lot 1 DP 107391, Lot 3 DP 239249, Lot 1 DP 431780, Lot 2 DP 431999, Lot 2 DP 597504, Lot 21 DP 836628, Lot 12 DP 863305 & Lots 1 & 2 DP 945014 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 14.5 hectares and is located on the eastern 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 (Intact and Canopy Only Variants) (4.9 ha)
- Exposed Hawkesbury Woodland (5 ha)
- Riverine Mangrove Scrub (0.1 ha); and
- Cleared / Disturbed Land (4.5 ha).

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

- Dry Sclerophyll Forest/Woodland Habitats (9.9 ha);
- Saline Wetland Habitats (0.1 ha); and
- Cleared / Disturbed Land Habitats (4.5 ha).

No threatened species, endangered populations or endangered ecological communities, 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 glaucophylla*
- *Darwinia peduncularis*
- *Epacris purpurascens* var. *purpurascens*
- *Genoplesium baueri*
- *Hibbertia procumbens*
- *Melaleuca deanei*
- *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 notable ecological value generally occur outside of areas which have been historically cleared for development. These areas contain one or more of the following:

- Intact naturally structured vegetation;
- Intact habitats suitable for threatened species; and/or
- Vegetated areas which contain or form buffers to wetland vegetation.

The existing disturbed and cleared areas of the site present the most suitable positions for future development with regard to ecological considerations. These areas consist of lands mapped as comprising Cleared/Disturbed Land and Canopy Only Vegetation.

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1. INTRODUCTION

1.1 Background

Conacher Environmental Group has been engaged to prepare an Ecological Site Appraisal Report at Lot 1 DP 107391, Lot 3 DP 239249, Lot 1 DP 431780, Lot 2 DP 431999, Lot 2 DP 597504, Lot 21 DP 836628, Lot 12 DP 863305 Pacific Highway & Lots 1 & 2 DP 945014, Point Road, 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.

TABLE 1.1 SITE DETAILS	
Location	Lot 1 DP 107391, Lot 3 DP 239249, Lot 1 DP 431780, Lot 2 DP 431999, Lot 2 DP 597504, Lot 21 DP 836628, Lot 12 DP 863305 Pacific Highway & Lots 1 & 2 DP 945014 Point Road, Mooney Mooney
Site Area	Approximately 14.5 hectares
Grid Reference	332825E 6288890N
Local Government Area	Gosford
Bioregion	Sydney Basin
Existing Land Use	The site currently contains a mix of institution buildings including dormitory complexes and various detached cottages with supporting offices, amenity and services buildings, residential dwellings and vacant bushland.
Current Zoning	Part 5(a) Special Uses 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.

TABLE 2.1 DATABASE SEARCHES CONDUCTED			
Database Searched	Purpose of Search	Date Viewed	Reference
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:

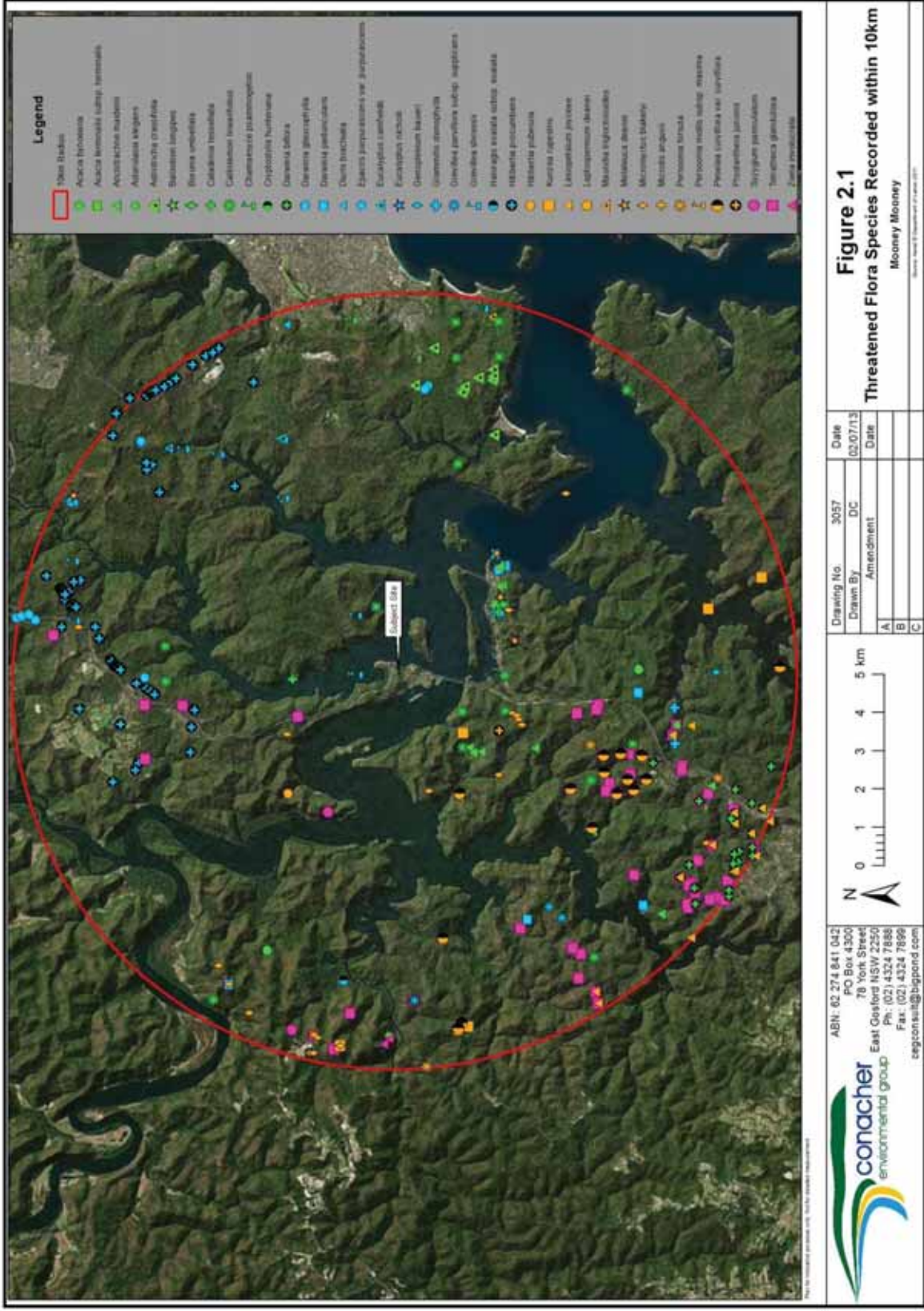
Figure 2.1: Threatened Flora Species Recorded within 10 km;

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

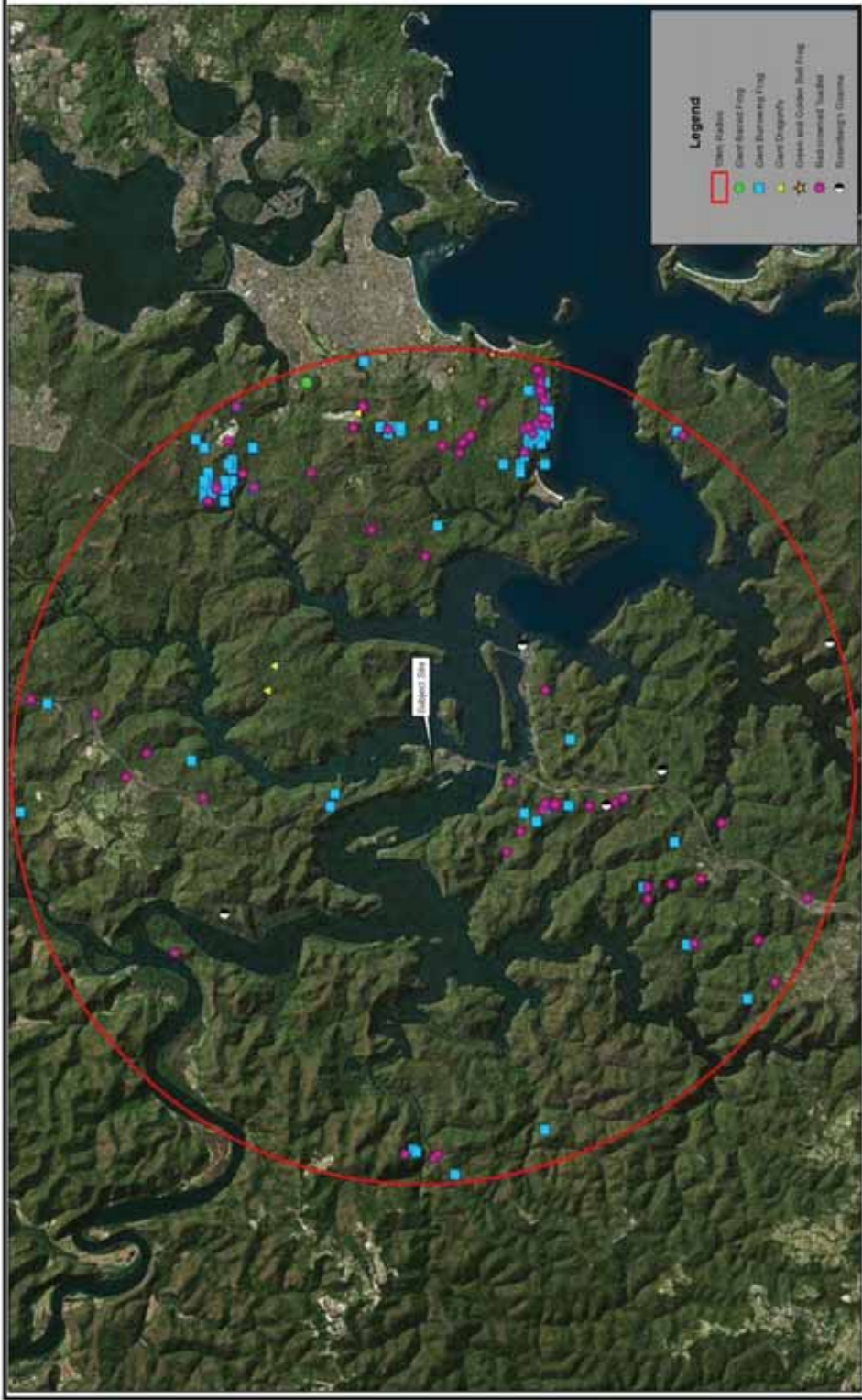
Figure 2.4: Threatened Bird Species Recorded within 10 km;


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.



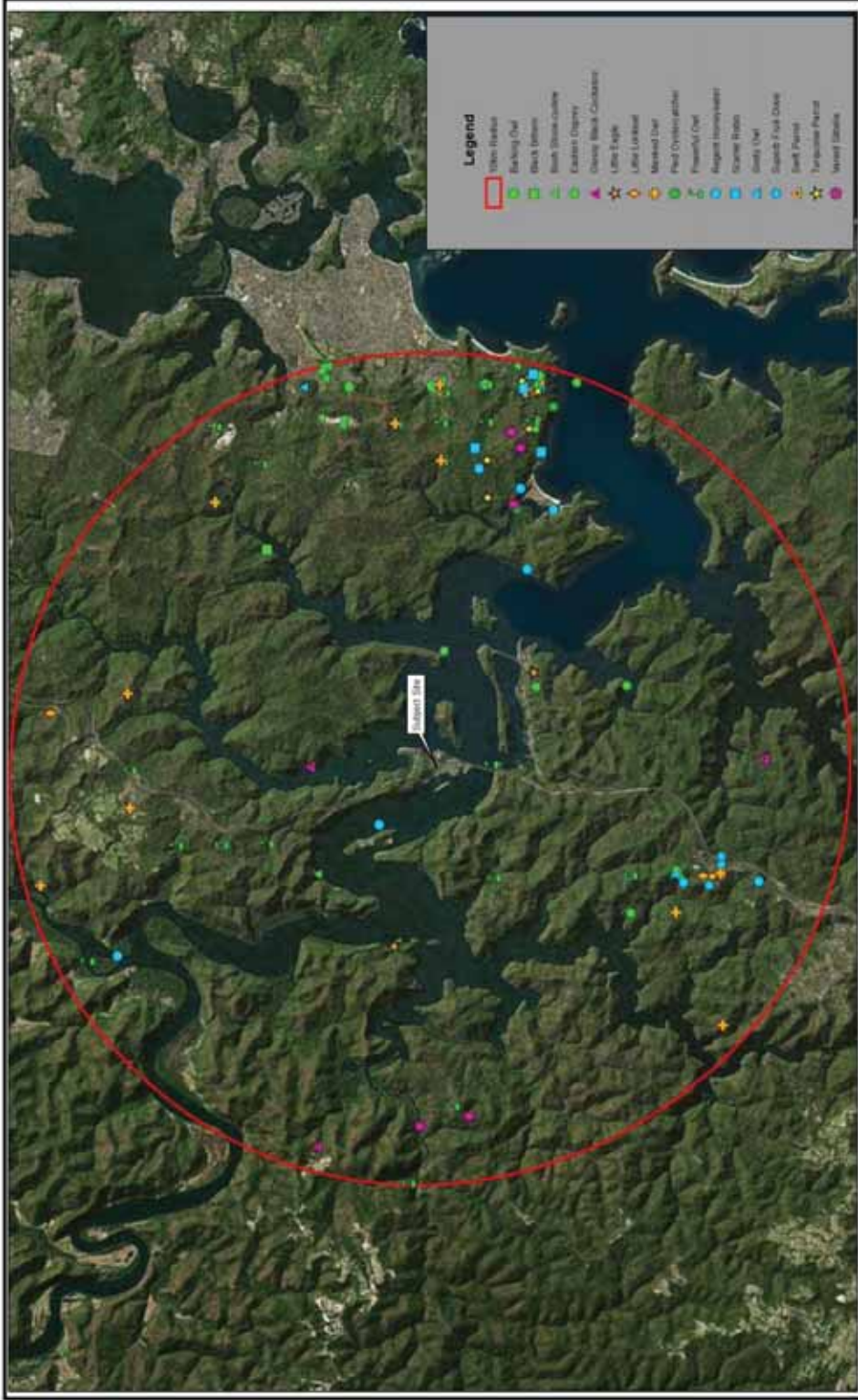
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 ABN: 62 274 841 042
 PO Box 4300
 78 York Street
 East Gosford NSW 2250
 Ph: (02) 4324 7888
 Fax: (02) 4324 7899
 ce@conacher.com.au

Drawing No. 3057
 Drawn By: DC
 Date: 02/07/13
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 Date:
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Figure 2.2
Threatened Amphibian, Reptile and Invertebrate Species Recorded within 10km
 Mooney Mooney
Mooney Mooney Peninsula




 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

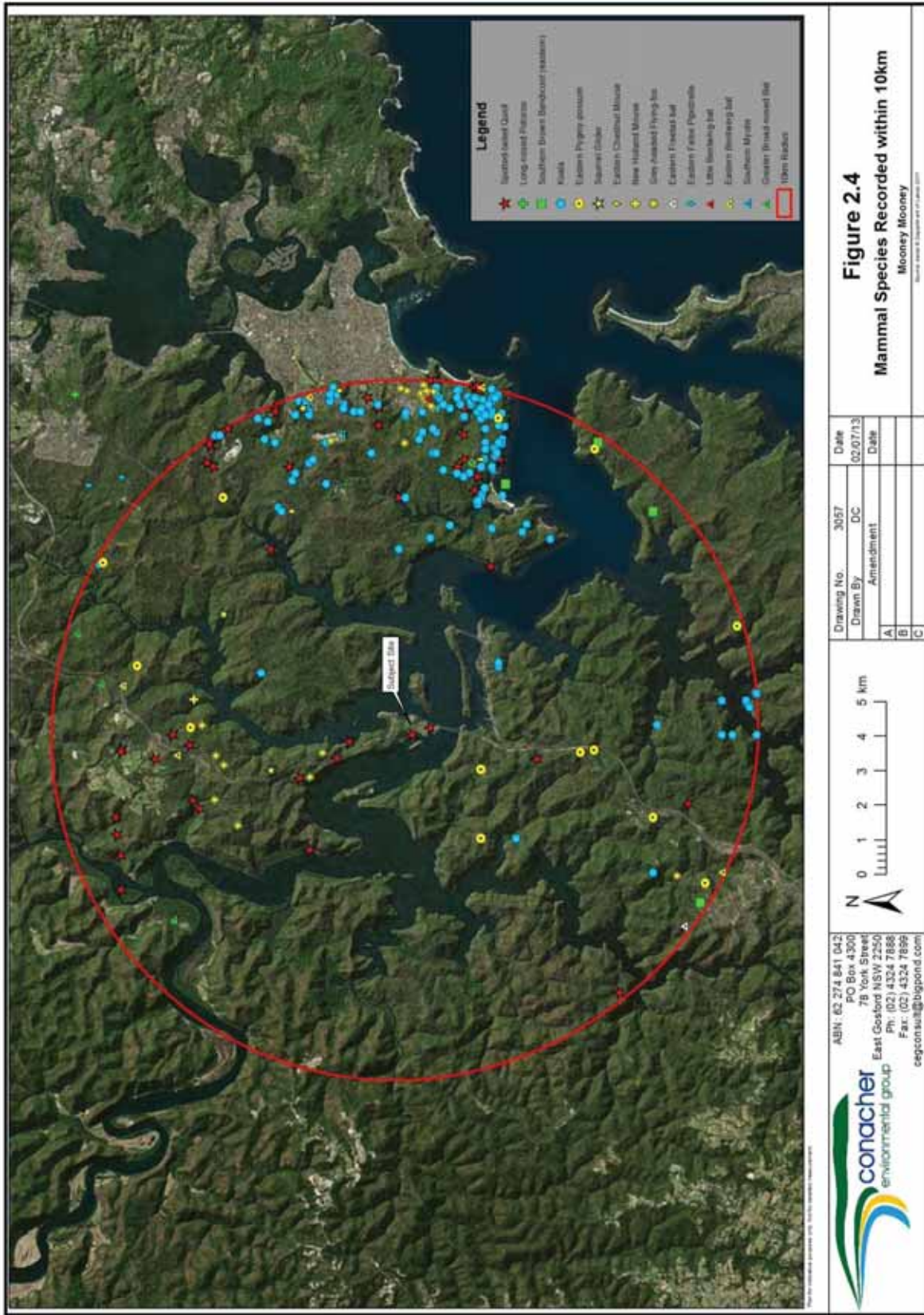
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0 1 2 3 4 5 km
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Figure 2.3
Threatened Bird Species Recorded within 10km
 Mooney Mooney



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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. The residential areas of the study area were not thoroughly searched due to difficulties with obtaining access, and observations from the roadside were instead undertaken.

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 two parcels of land located on either side of the Pacific Highway on the eastern side of the Mooney Mooney Peninsula. The topography is characterised by a steep hill in the north-western section of the site, which slopes east to tidal flats on the western bank of Mooney Mooney Creek. The site is located within the Gosford Local Government area in the Sydney Basin bioregion, it has a generally south-east facing aspect and covers approximately 14.5 hectares. The site is located within the Hawkesbury River Catchment and drainage is via overland flow directly to Mooney Mooney Creek.

The site has undergone disturbances associated with historical vegetation clearing and the subsequent construction of an institutional facility, school buildings and residential dwellings. A cleared access trail to a water tank is also present within the northern sections of the site.

The north-western sections of the site are mapped as the Watagan Soil Landscape which comprises the elevated vegetated areas of the site. In this area local relief low (40 to 80m) and slope gradients are gently to moderately inclined (10 to 25°). 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).

The central and eastern areas of the site mostly are mapped as the Erina Soil Landscape unit. 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).

A small portion of land along the eastern boundary of the site is mapped as the Mangrove Creek soil landscape which is characterised by low relief <3m, very gently inclined slopes and Holocene sediments of silty to peaty quartz sand, silt and clay. This portion of land is within the mangrove zone (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 (Intact and Canopy Only Variants)
- Exposed Hawkesbury Woodland
- 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:

Trees:	To 25 metres in height with 40% Projected Foliage Cover (PFC).
Sub-canopy	To 15 metres in height with 10% PFC.
Shrubs:	To 4 metres in height with 60% PFC.
Groundlayer:	To 1 metre in height with 50% PFC.

Floristics:

(Characteristic Species)

Trees:	<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).
---------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Sub-canopy:	<i>Allocasuarina torulosa</i> (forest oak) and <i>Ceratopetalum apetalum</i> (christmas bush).
Shrubs:	<i>Dodonaea triquetra</i> (hop bush), , <i>Persoonia linearis</i> (Narrow-leaved Geebung) and <i>Lantana camara</i> (lantana).
Groundlayer:	<i>Entolasia stricta</i> (wiry panic), <i>Themeda australis</i> (kangaroo grass), <i>Dianella caerulea</i> (blue flax-lily) <i>Lomandra longifolia</i> (Lomandra) and <i>Microlaena stipoides</i> (weeping grass).
Weeds:	<i>Lantana camara</i> (lantana), <i>Chloris gayana</i> (Rhodes grass) and <i>Erythrina X sykesii</i> (coral tree).

Weed Invasion:

Weed invasion is low on upper slopes, however is moderate to high on lower slopes due to the presence of exotic grasses and lantana in the understorey layer.

Disturbance:

The main source of disturbance observed was weed invasion.

Variation:

Higher levels of lantana are present on lower slopes and in sheltered areas of this community. A canopy only variant of this community also occurs, predominantly in the eastern areas of the study area, where remnant and regrowth eucalypts are present within residential areas.

Location and Distribution:

This community occurs predominantly in the central areas of the site. The intact variant (shown as 1a in Figure 3.1) occupies approximately 4.1 hectares and the Canopy Only variant (shown in Figure 3.1 as 1b) occupies approximately 0.8 hectares.

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 (Note: canopy only variant shown in foreground / intact vegetation shown in background)

EXPOSED HAWKESBURY WOODLAND

Structure:

Trees:	To 25 metres in height with 20% Projected Foliage Cover (PFC).
Sub-canopy	To 15 metres in height with 10% PFC.
Shrubs:	To 3 metres in height with 70% PFC.
Groundlayer:	To 0.5 metres in height with 70% PFC.

Floristics:

(Characteristic Species)

Trees:	<i>Corymbia gummifera</i> (bloodwood) and <i>Angophora costata</i> (smooth-barked apple).
Sub-canopy:	<i>Angophora bakeri</i> (narrow-leaved apple), <i>Banksia serrata</i> (old-man banksia) and <i>Allocasuarina littoralis</i> (black sheoak)
Shrubs:	<i>Persoonia linearis</i> (narrow-leaved geebung), <i>Leptospermum trinervium</i> (Flaky-barked Tea Tree), <i>Dodonaea pinnata</i> , <i>Kunzea ambigua</i> (tick bush), <i>Lambertia formosa</i> (mountain devil), <i>Acacia ulicifolia</i> (prickly moses), <i>Lomatia silaifolia</i> (crinkle bush).
Groundlayer:	<i>Entolasia stricta</i> (wiry panic), <i>Xanthorrhoea media</i> (grass tree), <i>Lomandra longifolia</i> (spiky-headed mat-rush) and <i>Pteridium esculentum</i> (bracken).
Weeds:	<i>Lantana camara</i> (lantana).

Weed Invasion:

Weed invasion is low within this community and is generally restricted to the understorey strata.

Disturbance:

The main source of disturbance observed was edge effects such as weed invasion and altered species composition on the edges of the vehicle track which intersects this community.

Variation:

The distribution of dominant species is variable within the understorey stratum in response to elevation and aspect.

Location and Distribution:

This community occurs within the north-western section of the site and occupies approximately 5 hectares as shown in Figure 3.1.

Classification:

This vegetation community corresponds to Map Unit 26 – Exposed Hawkesbury Woodland 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 3.1b – Exposed Hawkesbury Woodland 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.

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 along the eastern boundary of the site. This community occupies approximately 0.1 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

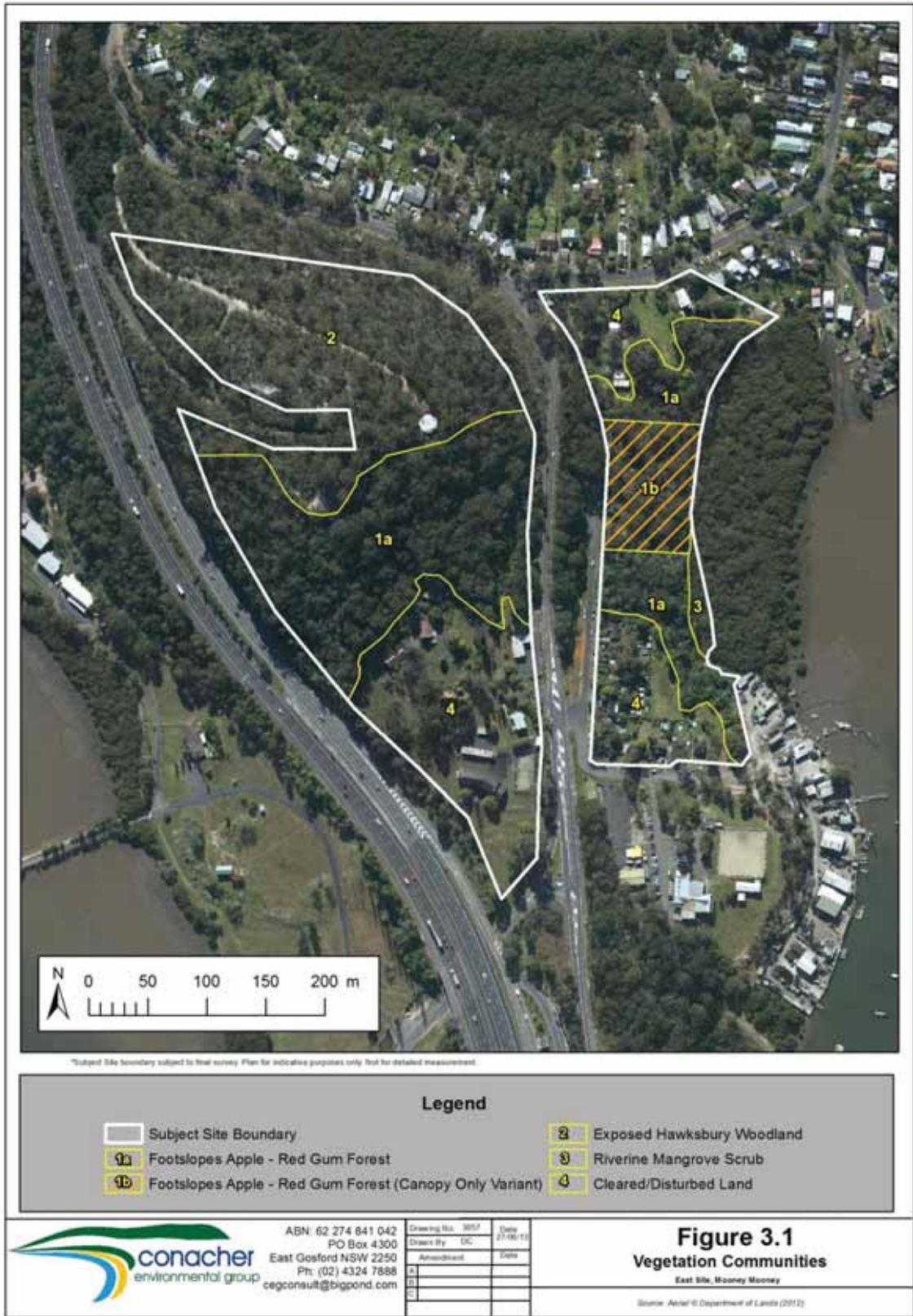
This vegetation type is present within the areas of the site which have been subject to extensive land clearing, associated disturbance and establishment of buildings and infrastructure and associated landscaping works.

These areas contain mostly exotic grasses, planted exotic trees and shrubs such as *Jacaranda mimosifolia* (jacaranda) *Nerium oleander* (oleander), *Erythrina x sykesii* (coral tree), *Cupressus* sp. (cypress) and *Pinus* sp. (Pine tree) and occasional remnant native trees characteristic of the adjoining natural vegetation types.

Cleared / Disturbed Land occurs across approximately 4.5 hectares of the site as shown in Figure 3.1.



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/Woodland Habitats;
- 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/ Woodland Habitats

This vegetation formation contains the following fauna habitat features:

- Hollow-bearing trees, including dead stags;
- Rock overhangs rocky outcrops;
- Large trees with basal cavities;
- Logs;
- 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*).

More open heathy woodland structured habitats are present within the elevated more exposed areas compared to the more densely forested habitats on sheltered lower slopes. 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 *A. costata* (smooth-barked apple), *C. gummifera* (bloodwood), *E. punctata* (grey gum) and *E. piperita* (sydney peppermint). *A. torulosa* (forest oak) and *A. littoralis* are present in moderate 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 vegetation within this community contains several heath species which provide a nectar foraging resource for fauna species and the groundlayer habitats are well structured and contain fallen branches, logs and leaf litter and rock outcrops and crevices. 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.

Saline Wetland Habitats

This vegetation formation contains the following fauna habitat features:

- Occasional hollow-bearing trees; and
- Mangrove vegetation and tidal flats.

This habitat type has a limited distribution within the site, however is part of a larger area of saline wetland habitats (riverine mangrove forest) which adjoins the eastern boundary of the site.

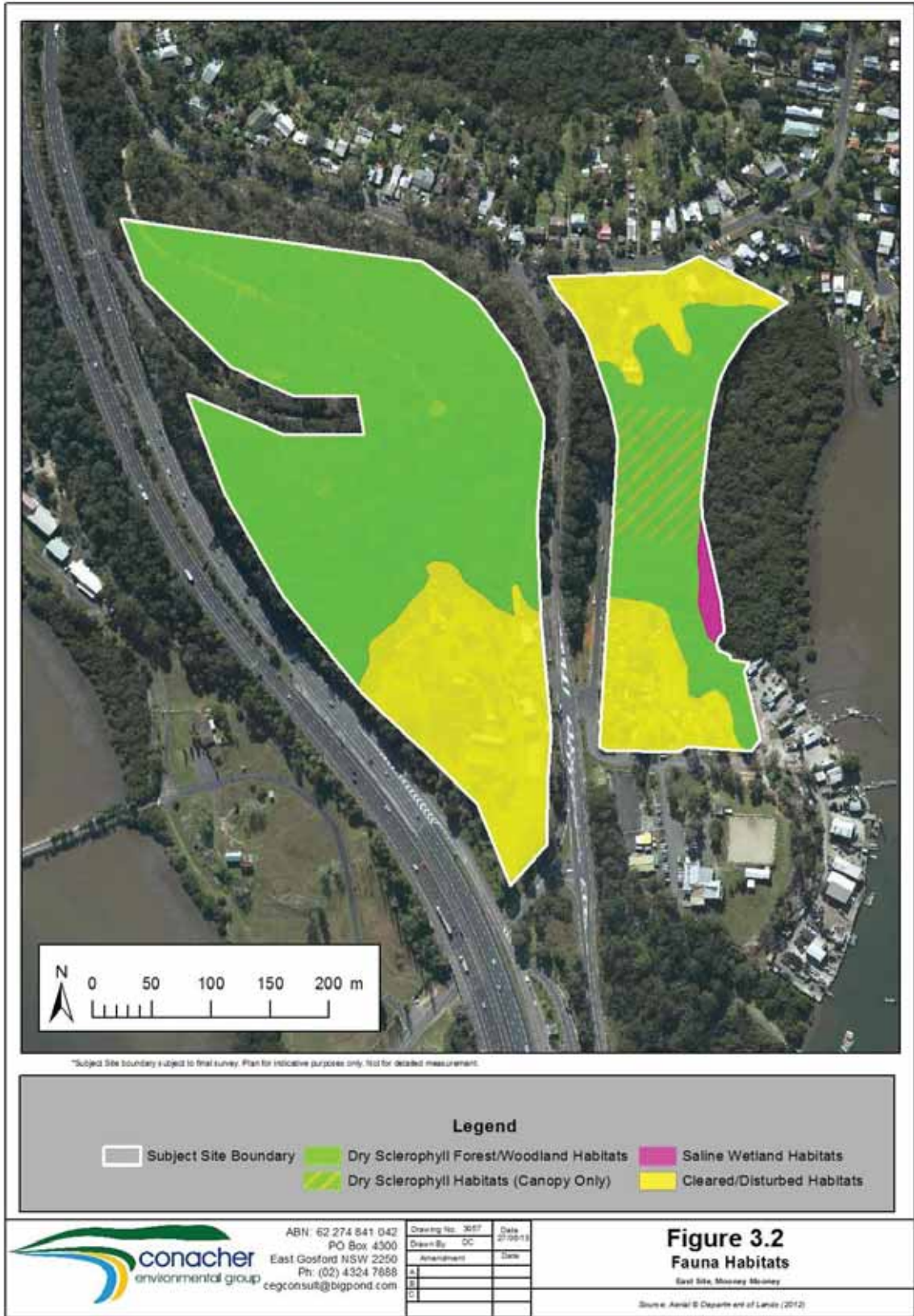
The fauna habitat types provided include sub-tidal estuarine habitats, small hollows in mangrove vegetation which provide potential roost sites for microchiropteran bat species and foraging habitats for various bird species including shorebirds.

Cleared / Disturbed Land Habitats

Cleared / Disturbed Land has resulted from significant site disturbances associated with clearing of native vegetation and the development of the site. 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 with Scattered Trees and Exotic Grassland:

- Seed and nectar producing tree and shrub species;
- Potential microchiropteran bat tree roosts and aerial foraging areas;
- Potential microchiropteran bat subterranean roosts (culverts and 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	-	Geology / Soils: Estuarine mud flats. Topography: Intertidal zone on the shores of estuaries and lagoons. Characteristic Species: <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	-	Geology / Soils: Periodically waterlogged acidic soils on Hawkesbury Sandstone. Topography: Impermeable sandstone plateaus in the headwater valleys of streams and on sandstone benches with abundant moisture seepage. Characteristic Species: Highly diverse and variable, includes scrubs, heaths, sedgelands 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	-	Geology / Soils: Silts, muds or humic loams. Topography: Depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. Characteristic Species: 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	-	Geology / Soils: Terrigal Formation of the Narrabeen Group. Soils are characterised by Yellow Podzolic Soils and Yellow Earths of the Erina Soil Landscape. Topography: 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
			Characteristic Species: <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> .	
Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions (LR)	E	CE	Geology / Soils: Sand dunes and on soils derived from underlying rocks Topography: Located near the seaoin coastal dunes, headland or riparian habitats. Characteristic Species: Comprises the <i>Cupaniopsis anacardioides</i> - <i>Acmena</i> spp. alliance of Floyd (1990).	No suitable habitat present.
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E	CE	Geology / Soils: High nutrient geological substrates, notably basalts and fine-grained sedimentary rocks. Topography: Coastal plains and plateaux, footslopes and foothills up to 600m ASL and within the Sydney basin below 350m ALS Characteristic Species: Principally encompasses the following groupings of Floyd (1990): <i>Argyrodendron trifoliatum</i> alliance (suballiances 1, 5 & 6); <i>Dendrocnide excelsa</i> - <i>Ficus</i> spp. alliance (suballiances 14 & 15); and <i>Drypetes australasica</i> – <i>Araucaria cunninghamii</i> alliance (suballiances 21 & 22).	No suitable habitat present.
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (PWSGF)	E	-	Geology / Soils: Shale-derived soils from Narrabeen series geology Topography: Undulating to rolling hills. Characteristic Species: <i>Corymbia maculata</i> and <i>Eucalyptus paniculata</i> .	No suitable habitat present.
River-Flat Eucalypt Forest on Coastal Floodplains of the North Coast, Sydney basin and South East Corner bioregions (REFCF)	E	-	Geology / Soils: Silts, clay-loams and sandy loams. Topography: Periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Characteristic Species: Eucalypt canopy with species belonging to the genus	No suitable habitat present.

TABLE 3.1 THREATENED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	TSC Act	EP&BC Act	Habitat Requirements	Comments
			Angophora or the sections Exsertaria or Transversaria of the genus Eucalyptus. Has low abundance of <i>E. robusta</i> , Casuarina and Melaleuca 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	-	Geology / Soils: Waterlogged or periodically inundated grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline. Topography: Flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Characteristic Species: <i>Casuarina glauca</i> .	No suitable habitat present.
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (SSFCF)	E	-	Geology / Soils: Waterlogged or periodically inundated humic clay loams and sandy loams. Topography: Alluvial flats and drainage lines associated with coastal floodplains. Characteristic Species: <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	-	Geology / Soils: Generally on the Warriewood and Tuggerah Soil Landscapes. Topography: Freshwater swamps in swales and depressions on sand dunes and low nutrient sandplain sites in coastal areas. Characteristic Species: <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	-	Geology / Soils: Found on a range of substrates including old sand dunes above cliffs and on basalt headlands, and less frequently on sandstone. Topography: Seacliffs and coastal headlands. Characteristic Species: <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	-	Geology / Soils: Holocene sediments of coastal sand. Iron podzols on the Woy Woy Soil Landscape. Topography: Sandplains on the Woy Woy Peninsula at Umina and Pearl Beach. Characteristic Species: <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				

No endangered ecological communities were observed within the subject site during surveys.

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 Exposed Hawkesbury Woodland and Footslopes Apple – Red Gum Forest communities.
<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 Exposed Hawkesbury Woodland and Footslopes Apple – Red Gum Forest communities.
<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 Exposed Hawkesbury Woodland and Footslopes Apple – Red Gum Forest communities.
<i>Astrotricha crassifolia</i>	V	V	Shrub to 2.4 m high. Grows in dry sclerophyll woodland on sandstone.	Suitable habitat present within Exposed Hawkesbury Woodland and Footslopes Apple – Red Gum Forest communities.
<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 Exposed Hawkesbury Woodland and Footslopes Apple – Red Gum Forest communities.
<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 Exposed Hawkesbury Woodland and Footslopes Apple – Red Gum Forest communities.
<i>Chamaesyce psammogeton</i>	E	-	Prostrate herb. Grows on coastal dunes.	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>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.
<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.	Suitable habitat present within Exposed Hawkesbury Woodland community.
<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 Exposed Hawkesbury Woodland and Foothslopes Apple – Red Gum Forest communities.
<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 Exposed Hawkesbury Woodland and Foothslopes Apple – Red Gum Forest communities.
<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 Exposed Hawkesbury Woodland and Foothslopes Apple – Red Gum Forest communities.
<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.

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 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.
<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> subsp. <i>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.	Suitable habitat present within Exposed Hawkesbury Woodland community.
<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 triglochoides</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.	Suitable habitat present within Exposed Hawkesbury Woodland community.

TABLE 3.3 THREATENED FLORA SPECIES OF THE AREA				
Scientific Name	TSC Act	EP&BC Act	Growth Form And Habitat Requirements	Habitat Suitability
<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.
<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 Exposed Hawkesbury Woodland and Foothills Apple – Red Gum Forest communities.
<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 shale/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 Exposed Hawkesbury Woodland and Foothills Apple – Red Gum Forest communities.
<i>Zieria involucreta</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 Exposed Hawkesbury Woodland and Foothills Apple – Red Gum Forest communities.
Key to TSC Act and EP&BC Act Status				
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				
Common Name Scientific Name	TSC Act	EP&BC Act	Preferred Habitat	Habitat Suitability and Likelihood of Occurrence
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"> No suitable habitats are present. Species is unlikely to occur within the site.
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"> Suitable habitat is present within Dry Sclerophyll Forest areas, particularly near the ephemeral watercourse. Moderate to high likelihood of occurrence.
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"> Suitable habitat is present within Dry Sclerophyll Forest areas, particularly near the ephemeral watercourse. Moderate to high likelihood of occurrence.
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"> No suitable habitats are present. Species is unlikely to occur within the site.
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"> Suitable habitat is present within Dry Sclerophyll Forest habitats, particularly near the watercourse area. High likelihood of occurrence.
Superb Fruit-Dove <i>Ptilinopus superbis</i>	V	-	Rainforests, adjacent mangroves, eucalypt forests, scrublands with native fruits.	<ul style="list-style-type: none"> Suitable habitats are present within the Dry Sclerophyll Forest and Saline Wetland habitat areas. Low likelihood of occurrence. Species may utilise the site on occasion.

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
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"> Suitable habitats are present within the Saline Wetland habitat areas. Low to moderate likelihood of occurrence. Species may utilise the site on occasion.
Black Bittern <i>Ixobrychus flavicollis</i>	V	-	Prefers permanent freshwater wetlands with tall, dense vegetation.	<ul style="list-style-type: none"> Suitable habitats are present within the Saline Wetland habitat areas. Species may utilise the site on occasion.
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"> Suitable habitats are present throughout the site. Moderate to high likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable roosting and nesting habitats are present throughout the site. High likelihood of occurrence. Species may utilise the site on occasion
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"> Suitable habitats are present throughout the site. Low likelihood of occurrence. Species may utilise the site on occasion.
Pied Oystercatcher <i>Haematopus longirostris</i>	E	-	Inhabits coastal beaches and estuarine flats.	<ul style="list-style-type: none"> Suitable habitats are present within the Saline Wetland habitat areas. Moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present throughout the site. Moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Moderate to high likelihood of occurrence. Species may utilise the site on occasion.

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
Swift Parrot <i>Lathamus discolor</i>	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts.	<ul style="list-style-type: none"> • Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas. • Low likelihood occurrence. • Species may utilise the site on occasion.
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"> • Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas. • Low likelihood occurrence. • Species may utilise the site on occasion.
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"> • Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas. • Moderate likelihood of occurrence. • Species may utilise the site on occasion.
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"> • Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas. • Moderate likelihood of occurrence. • Species may utilise the site on occasion.
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"> • Suitable habitats are present within the Dry Sclerophyll Forest areas. • Moderate likelihood of occurrence. • Species may utilise the site on occasion.
Masked Owl Tyto <i>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"> • Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas. • Moderate likelihood of occurrence. • Species may utilise the site on occasion.
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"> • No suitable habitats are present. • Species is unlikely to occur within the site.

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
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"> No suitable habitats are present. Species is unlikely to occur within the site.
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"> No suitable habitats are present. Species is unlikely to occur within the site.
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"> Subject site is located outside of species known range. Species is unlikely to occur within the site.
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"> Suitable habitats are present throughout the site. High to moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present within the Dry Sclerophyll Forest and Cleared / Disturbed Land areas. Moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Low to Moderate likelihood of occurrence. Species may utilise the site on occasion.
Southern Brown Bandicoot (eastern) <i>Isoodon 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"> Subject site is located outside of species known range. Species is unlikely to occur within the site.

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
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"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Low to Moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Moderate to high likelihood of occurrence.
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"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Low to Moderate likelihood of occurrence.
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"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Moderate likelihood of occurrence.
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"> No suitable habitats are present. Species is unlikely to occur within the site.
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"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Low to Moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present throughout the forested areas of the site. High likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present throughout the site. Moderate to high likelihood of occurrence.

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
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"> Suitable habitats are present throughout the site. Moderate to high 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"> Suitable habitats are present throughout the site. Moderate to high likelihood of occurrence.
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"> Suitable habitats are present throughout the site. Moderate to high likelihood of occurrence.
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"> Suitable habitats are present throughout the site. Moderate to high likelihood of occurrence.
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"> Suitable habitats are present throughout the site. Moderate to high likelihood of occurrence.
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"> No suitable habitats are present. Species is unlikely to occur within the site.
Key to TSC Act and EP&BC Act Status 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 listed 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"> Suitable habitats are present throughout the site. Moderate likelihood of occurrence.
Great Egret (<i>Ardea modesta</i>)	Wetland and estuarine habitats.	<ul style="list-style-type: none"> Suitable habitats are present within the Saline Wetland habitat areas. Low likelihood of occurrence. Species may utilise the site on occasion.
Cattle Egret (<i>Ardea ibis</i>)	Grazing lands and wetland habitats.	<ul style="list-style-type: none"> Suitable habitats are present within the Cleared / Disturbed Land areas. Low likelihood of occurrence. Species may utilise the site on occasion.
White-bellied Sea-eagle (<i>Haliaeetus leucogaster</i>)	Coastal areas and inland rivers and water bodies.	<ul style="list-style-type: none"> Suitable habitats are present within the forested areas. High likelihood of occurrence. Species may utilise the site on occasion. Observed during surveys.
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Almost exclusively aerial.	<ul style="list-style-type: none"> Suitable habitats are present throughout the site. Moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> Suitable habitats are present throughout the site. Moderate likelihood of occurrence. Species may utilise the site on occasion.
Black-faced Monarch (<i>Monarcha melanopsis</i>)	Wet sclerophyll and rainforest vegetation.	<ul style="list-style-type: none"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Moderate likelihood of occurrence. Species may utilise the site on occasion.
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"> No suitable habitat present. Species not likely to utilise the site.
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"> Suitable habitats are present throughout the site. Low to moderate likelihood of occurrence.

TABLE 3.5 LISTED MIGRATORY TERRESTRIAL FAUNA SPECIES OF THE AREA		
Common Name Scientific Name	Preferred Habitat	Comments
		<ul style="list-style-type: none"> Species may utilise the site on occasion.
Rufous Fantail (<i>Rhipidura rufifrons</i>)	Wet sclerophyll and rainforest vegetation.	<ul style="list-style-type: none"> Suitable habitats are present within the Dry Sclerophyll Forest areas. Moderate likelihood of occurrence. Species may utilise the site on occasion.
Latham's Snipe (<i>Gallinago hardwickii</i>)	Low dense vegetation within and surrounding freshwater wetlands.	<ul style="list-style-type: none"> No suitable habitat present. Species not likely to utilise the site.

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 eastern side of the Mooney Mooney peninsula. The site has tenuous connectivity to larger areas of vegetation to the north within Brisbane Water National Park.

Wildlife linkages through the site are limited by the F3 Freeway which adjoins the site to the west, mostly cleared land to the south and the mouth of Mooney Mooney Creek to the east.

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 western bank of Mooney Mooney Creek where it adjoins the Hawkesbury River. The site does not contain any mapped watercourses.

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).

Mooney Mooney Creek is a third order watercourse. It constitutes TYPE 1 Highly Sensitive Fish Habitat and CLASS 1 Major key Fish Habitat in accordance with NSW DPI (2013).

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

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

Threatened Fauna Species

- Giant Burrowing Frog
- Australasian Bittern
- Swift Parrot
- Spotted-tailed Quoll
- Koala
- Long-nosed Potoroo
- New Holland Mouse
- Grey-headed Flying-fox

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 glaucophylla*
- *Darwinia peduncularis*
- *Epacris purpurascens var. purpurascens*
- *Genoplesium baueri*
- *Hibbertia procumbens*
- *Melaleuca deanei*
- *Persoonia hirsuta*
- *Tetratheca 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

iii. Fisheries Management Act (1994)

The of 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 Mooney Mooney Creek as a third order watercourse is 30 metres from the top of bank. A VRZ of 30 metres is likely to be achievable for this site, however depending of the extent of future development proposed within the site, some areas may require a merits based assessment.

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

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:

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.

TABLE 4.1 SEPP-44 KOALA FEED TREE SPECIES (From SEPP-44 Schedule 2)			
Scientific Name	Common Name	Observed On Site	Percentage within survey plots
<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 notable ecological value which should be considered for retention generally contain one or more of the following attributes:

- Intact naturally structured vegetation;
- Intact habitats suitable for threatened species; and/or
- Vegetated areas which contain or form buffers to wetland vegetation.

In contrast the existing disturbed and cleared areas of the site present the most suitable positions for future development with regard to ecological considerations. These areas consist of lands mapped as comprising Cleared/Disturbed Land and Canopy Only Vegetation.

An area of Canopy Only vegetation is distributed within the site where residential dwellings are present in the area shown in Figure 3.1. This area contains a highly disturbed understorey, does not constitute intact naturally structured vegetation, and is unlikely to be a priority for retention.

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, 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, 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.
- 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 notable ecological value generally occur outside of areas which have been historically cleared for development and occur predominantly within the north-western and central areas of the site. These areas contain one or more of the following attributes:

- Intact naturally structured vegetation;
- Intact habitats suitable for threatened species; and/or
- Vegetated areas which contain or form buffers to wetland vegetation.

The remaining areas of the site generally consist of extensive cleared areas occupied by buildings, roads and areas of managed exotic grassland (5.3 hectares). These disturbed areas comprise the most suitable positions for future development with regard to ecological considerations and consist of lands mapped as Cleared/Disturbed Land and Canopy Only Vegetation. Due to the presence of native vegetation within the existing disturbed areas of the site, removal may be required, subject to approvals, to enable the future development of the site.

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APPENDIX 1

EP&BC ACT PROTECTED MATTERS SEARCH REPORT



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

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[Acknowledgements](#)



This map may contain data which are
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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](#).

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	74
Listed Migratory Species:	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.

Commonwealth Land:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	58
Whales and Other Cetaceans:	10
Critical Habitats:	None
Commonwealth Reserves:	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
Natural		
Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves	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
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area

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

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

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

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

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

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

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

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

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

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

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

Name	Status	Type of Presence area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. 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
Natural		
Hawkesbury Reserve (former)	NSW	Indicative Place
Marramarra National Park	NSW	Indicative Place
Big Bay Marramarra Creek Area	NSW	Registered
Brisbane Water National Park (1981 boundary)	NSW	Registered
Dharug National Park (1978 boundary)	NSW	Registered
Ku-ring-gai Chase National Park (1980 boundary)	NSW	Registered
Long Island Nature Reserve	NSW	Registered
Muogamarra Nature Reserve	NSW	Registered
Spectacle Island Nature Reserve	NSW	Registered
Indigenous		
The Whale Feast Engraving Site	NSW	Registered
Historic		
Bar Island Cemetery Precinct	NSW	Indicative Place
Broken Bay Entrance Foreshores Cottages	NSW	Indicative Place
Lone grave of Frances Peat	NSW	Indicative Place
Hawkesbury River Rail Bridge	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
North East NSW RFA	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
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
Rhinella marina Cane Toad [83218]		Species or species

Name	Status	Type of Presence
Mammals		
<u>Bos taurus</u> Domestic Cattle [16]		Species or species habitat likely to occur within area
<u>Canis lupus familiaris</u> Domestic Dog [82654]		Species or species habitat likely to occur within area
<u>Felis catus</u> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<u>Feral deer</u> Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
<u>Lepus capensis</u> Brown Hare [127]		Species or species habitat likely to occur within area
<u>Mus musculus</u> House Mouse [120]		Species or species habitat likely to occur within area
<u>Oryctolagus cuniculus</u> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<u>Rattus norvegicus</u> Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
<u>Rattus rattus</u> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<u>Vulpes vulpes</u> Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
<u>Alternanthera philoxeroides</u> Alligator Weed [11620]		Species or species habitat likely to occur within area
<u>Anredera cordifolia</u> 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
<u>Asparagus aethiopicus</u> Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
<u>Asparagus asparagoides</u> Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
<u>Asparagus plumosus</u> Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
<u>Asparagus scandens</u> Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
<u>Cabomba caroliniana</u> 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
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara 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
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S. babylonica, S. x calodendron & S. x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta 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