

**Gales-Kingscliff Pty Ltd**

ABN: 75 093 540 080

# **Cudgen Lakes Sand Extraction Project**

## **Fauna Assessment**

Prepared by

**Kendall & Kendall Ecological Services Pty Ltd**

**April 2008**

**Specialist  
Consultant  
Studies  
Compendium**

**Part 5**



# Gales-Kingscliff Pty Ltd

ABN: 75 093 540 080

## Cudgen Lakes Sand Extraction Project

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### Fauna Assessment

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**April 2008**

## **FOREWORD**

This report is a fauna assessment for the Cudgen Lakes Sand Extraction Project. The report has been prepared for R.W. Corkery and Co. Pty. Limited on behalf of Gales-Kingscliff Pty Ltd. The report provides an assessment of the impact of the Project on the fauna that occur throughout the Study Area and an assessment of the impact of the Project on Threatened species considered likely to occur within the Study Area or in the vicinity of the Study Area.

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The information presented in this report is based on an objective study undertaken in response to a brief provided by the client. While every attempt has been made to ensure the accuracy and objectivity of the report, the variability of the natural environment and the paucity of comparative research data may require that professional judgment be applied in reaching conclusions.

Any opinions expressed in the report are the professional opinions of the author. They are not intended to advocate any specific project or position.

Keith Kendall

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## EXECUTIVE SUMMARY

This report is a fauna assessment for the Cudgen Lakes Sand Extraction Project. The report has been prepared for R.W. Corkery and Co. Pty. Limited on behalf of Gales-Kingscliff Pty Ltd. The report provides an assessment of the impact of the Project on the fauna that occur throughout the Study Area and an assessment of the impact of the Project on Threatened species considered likely to occur within the Study Area or in the vicinity of the Study Area.

A search of the NSW Department of the Environment and Conservation, now Department of Environment and Climate Change (DECC) Threatened species website for the Murwillumbah subregion of the Northern Rivers Catchment Management Authority area and a search of the DECC wildlife atlas for the Tweed Heads and Murwillumbah 1:100 000 map sheets on 20 September 2005, 20 February 2006 and 9 March 2007 indicate the possible occurrence of a number of species listed as Threatened under the *Threatened Species Conservation Act 1995* (TSC Act) in the vicinity of the Study Area. Assessment of the habitats present within the Study Area provided a ranking of the likely occurrence of these species on and near the Study Area.

Two field surveys identified the occurrence of approximately 150 vertebrate fauna species and approximately 20 invertebrate fauna species on, over or near the Study Area. The Study Area has been defined as the Project Site and the proposed and alternative northern and eastern pipeline corridors. The first field survey conducted in May 2005 covered the Project Site and the proposed northern pipeline corridor; the second field survey conducted in November 2006 provided information relevant to the proposed and alternative eastern pipeline corridor. Of the approximately 170 fauna species recorded:

- 132 are protected under the schedules of the *National Parks and Wildlife Act 1974* (NPW Act);
- seven are listed as vulnerable species on Schedule 2 of the TSC Act, with a further two vulnerable species on Schedule 2 of the TSC Act identified to a probable level of confidence by Anabat bat call analysis;
- 19 are listed under the migratory provision of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- eight are introduced feral vertebrate species; and
- one fauna species listed under the Threatened species provisions of the EPBC Act was recorded.

It is considered that past land uses have severely modified the fauna habitat within the Project Site and proposed northern pipeline corridor to the extent this area has little native fauna habitat value. Nevertheless impact assessments using the Part 3A Draft Guidelines for Threatened Species Assessment and Threatened Species Assessment Guidelines – The Assessment of Significance have been prepared for TSC Act Threatened species likely to occur on or in the vicinity of the Project Site and proposed northern pipeline corridor. These assessments indicate that the Project will not have a significant impact on these species.

Likewise, an assessment using the “Environmental Guidelines” under the EPBC Act assessed the impact of the Project on migratory and Threatened species recorded on or in the vicinity of the Project Site and proposed northern pipeline corridor or considered likely to occur on or near the Project Site and proposed northern pipeline corridor indicated that the Project would not cause a significant impact on these species and hence the referral of the Project to the federal Environment Minister is not considered necessary.

An alternative northern pipeline corridor has also been identified and is located to the west of Tweed Coast Road through cleared areas. At this stage, assessment of this alternative corridor has not been completed, however, considering that no vegetation would be cleared and the pipeline would be laid across the ground surface, no significant impacts on Threatened or migratory species are expected.

Vegetation removal along the proposed eastern pipeline corridor is subject to development consent under a separate development application for the construction of a proposed haul road. If this approval is granted, vegetation along the route of the proposed road would be removed under that consent. In other words, vegetation would not need to be removed for construction of the proposed eastern pipeline. Therefore, no significant impacts on Threatened or migratory species are expected.

Likewise, an assessment using the “Environmental Guidelines” under the EPBC Act assessed the impact of the Project on migratory and Threatened species recorded on or in the vicinity of the proposed eastern pipeline corridor or considered likely to occur on or near the proposed eastern pipeline corridor indicated that the Project would not cause a significant impact on these species and hence the referral of the Project to the federal Environment Minister is not considered necessary.

An alternative eastern pipeline corridor has also been identified to the north of the proposed corridor that is located in a substantially cleared area. As for the alternative northern pipeline corridor, at this stage, assessment of this alternative eastern pipeline corridor has not been completed, however, considering that no vegetation would be cleared and the pipeline would be laid across the ground surface, no significant impacts on any Threatened or migratory species are expected.

It is considered that the Study Area does not contain potential Koala habitat as defined in the *NSW State Environmental Planning Policy (Koala Habitat Protection)* No. 44 (SEPP 44).

# **1 INTRODUCTION**

## **1.1 Aims and Objectives**

This assessment has been commissioned by R. W. Corkery and Co. Pty. Limited on behalf of Gales-Kingscliff Pty Ltd (the “Proponent”).

The aim of this report is to describe the fauna and fauna habitat of the area to be modified by the Cudgen Lakes Sand Extraction Project (the “Project”) and adjoining areas and to examine the potential for the occurrence of Threatened species or populations, or their habitats. This report also includes an assessment meeting the requirements of State Environmental Planning Policy (SEPP) 44 (Koala Habitat Protection).

Specific objectives of this study are to:

- review Threatened fauna species and population records in the locality of the Study Area and other available existing information;
- conduct a fauna survey using specified techniques;
- describe the fauna habitats within and surrounding the Project Site and any connecting fauna habitats, and identify their conservation significance;
- identify any possibly occurring Threatened fauna species or Threatened populations, or critical habitat present, in the Study Area, that are listed by the NSW *Threatened Species Conservation Act 1995* (TSC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- conduct a SEPP 44 Koala habitat assessment;
- assess the impact of the Project on fauna that occupy the Study Area; and
- assess the impact of the Project on Threatened and migratory fauna listed under the provisions of either the TSC Act or EPBC Act that occur on or in the vicinity of the Study Area or are considered likely to occur within the Study Area.

This report should be read in conjunction with the flora assessment conducted by Idyll Spaces (2008 – see Part 4 of the *Specialist Consultant Studies Compendium*).

## **1.2 Project Site, Study Area and Locality**

The Project Site covers an area of 67ha which includes:

- a 9ha extraction site north of Altona Drive (‘northern extraction site’);
- a 37ha extraction site south of Altona Drive (‘southern extraction site’); and
- a processing area north of Altona Drive covering an area of 3.7ha.

Two pipeline corridors are also proposed extending north and east from the southern extraction site. These are referred to as the “northern pipeline corridor” (0.8km in length) and the “eastern pipeline corridor” (1.5km in length). The proposed northern pipeline corridor would be located in the road reserve on the western side of Tweed Coast Road. The proposed eastern pipeline corridor would be located within the road reserve for a proposed subdivision road within land owned by the Proponent.

It is acknowledged that the proposed road has not yet been approved. Therefore, an alternative eastern pipeline corridor has been proposed in the event that the proposed road is not approved within a suitable timeframe. An alternative northern pipeline has also been proposed in the event that suitable agreements are reached with an adjoining landholder.

The Project Site and the proposed pipeline corridors and alternative pipeline corridors for the purposes of this fauna assessment are collectively referred to as the Study Area. **Figure 1** shows the Project Site and Study Area, **Figure 2** shows the Project Site and proposed pipeline corridors within the local setting and **Figure 3** shows the layout of the Project Site.

Throughout this report there are numerous references to “the locality” which for the purposes of this assessment is defined as the area generally within approximately 10km of the Study Area.

The extraction sites and processing area are located within Lot 21 DP 1082482 and Lot 2 DP 216705 together with the existing road reserve for Altona Drive. The proposed northern pipeline corridor commences adjacent to the northeastern boundary of Lot 21 DP 1082482, is aligned for a distance of approximately 450m adjacent to the western side of Tweed Coast Road and then crosses Tweed Coast Road ending on the boundary of Lot 1 DP 1075645. The proposed eastern pipeline corridor commences adjacent to the eastern boundary of Lot 21 DP 1082482, crosses Tweed Coast Road and traverses Lots 1 and 3 DP 828298, Lot 26C and 26D DP 10715, Lot 11 DP 871753 and the road reserve situated between Lot 26D DP 10715 and Lot 11 DP 871753 before crossing Elrond Drive and Turnock Street.

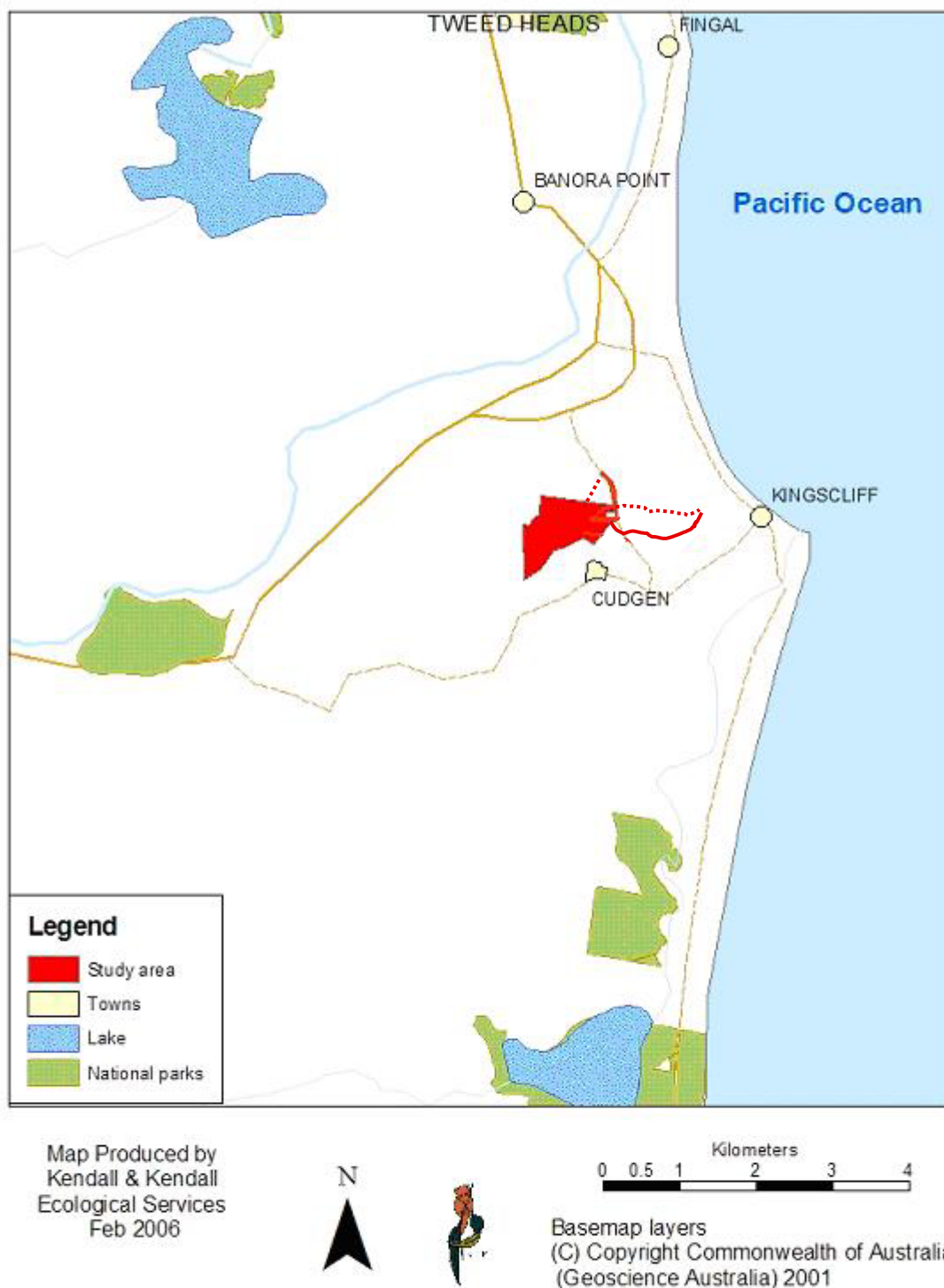
The Project Site and Pipeline corridors are located within the County of Rous and the Tweed Local Government Area.

The Study Area consists of the Project Site and the proposed northern and proposed eastern pipeline corridors.

## 2 DESCRIPTION OF THE PROJECT

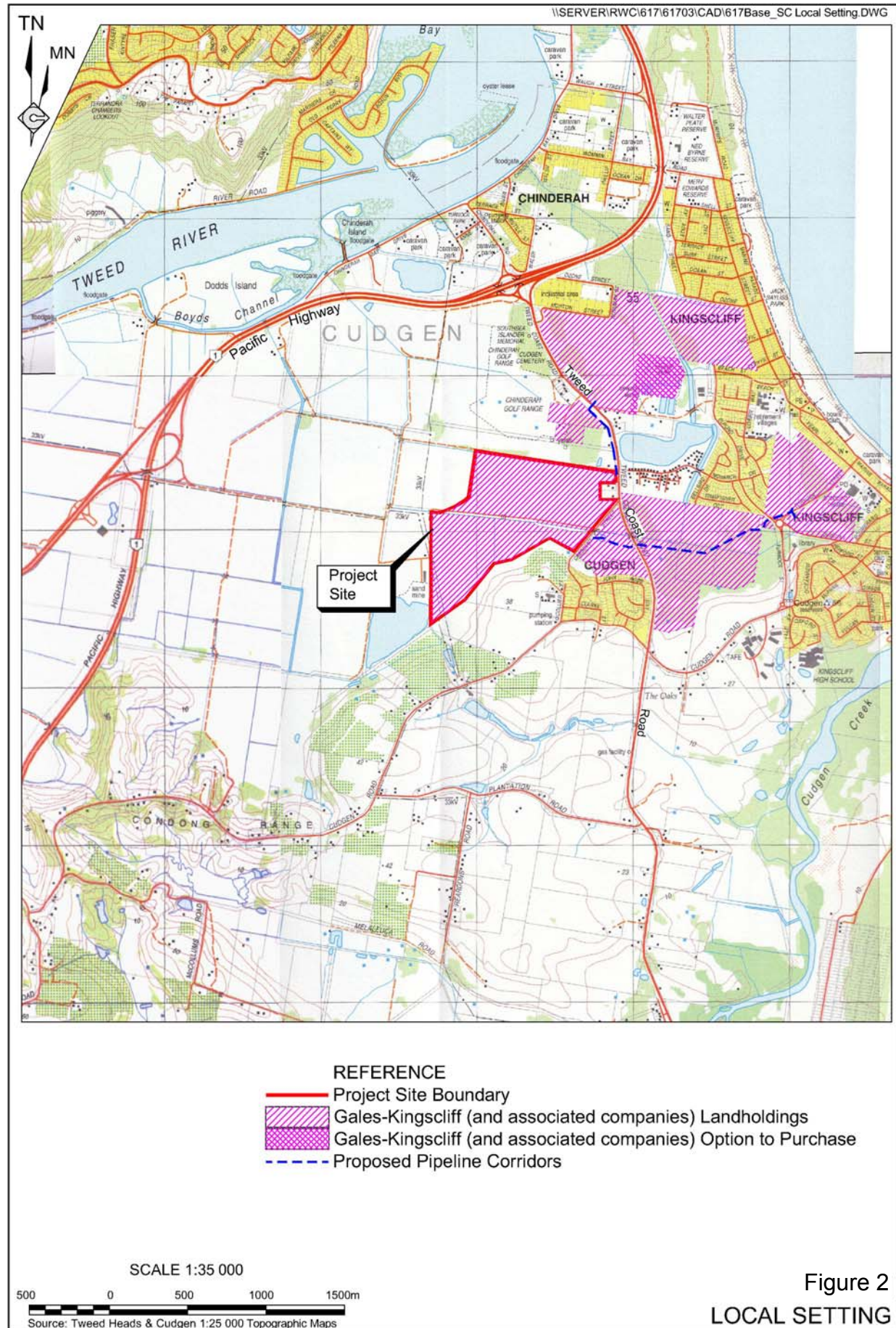
The Proponent proposes to develop and operate a sand extraction operation to supply fill sand to a number of nominated fill sites via two pipeline corridors and to produce a range of sand products for sale to the local construction industry. The Project would also be appropriately licensed to accept virgin excavated natural material (VENM) which would be used in production of saleable sand products, used to backfill the northern extraction pond or interned at the base of the southern extraction pond. The Project would involve the removal of approximately 5 000 000m<sup>3</sup> of sand over a period of 15 to 20 years.

The operation has been designed to optimise the recovery of sand whilst at the same time addressing and managing the environmental constraints within and surrounding the Project Site. As the Project proceeds, the northern extraction pond would be progressively backfilled to ultimately form sporting fields and recreational facilities and finalised sections of the southern extraction pond would be progressively rehabilitated in order to form a recreational lake and surrounding parklands.



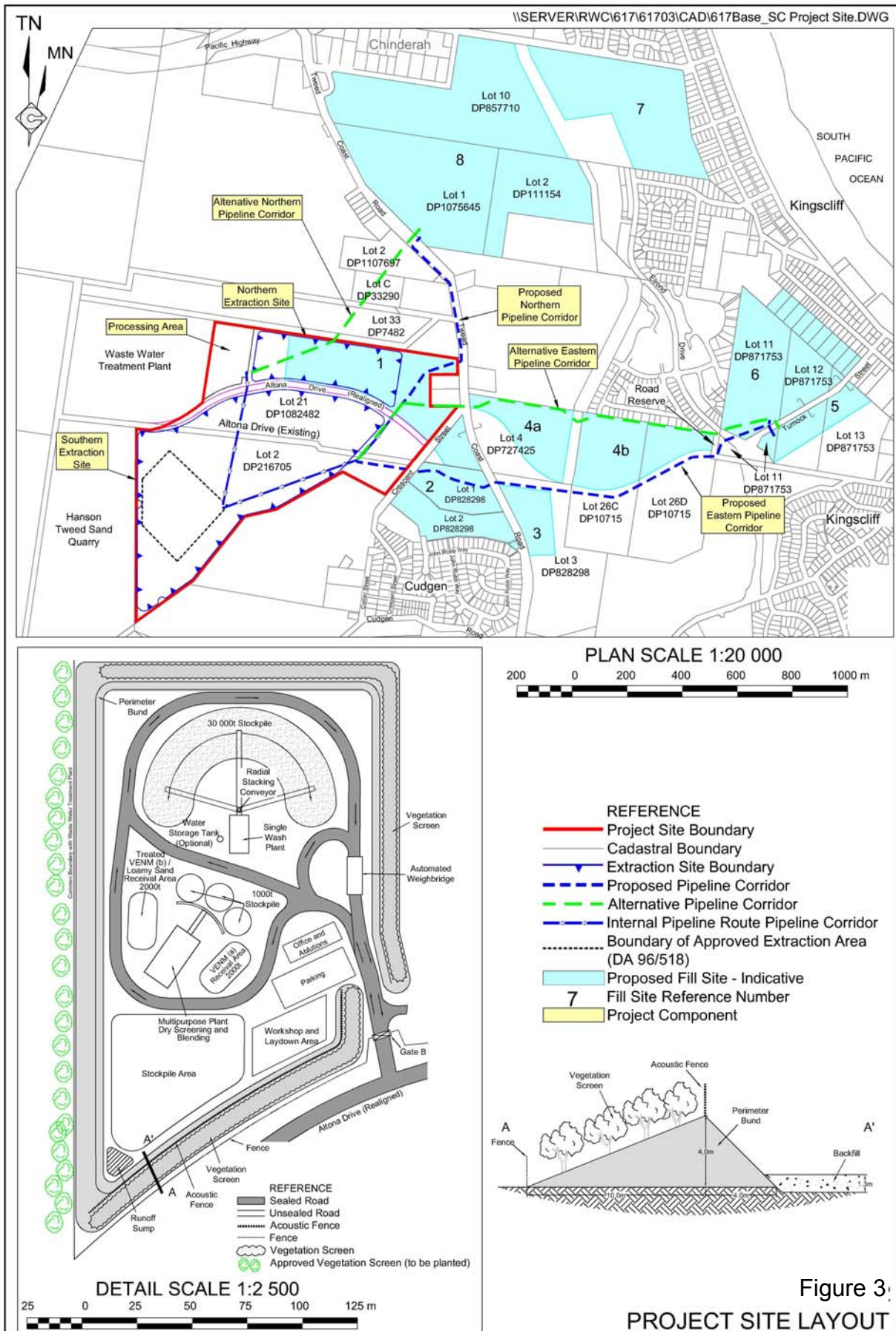
**Figure 1**  
**Location of Study Area**





Note: A colour version of this figure is available on the Project CD.





Note: A colour version of this figure is available on the Project CD.

Construction and site establishment would occur over an approximately 3 month period in which three site entrances and internal roads would be constructed together with the processing plants, offices, workshop and perimeter bunding. The dredge, pipelines to the processing area, pumps and other equipment would also be installed during the construction period. Construction activities would occur between 7:00am and 6:00pm Monday to Friday and 7:00am to 1:00pm Saturday.

The extraction sequence would involve: stripping of topsoil; formation of bunds; and extraction of the sand resource (loamy sand and fine grained sand). Extraction of all material within the northern extraction site would be undertaken over four stages progressing east to west to a depth of approximately 5m using excavator and trucks.

Within the southern extraction site extraction would occur over 10 stages, generally progressing west to east. Extraction would occur to the depth of the resource, typically 20m below current ground level with the upper loamy sand material extracted using an excavator and the remaining fine grained sand material extracted using a cutter-suction dredge.

The upper loamy sand material would be treated using alkaline amendments, such as agricultural lime, prior to being transferred to the processing area for production of various construction materials, such as mortar sand. The fine grained sand material would either be trucked or pumped to the processing area and washed to remove oversize and undersize materials, producing construction grade sand, or be pumped to a nominated fill site for use as fill material. All fines separated during processing or returned from the fill sites would be returned to the base of either the northern or southern extraction pond.

All soil removal and excavation of sand (ie. mechanical removal) would occur between 7:00am and 6:00pm Monday to Friday and 7:00am to 1:00pm Saturday. Dredging and pumping of sand to the processing area, and processing activities, would occur between 6:30am and 10:00pm Monday to Friday and 7:00am to 4:00pm Saturday whilst dredging of sand for pumping to fill sites would occur between 6:30am and 6:30pm Monday to Friday and 7:00am to 1:00pm Saturday.

Sand to be used as a filling material to raise the level of various parcels of land in the Kingscliff, Chinderah and Cudgen areas would be pumped hydraulically to the fill sites from the southern extraction site as a sand / water slurry. Water draining from the sand at the fill sites would be pumped back to the southern extraction pond. The Proponent intends to use up to two enclosed staging pumps beyond the dredge to convey the sand to the fill sites, one located within the Project Site and one within each pipeline corridor. Pumping would only occur along one corridor at a time. Up to 450 000m<sup>3</sup> of sand could be pumped annually to the fill sites.

Based on maximum annual sales of 300 000tpa the average number of product truck movements on any weekday or Saturday would be approximately 100 and 60 respectively (50 and 30 loads). As sales would vary from day to day, the 85<sup>th</sup> percentile number of product truck movements on the local roads on a busy weekday or Saturday would be 130 and 80 respectively (65 and 40 loads). Based on the importation and receipt of up to 45 000tpa of VENM, it is estimated that the incoming VENM would generate approximately 24 truck movements (12 loads) per week. The 85<sup>th</sup> percentile volume has been estimated at 32 truck movements (16 loads) per day.

In total, it is assumed, once the Project is fully operational, the despatch of products and importation of VENM would generate up to 124 truck movements (62 loads) per day on an average day. All product distribution and VENM receipt would occur between 7:00am to 6:00pm Monday to Friday and 7:00am to 1:00pm Saturday.

Both non acid generating VENM - VENM(a) and acid producing VENM – VENM(b) would be received at the Project Site via road trucks, appropriate details recorded and the material classification verified. VENM(a) would either: be processed to produce saleable products or used to backfill the northern extraction pond or finalised edges of the southern extraction pond. VENM(b) which is suitable for processing would be placed adjacent to the southern extraction pond for treatment, as for the loamy sand material, prior to processing. VENM(b) not suitable for processing would be either used to backfill the northern extraction pond or interned at the base of finalised sections of the southern extraction pond.

All VENM delivered to the Project Site and processed materials despatched from the processing area would be transported via Altona Drive, Crescent Street and Tweed Coast Road. Access to the Project Site would be provided via three entrances off Altona Drive, one to the processing area and northern extraction site and two to the southern extraction site.

The Proponent would adopt a progressive approach to site landscaping and rehabilitation to ensure that, wherever possible, disturbed areas are either temporarily or permanently stabilised to limit erosion and adverse visual impacts. An important component of the rehabilitation of the Project Site would be the progressive backfilling of selected finalised sections of the shore of the southern extraction pond and introduction of native vegetation to create wetland areas and parklands. The construction of recreational facilities such as walking and equestrian / cycling tracks would occur following completion of sand extraction activities. The final lake would have a depth of up to 20m and cover an area of approximately 37ha.

### **3 METHODOLOGY**

#### **3.1 Background Research**

Records of fauna species known to occur within the locality were obtained under license from the NSW Department of the Environment and Conservation, now the NSW Department of Environment and Climate Change (DECC) wildlife atlas database (17 February 2006 and 9 March 2007). Significant fauna or fauna species habitat potentially occurring within 5km of the Study Area were obtained from the Commonwealth Department of the Environment and Water Resources (DEWR) web site (<http://www.environment.gov.au/erin/ert/epbc/index.html> initially on 20th February 2006 and updated on 6th March 2007).

Current schedules of the TSC Act and the EPBC Act, the existence of any relevant Threatened species recovery or threat abatement plans, and preliminary determinations, were reviewed online.

#### **3.2 Field Surveys**

Two field surveys were conducted for the Project. The initial survey concentrated on the Project Site and proposed northern pipeline corridor whilst the second survey concentrated on the proposed eastern pipeline corridor.

##### **3.2.1 Project Site and Northern Pipeline Field Survey**

The majority of fauna survey techniques were implemented between 9 May 2005 and 13 May 2005. These being:

- 20 tree mounted Elliott traps set over 4 nights;
- 20 hair tubes set over 4 nights;

- 20 ground placed Elliott traps set over 4 nights;
- 6 cage traps set over 4 nights;
- nocturnal call playbacks of the powerful owl, masked owl, barking owl; grass owl, yellow-bellied glider, Koala and squirrel glider played on 4 nights, with additional call playbacks of the grass owl played on 10 and 11 December 2005 and 4 March 2004. Note that the powerful owl, masked owl, barking owl; yellow-bellied glider, Koala and squirrel glider are not considered likely to occur within the Study Area, however, whilst on site the opportunity was taken to survey for these species;
- spotlighting on 4 nights incorporating nocturnal herpetology searches;
- 30 minutes anabat recording for microbats over 2 nights;
- opportunistic identification of birds and bird calls;
- diurnal and nocturnal herpetology searches; and
- searching for sign of significant fauna.

The locations of survey methodologies are indicated on **Figure 4**. The majority of the survey methodologies were implemented on the area defined as the Project Site with some methodologies implemented on the proposed northern pipeline corridor.

At sites 1, 2 and 3 a number of methodologies were implemented including Elliott and cage trapping, hair tubing and herpetology searches. An additional herpetology search was conducted at a large pile of rubbish at the location indicated on **Figure 4**.

No harp trapping was implemented, as the Project Site does not contain suitable harp trapping sites.

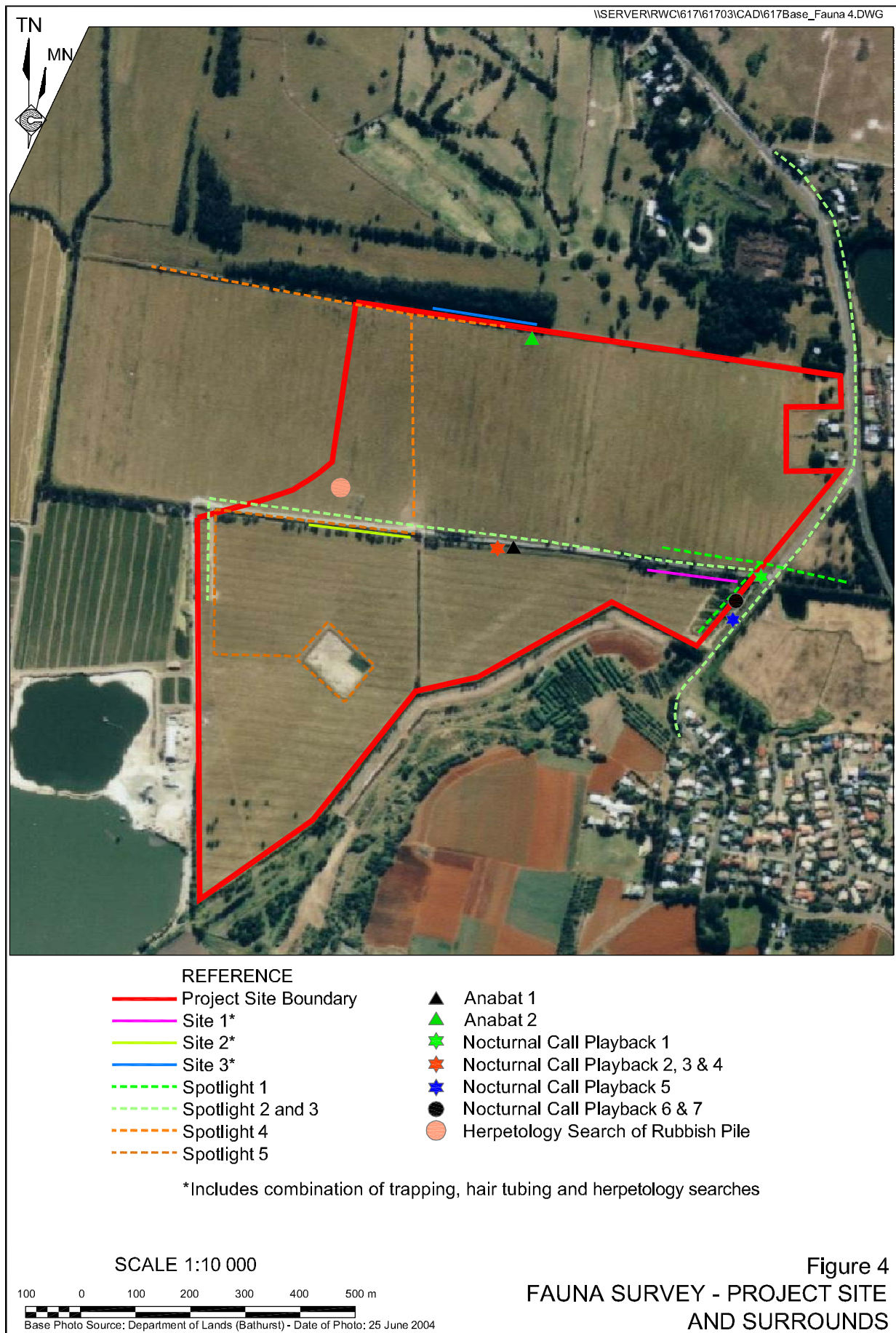
### 3.2.2 Proposed Eastern Pipeline Field Survey

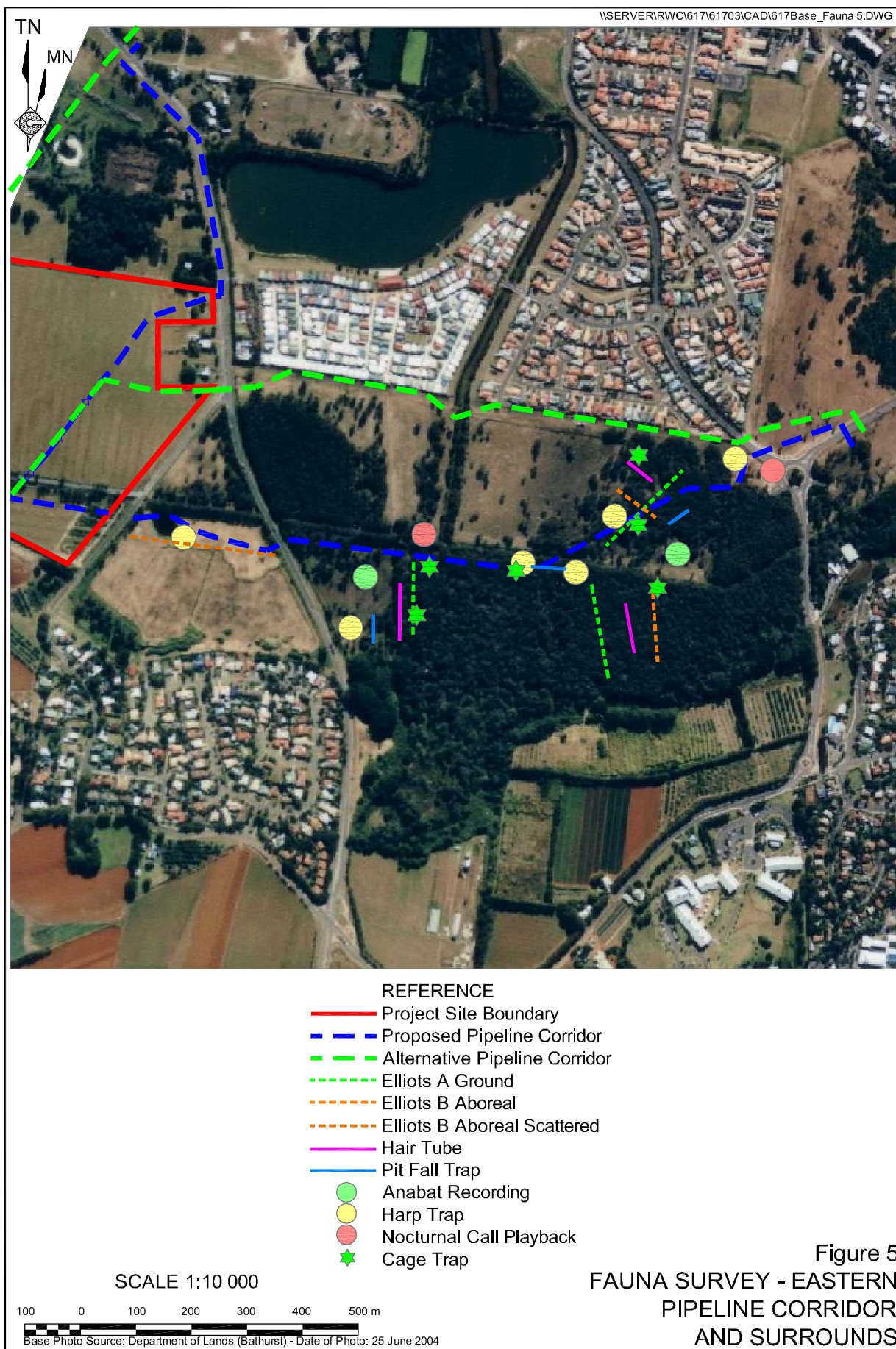
The majority of fauna survey techniques were implemented between 21 November 2006 and 26 November 2006. These being:

- 30 tree mounted Elliott traps set over 4 nights;
  - 75 ground placed Elliott traps set over 4 nights;
  - 60 ground and arboreal hair tubes set over 4 nights;
  - 6 cage traps set over 4 nights;
  - nocturnal call playbacks of the powerful owl, masked owl, barking owl, grass owl, yellow-bellied glider, Koala and squirrel glider played on 4 nights;
  - spotlighting on 4 nights incorporating nocturnal herpetology searches;
  - Anabat recording for microbats over 2 nights;
  - opportunistic identification of birds and bird calls;
  - diurnal and nocturnal herpetology searches; and
- searching for sign of significant fauna.

The locations of survey methodologies are indicated on **Figure 5**.







### 3.3 Survey Limitations

The field surveys were each limited to a short period.

Weather conditions during the Project Site field survey undertaken in May 2005 were conducive to fauna surveying, heavy rain had fallen prior to the field survey and intermittent drizzly rain continued throughout the field survey.

Weather conditions during the proposed eastern pipeline field survey undertaken in November 2006 were also conducive to fauna surveying.

Weather conditions at the times of implementing survey techniques were recorded and are presented in **Table 1**.

**Table 1**  
**Weather Conditions During Specific Survey Techniques**

Date	Time	Wet Bulb Thermometer (Degrees Celsius)	Dry Bulb Thermometer (Degrees Celsius)	Rain	Cloud Cover (Measured as fractions of eights of sky covered by cloud)	Wind
9/05/2005	1955	17	17	clear	2/8	slight nw
10/05/2005	2115		15		6/8	calm – slight breeze
11/05/2005	2015			drizzle	8/8	moderate SE
12/05/2005	1140	17	19	drizzle	8/8	
12/05/2005	1210	17.5	17.5	drizzle	8/8	
12/05/2005	1330	18	19	drizzle	8/8	
12/05/2005	2110	17	19	drizzle	8/8	moderate to strong SE
21/11/2006	2030	17.5	22	Nil	0/8	slight to moderate easterly
22/11/2006	2010	19	23	Nil	0/8	slight to moderate easterly
23/11/2006	2030	20	23	Nil	0/8	moderate northeast wind
25/11/2006	2005	20	22.5	Nil	0/8	moderate to strong northeast with strong gusts
26/11/2006	1115	23.5	28	Nil	0/8	strong north east
26/11/2006	2050	21	24	Nil	4/8	calm - slight breeze

## 4 RESULTS

### 4.1 Significant Fauna Species or Populations Records within the Locality

#### 4.1.1 TSC Act Threatened Fauna Species and Populations

Potentially occurring TSC Act Threatened species occurring in the Murwillumbah subregion of the Northern Rivers Catchment Management Authority area were identified from the DECC Threatened species website at <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>, this list of species is attached as **Appendix 1**. The use of this list provides a starting point based on DECC information on which to assess the likely occurrence of Threatened species on the Study Area.

**Table 2** contains a list of TSC Act Threatened fauna species recorded on the DECC wildlife atlas (17/2/2006) as occurring within approximately 5km of the Study Area (note that as the data obtained during the first field survey for this assessment has been submitted to the DECC, the field survey data is included in the wildlife atlas search). The DECC wildlife atlas provides approximate locations of species records, therefore **Table 2** provides an indication of some records existing within a buffer approximately 5km from the Study Area boundary. **Table 2** also provides a description of the preferred habitat of the species and an indication of their likelihood of occurrence within the Study Area. **Appendix 2** contains a more detailed description of the habitat of each species obtained from the DECC Threatened species website within the Study Area and other information on each of the Threatened species listed in **Appendix 1**. It also contains the author's reasoning regarding the likely occurrence of each species within the Study Area.

The DECC wildlife atlas contains records of the Black Flying-fox and Grey-headed Flying-fox occurring within the Study Area, the dates of these records indicate that they originated from the field survey conducted for this assessment when both of these species were observed flying over the Study Area.

**Table 3** provides a list of TSC Act Threatened fauna species not recorded on the DECC wildlife atlas within approximately 5km from the Study Area but listed as possible or known occurrences in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area as listed on the DECC Threatened species website see **Appendix 1** and considered as possible or likely to occur within the Study Area based on the information in **Appendix 2**.



**Table 2**  
**TSC Act Threatened Species Recorded Within approximately 5km of the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of occurrence within the Study Area	Approx. Distance to closest record (5km)	No. of records within 5km
<i>Litoria olongburens</i>	Olongburra Frog	V	Paperbark and sedge swamps of coastal "wallum" country.	Nil	1.9	1
<i>Crinia tinnula</i>	Wallum Froglet	V	Paperbark and sedge swamps of coastal "wallum" country	Unlikely	1.3	29
<i>Pandion haliaetus</i>	Osprey	V	Beach, estuaries, rivers and adjoining areas.	Possible	1.0	67
<i>Ixobrychus flavicollis</i>	Black Bittern	V	Dense vegetation fringing and in streams, swamps, tidal creeks and mudflats, particularly amongst swamp she-oaks and mangroves (NPWS 2002).	Possible	5.0	1
<i>Esacus neglectus</i>	Beach Stone-curlew	E	Estuary/beach.	Nil	5.2	1
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V	Usually associated with Allocasuarina trees in coastal forests and woodlands, timbered watercourses and moist and dry eucalypt forest of the coast and the Great Divide up to 1000m (NPWS 2002).	Nil	3.3	3
<i>Charadrius leschenaultii</i>	Greater Sand Plover	V	Sandy beaches, mangroves, mudflats, exposed reefs and occasionally away from water in dune wastes (NPWS 2002).	Nil	3.0	3
<i>Charadrius mongolus</i>	Lesser Sand Plover	V	Sandy beaches, mangroves, mudflats, exposed reefs and occasionally away from water in dune wastes (NPWS 2002).	Nil	5.0	4
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	Swamps, mangroves, mudflats, dry floodplains, and irrigated land, occasionally in open grassy woodland (NPWS 2002).	Possible	4.1	5
V = Vulnerable species (TSC Act)                      E = Endangered species (TSC Act)						

**Table 2 (Cont'd)**  
**TSC Act Threatened Species Recorded Within 5km of the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of occurrence within the Study Area	Approx. Distance to closest record (km)	No. of records within 5km
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V	Recorded mainly from subtropical and dry rainforest (Gilmore and Parnaby 1994), swamp forest (Kendall pers obs) and expected to occur where mesic fruiting plants occur.	Possible	5.6	1
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V	Subtropical rainforest and dry rainforest and occasionally in other rainforest and moist eucalypt forest and swamp forest they feed on fruit (Gilmore and Parnaby 1994).	Possible	2.0	2
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V	Estuary/beach.	Nil	2.7	19
<i>Haematopus longirostris</i>	Pied Oystercatcher	V	Estuary/beach.	Nil	2.7	33
<i>Todiramphus chloris</i>	Collared Kingfisher	V	Virtually confined to mangroves and adjoining areas, although rarely leave mangroves (Higgins 1999).	Nil	2.7	4
<i>Sterna albifrons</i>	Little Tern	E	Marine/estuary/beach.	Nil	2.7	28
<i>Puffinus carneipes</i>	Flesh-footed Shearwater	V	Marine.	Nil	4.7	1
<i>Calidris tenuirostris</i>	Great Knot	V	Found in a variety of habitats, in coastal northeast NSW they have been recorded in dry open forest and areas of mixed rainforest-eucalypt forest (NPWS 2002).	Nil	2.7	5
<i>Limosa limosa</i>	Black-tailed Godwit	V	Tidal mudflats, sand spits, swamps, shallow river-margins and reservoirs (NPWS 2002).	Nil	5.0	4
<i>Xenus cinereus</i>	Terek Sandpiper	V	Marine/estuary.	Nil	5.0	2
V = Vulnerable species (TSC Act)		E = Endangered species (TSC Act)				

**Table 2 (Cont'd)**  
**TSC Act Threatened Species Recorded Within 5km of the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of occurrence within the Study Area	Approx. Distance to closest record (km)	No. of records within 5km
<i>Ninox connivens</i>	Barking Owl	V	Occupies eucalypt woodland, open forest, swamp woodland and timber along watercourses, occasionally roosts in denser habitat but hunts over more open country, nests in tree hollows (NPWS 2002).	Possible	4.3	1
<i>Tyto capensis</i>	Grass Owl	V	Swamps and rank grasslands.	Likely	1.7	3
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail	E	Lowland tropical rainforest and swamp forest, typically found under leaf litter on the forest floor (NPWS 2002).	Nil	1.2	66
<i>Planigale maculata</i>	Common Planigale	V	Inhabit rainforest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water (NPWS 2002).	Unlikely	1.9	4
<i>Phascolarctos cinereus</i>	Koala	V	Koala habitat includes forests and woodlands and treed urban areas where appropriate food trees occur. Main food trees vary from area to area however some of the primary food trees include tallowwood, swamp mahogany, grey gum and forest red gum (NPWS 2002).	Unlikely	0.7	56
<i>Potorous tridactylus</i>	Long-nosed Potoroo	E2	Occupy a range of plant communities from cool temperate rainforest at altitudes of 1500m , through moist and dry forests to wet heathland. Habitats have a dense layer of grasses, ferns, vines or shrubs, with the occasional open area. A sandy loam soil is also a common feature, particularly in coastal habitats (NPWS 2002).	Unlikely	5.8	2

V = Vulnerable species (TSC Act)

E = Endangered species (TSC Act)

**Table 2 (Cont'd)**  
**TSC Act Threatened Species Recorded Within Approximately 5km of the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of occurrence within the Study Area	Approx. Distance to closest record (km)	No. of records within 5km
<i>Pteropus alecto</i>	Black Flying-fox	V	Forms communal camps in coastal subtropical rainforest or swamp forest feed on rainforest fruits, nectar and pollen from flowering eucalypts, paperbarks and banksias. When native foods are scarce they take fruit from orchards (NPWS 2002).	Confirmed	0.4	32
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Roosts in camps in lowland rainforest and swamp forest, forage on fruit, nectar and pollen in rainforests and eucalypt forests (NPWS 2002).	Confirmed	0.4	22
<i>Syconycteris australis</i>	Common Blossom-bat	V	Roost in littoral rainforest and forage in adjacent coastal heath and paperbark swamp (NPWS 2002).	Possible	1.9	2
<i>Miniopterus australis</i>	Little Bentwing-bat	V	Moist eucalypt forest, rainforest and dense coastal banksia scrub, roost in caves, tunnels and sometimes tree hollows. (NPWS 2002).	Possible	3.8	1
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	Found in wide variety of forest types where they feed just above canopy, roost and breed in caves (Churchill 2002).	Possible	3.9	4
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured (DECC 2006).	Possible	3.9	2
V = Vulnerable species (TSC Act)                      E = Endangered species (TSC Act)						

**Table 3**  
**Other TSC Act Threatened Species Considered Possible to Occur Within the Study Area**

Page 1 of 6

Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Anseranas semipalmata</i>	Magpie Goose	V	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	Possible - Occasionally may forage within the Study Area.
<i>Grus rubicundus</i>	Brolga	V	Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are also dependent on wetlands, especially shallow swamps, where they will forage with their head entirely submerged. They feed, using their heavy straight bill as a crowbar to probe the ground or turn it over, primarily on sedge roots and tubers. They will also take large insects, crustaceans, molluscs and frogs. The famous Brolga dance is apparently at least in part a courtship or bonding display where a pair or many pairs face each other, crouch down and stretch upwards, trumpet, leap and toss grass and sticks into the air. The nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water. Two eggs are laid from winter to autumn.	Possible - Occasionally may forage within the Study Area.
<i>Amaurornis olivaceus</i>	Bush-hen	V	Occurs in a variety of coastal wetlands from mangroves, lagoons and swamps, to river margins and creeks running through rainforest. It has also been recorded away from water in dense low vegetation, including Bladey Grass and the introduced Lantana.	Known to occur in suitable habitat at the eastern end of the proposed eastern pipeline corridor. Suitable habitat for this species occurs along the alternative eastern pipeline corridor but is not present elsewhere within the Study Area.
V = Vulnerable species (TSC Act)		E = Endangered species (TSC Act)		

**Table 3 (Cont'd)**  
**Other TSC Act Threatened Species Considered Possible to Occur Within the Study Area**

Page 2 of 6

Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Rostratula benghalensis</i>	Painted Snipe	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Possible - Suitable habitat occurs at the eastern end of the eastern pipeline corridors.
<i>Lophoictinia isura</i>	Square-tailed Kite	V	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid northwestern NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km <sup>2</sup> . Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Possible - Suitable habitat occurs close to the Study Area and the Square-tailed Kite may fly over the Study Area.
<i>Tyto novaehollandiae</i>	Masked Owl	V	Lives in dry eucalypt forests and woodlands from sea level to 1100m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Possible - Minor amount of marginal foraging habitat only within the Study Area.
<i>Monarcha leucotis</i>	White-eared Monarch	V	In NSW this species occurs primarily in coastal rainforest, swamp forest and wet eucalypt forest. It appears to favour rainforest edges where trees are frequently covered with vines and through the canopy of more extensive patches of rainforest.	Likely - Suitable habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.
V = Vulnerable species (TSC Act)                      E = Endangered species (TSC Act)				

**Table 3 (Cont'd)**  
**Other TSC Act Threatened Species Considered Possible to Occur Within the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Coracina lineata</i>	Barred Cuckoo-shrike	V	Rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. They are usually seen in pairs or small flocks foraging among foliage of trees for insects and fruit. They are active birds, frequently moving from tree to tree.	Possible - Some rainforest fruit-bearing plants may occur in the swamp sclerophyll woodland on the alternative eastern pipeline corridor and they may attract occasional foraging visits from this species.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	Likely - Recorded flying over the Study Area although no suitable sheltering habitat occurs within the Study Area.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and may raid possum and glider dens and prey on roosting birds. Use latrine sites, often on flat rocks among boulder fields and rocky cliff-faces; these may be visited by a number of individuals; latrine sites can be recognised by the accumulation of the sometimes characteristic twisty-shaped faeces deposited by animals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares; usually traverse their ranges along densely vegetated creeklines. Average litter size is five; both sexes mature at about one year of age	Possible - Suitable habitat occurs along the alternative eastern pipeline corridor
V = Vulnerable species (TSC Act)			E = Endangered species (TSC Act)	

**Table 3 (Cont'd)**  
**Other TSC Act Threatened Species Considered Possible to Occur Within the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum ( <i>Pseudocheirus peregrinus</i> ) dreys or thickets of vegetation, (eg. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. Young can be born whenever food sources are available, however most births occur between late spring and early autumn. Agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal. Frequently spends time in torpor especially in winter, with body curled, ears folded and internal temperature close to the surroundings.	Possible - Suitable habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Possible - presence of wattles in marginal habitat along the alternative eastern pipeline corridor.

V = Vulnerable species (TSC Act)

E = Endangered species (TSC Act)



**Table 3 (Cont'd)**  
**Other TSC Act Threatened Species Considered Possible to Occur Within the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat	V	Found in a range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses. They can also occur in towns and cities. Roost mainly in tree hollows but relatively large colonies have been found under house roofs in urban areas in Queensland.	Possible - Suitable foraging habitat occurs within the Study Area.
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Solitary and probably insectivorous.	Possible - Suitable foraging habitat occurs within the Study Area.
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	Prefers moist habitats, with trees taller than 20m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	Possible - Suitable foraging habitat occurs within the Study Area.
<i>Myotis adversus</i>	Large-footed Myotis	V	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	Likely - Suitable foraging habitat occurs within the Study Area.
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark.	Likely - Suitable foraging habitat occurs within the Study Area.
V = Vulnerable species (TSC Act)                      E = Endangered species (TSC Act)				

**Table 3 (Cont'd)**  
**Other TSC Act Threatened Species Considered Possible to Occur Within the Study Area**

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Scientific Name	Common Name	Legal Status TSC Act 1995	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.	Likely - Suitable foraging habitat occurs within the Study Area.
<i>Pseudomys gracilicaudatus</i>	Eastern Chestnut Mouse	V	In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps. In the tropics it is more an animal of grassy woodlands. Optimal habitat appears to be in vigorously regenerating heathland burnt from 18 months to four years previously. By the time the heath is mature, the larger Swamp Rat becomes dominant, and Eastern Chestnut Mouse numbers drop again. Feeds at night via runways through the grassy and sedge understorey, within an area of less than half a hectare. It has a broad diet of grass stems, invertebrates, fungi and seeds, with the relative significance of each component varying seasonally. Up to three litters are produced from spring to autumn; this strategy allows rapid build-up of numbers in years following fire.	Possible - marginal habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.
V = Vulnerable species (TSC Act)                      E = Endangered species (TSC Act)				

#### 4.1.2 EPBC Act Significant Species

The list of significant EPBC Act significant fauna species in **Table 4** was generated from a search of Department of Environment and Heritage interactive map Protected Matters Search Tool on 6<sup>th</sup> March 2007 (see **Appendix 5**); which provided information pertaining to the status of each species and the type of presence derived from maps of the species distribution. The caveat at the end of the search states:

“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 migratory and marine provisions of the Act have been mapped.

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.”

**Table 4** also provides the author’s opinion of the possibility of the occurrence of each species within the Study Area. **Table 4** does not include species listed in **Appendix 5** considered not to have suitable habitat on the Study Area.

The DEWR website’s interactive map Protected Matters Search Tool due to lack of availability of habitat maps does not include all species covered by the provisions of the EPBC Act. In regard to international migratory birds, the EPBC Act covers birds listed under the:

Japan-Australia Migratory Bird Agreement (JAMBA);  
China-Australia Migratory Bird Agreement (CAMBA); and  
Convention on the Conservation of Migratory Species of Wild Animals - (Bonn Convention) for which Australia is a range state.

The DEWR website provides a list of bird species covered by the above agreements, this list is attached as **Appendix 3**.

**Table 4**  
**EPBC Act Significant Species considered as possible to occur on the Study Area**

Scientific Name	Scientific name	EPBC Act Status	Possibility of Occurrence
Swift Parrot	<i>Lathamus discolor</i>	Endangered	Unlikely
Black-throated Finch (southern)	<i>Poephila cincta cincta</i>	Endangered	Unlikely
Australian Painted Snipe	<i>Rostratula australis</i>	Vulnerable	Unlikely
Regent Honeyeater	<i>Xanthomyza phrygia</i>	Endangered & Migratory	Unlikely
Large-eared Pied Bat, Large Pied Bat	<i>Chalinolobus dwyeri</i>	Vulnerable	Unlikely
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Endangered	Unlikely
Long-nosed Potoroo (SE mainland)	<i>Potorous tridactylus tridactylus</i>	Vulnerable	Unlikely
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable	Confirmed
Mitchell's Rainforest Snail	<i>Thersites mitchellae</i>	Critically Endangered	Unlikely
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Migratory	Possible
White-throated Needletail	<i>Hirundapus caudacutus</i>	Migratory	Likely
Rainbow Bee-eater	<i>Merops ornatus</i>	Migratory	Confirmed
Black-faced Monarch	<i>Monarcha melanopsis</i>	Migratory	Possible
Spectacled Monarch	<i>Monarcha trivirgatus</i>	Migratory	Possible
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	Migratory	Possible
Rufous Fantail	<i>Rhipidura rufifrons</i>	Migratory	Possible
Latham's Snipe, Japanese Snipe	<i>Gallinago hardwickii</i>	Migratory	Possible
Painted Snipe	<i>Rostratula benghalensis</i> s. lat.	Migratory	Unlikely

## 4.2 Habitat Present within the Study Area

### 4.2.1 Vegetation

The following descriptions of the vegetation communities are drawn from the accompanying flora report prepared by Idyll Spaces (2008) (see Part 4 of the *Specialist Consultant Studies Compendium*). It is considered that these vegetation community descriptions provide an adequate basis for the description of the habitat within the Study Area. The author, following the field survey, concurs with the vegetation community descriptions provided in Idyll Spaces (2008). **Figure 6** shows the boundaries of the identified vegetation communities.

#### 4.2.1.1 Community 1: *Casuarina glauca* Woodland

Stands of swamp oak *Casuarina glauca* are the dominant species in this community, with other tree species limited to occasional Blackwood Wattle *Acacia melanoxylon*. Mile-a-minute *Ipomoea cairica* is the only 'midstratum' species and occurs as a climber on trees. The native sedge *Schoenoplectus validus* is the dominant 'ground layer' species in flooded drains, and mats of *Bacopa monniera* occur on exposed mud. Higher land is dominated by exotic pasture grasses.

The structure of this community consists of sparse small stands of trees, or isolated trees, to 12m tall and 30cm diameter, with a sparse to mid-dense ground layer of aquatic herbs and exotic grasses.

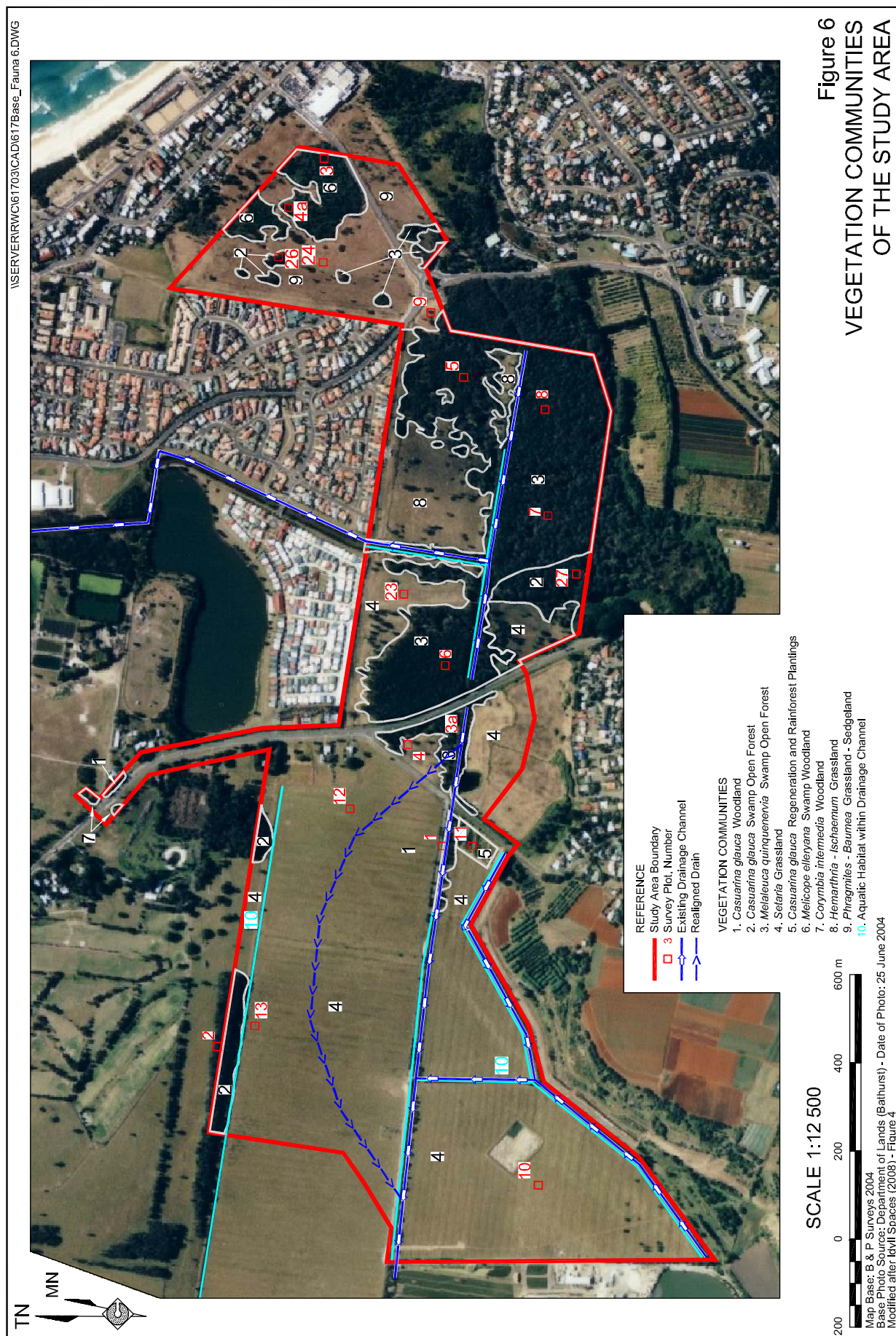
This community occurs as a narrow strip on wet soils on the banks and in shallower waters of the major drain currently oriented east-west parallel with Altona Drive, or as several small patches in roadside table drains in the pipeline corridors.

#### 4.2.1.2 Community 2: *Casuarina glauca* Swamp Open Forest

Swamp Oak *Casuarina glauca* is the dominant species in this community, with Broadleaved Paperbark *Melaleuca quinquenervia* subdominant. Other common tree species include Willow Bottlebrush *Callistemon salignus* and Camphor Laurel *Cinnamomum camphora*. The lower strata include the common rainforest species Sandpaper Fig *Ficus coronata*, Cockspur Thorn *Maclura cochinchinensis* and the weed Lantana *L. camara*. Setaria Grass *S. sphacelata* is the dominant ground cover, at least on the edge of the stand.

This community consists of a sparse stratum of Swamp Oak to 20m tall and 60cm diameter over a mid-dense upper midstratum of Broadleaved Paperbark, Willow Bottlebrush and Camphor Laurel to 12m tall, and a sparse lower midstratum of Lantana, Sandpaper Fig and Cockspur to approximately 4m tall. The mid-dense ground layer of exotic grasses is around 1m tall.

This community occurs as remnants in grazed pasture on flat and low-lying Quaternary coastal alluvium directly north of the Study Area. There are ongoing impacts to understorey vegetation from grazing cattle. It is separated from the Study Area by a flooded drain and a bund.



#### 4.2.1.3 Community 3: *Melaleuca quinquenervia* Swamp Open Forest

In this community Paperbark is the dominant tree species, with occasional Swamp Oak. Silkpod Vine a common woody climber, otherwise a midstratum is absent. Ground layer vegetation is dominated by the exotic grasses, especially *Setaria* *S. sphacelata* and Sourgrass *Paspalum conjugatum*. This community consists of open stands of young trees to around 12m tall over mid-dense grasses and occasional sedges. This community of young paperbark over mixed grassland/sedgeland occurs on wet organic soils over Quaternary coastal alluvium. The small size of the trees and absence of large old trees, stags or stumps indicates that this community has regenerated relatively recently following catastrophic disturbance such as clearing.

The proposed eastern pipeline passes through this community.

#### 4.2.1.4 Community 4: *Setaria* *sp* Grassland

The exotic species *Setaria* grass was clearly the dominant species in this community during the most recent survey in May 2005, but was co-dominant with Carpet Grass *Axonopus fissifolius* when surveyed in November 2003. Other common species include the exotic Sourgrass *Paspalum conjugatum*, Native Forb *Centella asiatica*, grasses common Couch *Cynodon dactylon* and Queensland Blue Couch *Digitaria didactyla*, and the exotics Kikuyu *Pennisetum clandestinum*, Fireweed *Senecio madascariensis*, the rush *Juncus cognatus*, and the sedges *Cyperus brevifolius* and *C. sesquiflorus*.

This community is a dense to mid-dense sod grassland, from less than 10cm tall when recently mowed or heavily grazed, to over 1m tall elsewhere. Although trees were generally absent, swamp oak coppice to 1.5m occurred occasionally.

This community occupies most of the Study Area, including the ground layer of forest and woodland communities. Functionally this is a cowpasture, with evidence of pasture improvement (Japanese Clover *Lespedeza striata*, White Clover, *Setaria*) of a low-productivity grassland based on the naturalised exotic carpet grass. The cowpasture occupies land that was apparently developed for sugar cane production *i.e.*: cleared of native vegetation and modified by the construction of a drainage network to reduce flooding and lower the water table.

#### 4.2.1.5 Community 5: *Casuarina glauca* and Rainforest tree plantings

In November 1993 the exotic annual *Aster subulatus* and exotic perennial *Cuphea carthagenensis* were the dominant species in this community, but subsequently Swamp Oak Coppice present then has grown, together with planted rainforest trees of Blue Fig *Elaeocarpus grandis*, Umbrella Cheese Tree *Glochidion sumatranum* and Macaranga *M. tanarius*. Other common species include the exotics *Setaria* Grass and Stinking Pennywort *Hydrocotyle bonariensis*, and the natives *Centella asiatica*, Buttercup *Ranunculus inundatus* and Blue Commelina *Commelina cyanea*.

The structure of this community is a sparse stand of young trees to 6m tall over a dense ground layer to 60cm tall of *Cuphea carthagenensis*, Stinking Pennywort and other weedy broadleaved plants among dead and moribund *Setaria* Grass to 2m tall.



This community occurs in a small fenced paddock at the eastern extremity of the Study Area adjoining Crescent Street. It appears to be a pasture from which grazing has been excluded for several years, and subject to managed tree regeneration to act as a buffer zone.

#### **4.2.1.6 Community 6: *Lophostemon confertus* – *Banksia integrifolia* Woodland**

There is a sparse cover of Brush Box *Lophostemon confertus* and Coast Banksia *B. integrifolia*. The midstratum flora is dominated by Coast Wattle *Acacia sophorae* and Lilly Pilly *Acmena smithii*, but also includes heath shrubs such as *Leucopogon* spp and *Monotoca elliptica*. The ground layer consists mainly of Blady Grass *Imperata cylindrica*, Bracken *Pteridium esculentum*, and Mat Rush *Lomandra longifolia*.

The structure of this community is a woodland of scattered regrowth trees to 8m and a very sparse midstratum to 3m over a dense ground layer of grasses and ferns to 1.5m tall.

#### **4.2.1.7 Community 7. *Corymbia intermedia* Open Forest**

There is scattered cover of Pink Bloodwood *Corymbia intermedia* with Brush Box, Coast Banksia, Swamp Oak and Broadleaved Paperbark. The midstratum flora is absent, and the ground layer consists of mowed exotic grasses and occasional small sedges.

The structure of this community is patches of scattered regrowth trees to 10m over mowed mid-dense grassland.

All woody vegetation is young, apparently being regeneration from a major clearing event ca 30 years ago.

#### **4.2.1.8 Community 8: *Hemarthria uncinata*-*Ischaemum australe* Grassland**

The native grasses Matgrass *Hemarthria uncinata* and *Ischaemum australe* are typically codominant, and Carpet Grass *Axonopus fissifolius* is very common. Other common species include the native grass *Paspalidium* sp, the woody-rooted forb *Gonocarpus chinensis*, and herbs such as *Hydrocotyle laxiflora* and *Velliea spathulata*. There are occasional sedges *Baumea* spp in depressions.

The structure of this community is a mid-dense to dense grassland approximately 7cm tall, recently mowed, with smaller shade-tolerant herbs below the grasses and occasional stands of sedges in depressions.

This community occurs on loam soils of cleared and mowed areas. The presence of woody-rooted forbs, coppicing shoots and depressions with sedges indicate that it has not been repeatedly cultivated.

This community occurs in the alternative eastern pipeline corridor.



#### **4.2.1.9 Community 9: *Baumea rubiginosa* -*Phragmites australis* Mixed Grassland-Sedgeland**

The sedge *Baumea rubiginosa* is generally common and an indicator species for this community. The natives common Reedgrass *Phragmites australis* and Swamp Ricegrass *Leersia hexandra* also occur, as does the swamp fern *Blechnum sp* and the sedge *Schoenus brevifolius*. Introduced grasses such as Sourgrass *Paspalum conjugatum*, Vasey Grass *P. urvillei*, Guinea Grass *Panicum maximum*, Para Grass *Urochloa mutica* and Carpet Grass are common, and locally dominant on and adjoining fill batters.

The structure of this community is a sparse to mid-dense mixed grassland and sedgeland to 60cm tall, with occasional fern.

This community occurs on inundated peaty mud of cleared and mowed areas. It is likely that it would form a taller and denser community in the absence of mowing. It is likely to be undergoing change from a drier grassland to a wetter swamp fern/sedge community as a result of increased ponding following construction of the Turnock Street road embankment.

This community occurs at the eastern ends of the alternative and proposed eastern pipeline corridors.

#### **4.2.1.10 Community 10: – Drains and Aquatic Vegetation**

The native sedge *Schoenoplectus validus* is the dominant ground layer species in flooded drains, and mats of *Bacopa monniera* occur on exposed mud. There are occasional plants of Water Lily *Nymphaea capensis* in deeper areas of water.

The structure varies according to water depth, with isolated individual floating aquatics and stands of emergents in deeper water, and mats of low growing species on exposed mud.

The stands of aquatic vegetation vary according to grazing pressure, competition from tall exotic grasses, and seasonal fluctuations in water level and salinity.

#### **4.2.2 Other Habitat Attributes**

Two farm dams are located in the southwest section of the Study Area, within an adjoining property immediately south of the Project Site. Both dams are associated with spear pumps, which are used to fill the dams during dry periods and one used for irrigation. They do not support wetland flora species or fringing vegetation.

A system of linear drains containing water support, in a few isolated locations, water lilies. However these only cover a small area and their coverage is sparse. The drains also contain some sedges. Further consideration to aquatic ecology has been provided by the Ecology Lab 2007 – see Part 6 of the *Specialist Consultant Studies Compendium*.

The cleared cow paddocks are low lying and in many areas, were poorly drained during the field survey, with the paddocks being covered by water as a consequence of a recent rainfall event.

#### 4.2.3 Sheltering Resources

The Study Area does not contain important habitat attributes such as hollow bearing trees or any other important sheltering resource that may be used by hollow dependant Threatened species that may occur in the locality.

No caves, rock crevices or rocky area habitats occur within the Study Area.

#### 4.2.4 Foraging Resources

The Study Area does contain some rainforest plants whose fruit may provide a foraging resource for some Threatened species including the Grey-headed and Black Flying-foxes and the Yellow-eyed Cuckoo-shrike.

Banksia and Broad-leaved Paperbark that occur in some vegetation communities may provide a suitable foraging resource for the Common Blossom Bat and Grey-headed Flying-fox.

The Study Area does not contain browse tree species important for Koalas, however, a limited amount of a browse tree species for the Glossy Black Cockatoo occurs within the proposed northern pipeline corridor.

### 4.3 Habitat Present in the Locality

As stated in Section 1.2 for the purposes of this assessment the locality is defined as the area within approximately 10km of the Study Area.

A variety of vegetation formations occur in the locality and these can be used to indicate habitat available for various fauna species. The DECC native vegetation map available on the DECC website (at <http://maps.environment.nsw.gov.au/stateveg/default.htm#habitat>) provides estimates of the areas of various vegetation classes as described by Keith (2004). These areas are available for each pixel of 6400ha in the locality of the Study Area. The table in Appendix 4 from *Idyll Spaces* (2008 – Part 4 of the *Specialist Consultant Studies Compendium*) provides information pertaining to the extent of the various vegetation formations that occur within the locality. The individual “species profiles” provided on the web site refer in most cases to the occurrence of the species occurring within the various vegetation formations listed in Appendix 4.

Furthermore the individual “species profiles” also refer to habitat types specific to particular species such as beaches, reefs etc, habitats that occur within the locality of the Study Area but not present on the Study Area. The habitat descriptions in **Appendix 2** were sourced from the individual species profiles available on the DECC website.

Due to lack of available information it is not possible to describe the occurrence of some specific habitat features on the locality of the Study Area. For example two senescent Red Gums containing tree hollows were observed just to the north of site 3 (**Figure 4**), however, it is not known to what extent tree hollows occur in the locality.

#### 4.4 SEPP No. 44 – Koala Habitat Protection (SEPP 44)

The main aim of SEPP 44 is:

“to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline.”

Schedule 1 of SEPP 44 contains a list of local government areas to which the SEPP 44 applies; Tweed Council is included in the schedule.

Schedule 2 contains a list of tree species that are favoured food tree species of Koalas in NSW.

Potential Koala habitat is defined in the SEPP as areas of vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. No Schedule 2 tree species occur within the Study Area, therefore, the Study Area is not potential Koala habitat as defined in the SEPP and the SEPP is no longer applicable.

#### 4.5 Wildlife Corridors and Key Habitat

A search of the Canri website (<http://www.canri.nsw.gov.au/>) on 9 June 2005 indicated that the majority of the Study Area does not occur on any regional or subregional wildlife corridor identified in the NSW NPWS key habitats and corridor study. However the proposed and alternative eastern pipeline corridors pass across the Cudgen-Wommin Lake regional corridor (see **Figure 7**).

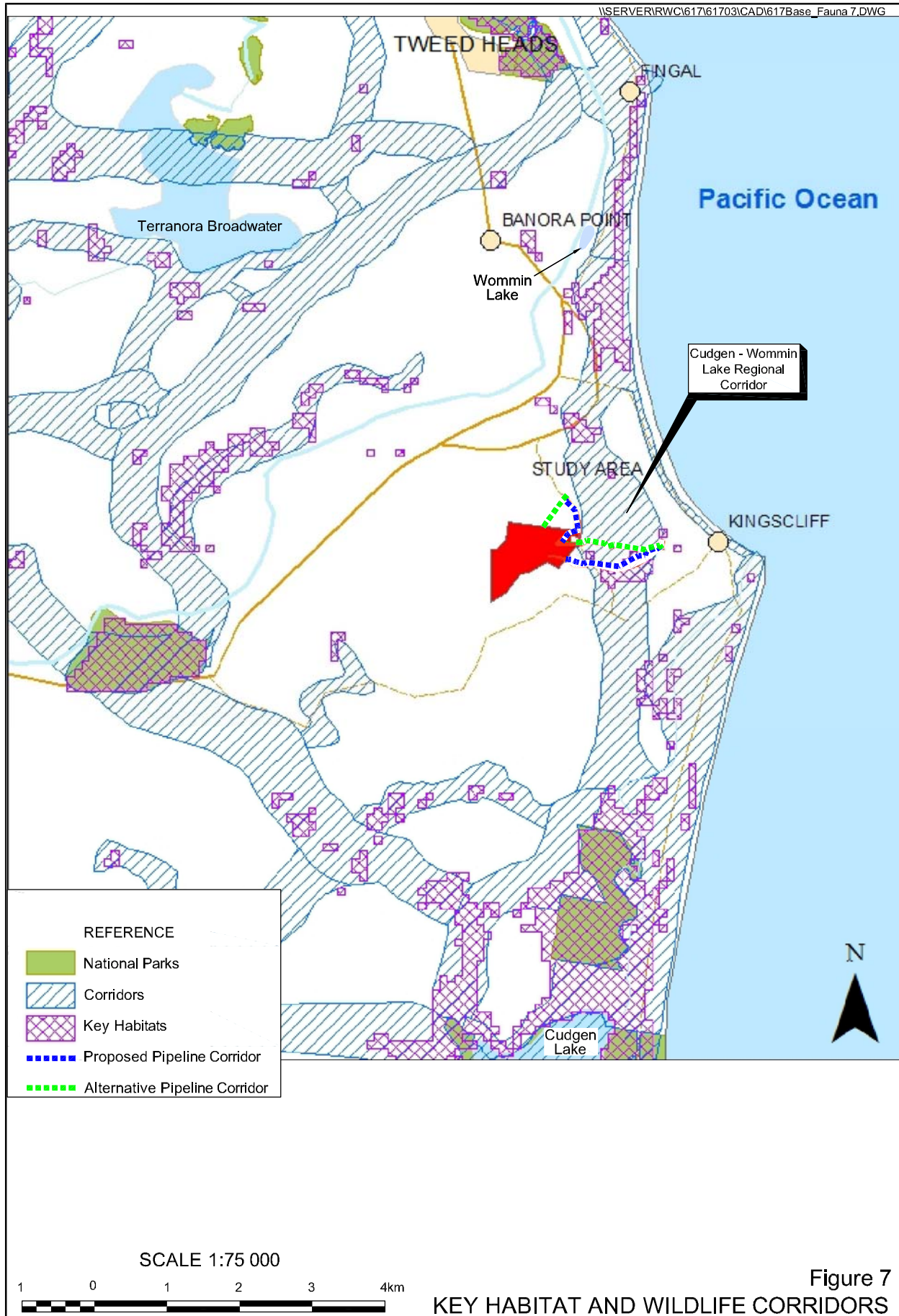
**Figure 7** indicates that the majority of the Study Area lies to the west of the Cudgen-Wommin Lake regional corridor and to the west of identified key habitat. However, both the proposed and alternative eastern pipeline corridors pass across the Cudgen-Wommin Lake regional corridor.

The Cudgen-Wommin Lake regional corridor links Wommin Lake and Cudgen Creek and was derived from the following fauna assemblages:

- wet escarpment foothills UNC;
- moist escarpment foothills UNC;
- dry coastal foothills UNC; and
- coastal complex UNC.

(Note: Fauna assemblages are mapped from a pool of individual species distributions by grouping those with similar distribution patterns, a reflection of their ecological association, at least at a regional scale (NSW NPWS 2003).

Scotts (2003) defines key habitat as “areas of predicted high conservation value for priority forest fauna assemblages, endemic forest vertebrates or endemic invertebrates”. **Figure 7** indicates that the proposed eastern pipeline corridor passes through key habitat.



## 4.6 Fauna Field Survey

A full list of the fauna species recorded during the two field surveys is provided in **Appendix 4**.

### 4.6.1 Project Site and Northern Pipeline Field Survey

In total, 99 vertebrate species were recorded within the Project Site and proposed northern pipeline corridor with additional unidentified microbats recorded during spotlighting.

Threatened species listed on Schedule 2 of the TSC Act recorded during the field survey include:

- Grey-headed Flying Fox (*Pteropus poliocephalus*);
- Black Flying-fox *Pteropus (alecto)*; and
- Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*).

All of these species were recorded flying over the Study Area. The recording of the Yellow-bellied Sheath-tail Bat was attained soon after sunset by Anabat analysis of recorded microbat calls. It is assumed that the animal may have been roosting in tree hollows observed to the north of the Study Area in senescent Red Gums.

The Grey-headed Flying Fox is also listed as vulnerable under the provisions of the EPBC Act. There were sixteen species listed under the migratory provisions of the EPBC Act recorded on the Project Site and proposed northern pipeline corridor (see **Table 5**).

**Figure 8** shows the locations of listed fauna species recorded during the field surveys.

Introduced vertebrate species recorded during the field survey of the Project Site and proposed northern pipeline corridor were the:

- House Mouse (*Mus musculus*);
- Cane Toad (*Bufo marinus*);
- Fox (*Vulpes vulpes*);
- Mosquitoe Fish (*Gambusia holbrooki*);
- Brown Hare (*Lepus capensis*); and
- Common Myna (*Acridotheres tristis*).

Recorded species within the Project Site and proposed northern pipeline corridor included:

- 75 bird species;
- 14 mammal species of which one was a probable recording of a microbat species;
- three reptile species;
- seven amphibian species; and
- one introduced fish species



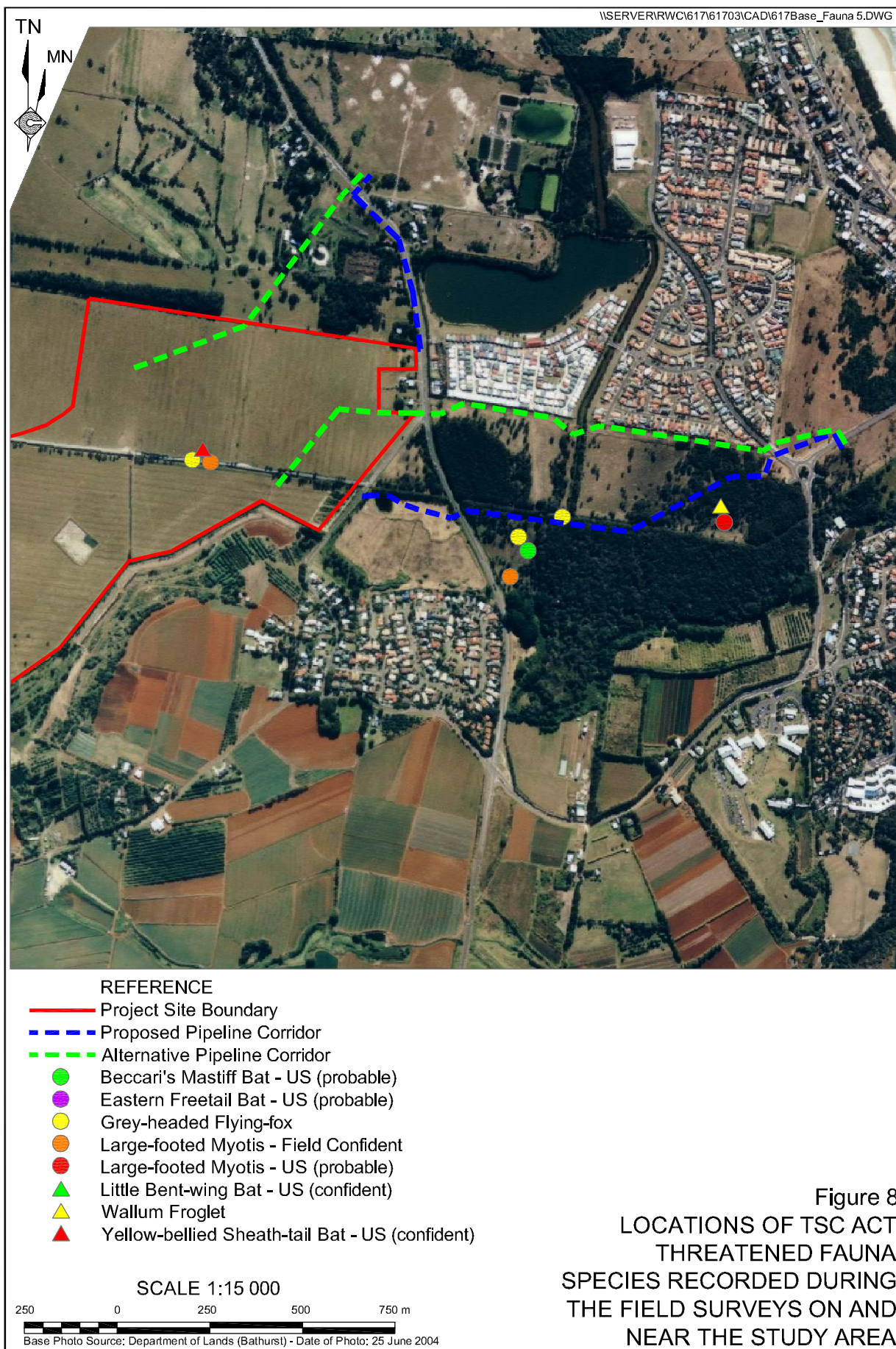


Figure 8  
LOCATIONS OF TSC ACT  
THREATENED FAUNA  
SPECIES RECORDED DURING  
THE FIELD SURVEYS ON AND  
NEAR THE STUDY AREA

Of interest, the Plum-headed Finch was recorded within the Project Site and proposed northern pipeline corridor feeding on grass seeds. The Study Area is well beyond the normal distribution of this finch, that in NSW, is west of the Great Dividing Range (Barret et al 2003). It is considered that birds were probably seeking refuge on the coast from the current drought.

#### 4.6.2 Proposed Eastern Pipeline Corridor Field Survey

In total, 102 vertebrate species (including two probable identifications of microbat species by Anabat Call analysis) were recorded within the area around the proposed eastern pipeline corridor with additional unidentified microbats recorded during spotlighting and an unidentified skink which was also observed.

Threatened species listed on Schedule 2 of the TSC Act recorded during this field survey include:

- Wallum Froglet (*Crinia tinnula*);
- Little Bent-wing Bat (*Miniopterus australis*);
- Eastern Freetail Bat (Probable) (*Mormopterus norfolkensis*);
- Large-footed Myotis (*Myotis adversus*); and
- Grey-headed Flying-fox (*Pteropus poliocephalus*).

The Grey-headed Flying Fox is also listed as vulnerable under the provisions of the EPBC Act. There were twelve species listed under the migratory provisions of the EPBC Act recorded on the proposed eastern pipeline corridor 3 of which were not recorded within the Project Site (see **Table 5**).

**Figure 8** shows the locations of listed Threatened fauna species recorded during the field surveys.

Introduced vertebrate species recorded during the field survey of the Study Area were the:

- Cattle (*Bos taurus*);
- Cane Toad (*Bufo marinus*);
- Mosquitoe Fish (*Gambusia holbrooki*);
- Black Rat (*Rattus rattus*); and
- Fox (*Vulpes vulpes*).

**Appendix 4** provides a list of all fauna species recorded within the Study Area, all relevant field data has been submitted to the DECC for inclusion in the wildlife atlas.

**Table 5** provides a list of species recorded during the field survey that are identified as EPBC Act migratory species as listed in **Appendix 4**.

**Table 5**  
**EPBC Act Migratory Species Recorded Within the Study Area during the Field Survey**

Class Name	Family Name	Scientific Name	Common Name
Aves	Anatidae	<i>Anas gracilis</i>	Grey Teal
Aves	Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck
Aves	Anatidae	<i>Chenonetta jubata</i>	Australian Wood Duck
Aves	Anatidae	<i>Dendrocygna arcuata</i>	Wandering Whistling-Duck
Aves	Anatidae	<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck
Aves	Ardeidae	<i>Ardea alba</i>	Great Egret
Aves	Ardeidae	<i>Ardea ibis</i>	Cattle Egret
Aves	Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk
Aves	Accipitridae	<i>Haliastur indus</i>	Brahminy Kite
Aves	Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite
Aves	Scolopacidae	<i>Gallinago hardwickii</i>	Latham's Snipe
Aves	Scolopacidae	<i>Tringa stagnatilis</i>	Marsh Sandpiper
Aves	Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt
Aves	Charadriidae	<i>Vanellus miles</i>	Masked Lapwing
Aves	Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater
Aves	Campephagidae	<i>Coracina tenuirostris</i>	Cicadabird
Aves	Sylviidae	<i>Acrocephalus stentoreus</i>	Clamorous Reed-Warbler
Aves	Sylviidae	<i>Cisticola exilis</i>	Golden-headed Cisticola
Aves	Sylviidae	<i>Megalurus timoriensis</i>	Tawny Grassbird

## 5 MITIGATION MEASURES

### 5.1 General Measures

The author concurs with the following measures proposed by Idyll Spaces (2008).

- Vegetation to be retained should be clearly defined and marked prior to the commencement of site establishment to ensure that native vegetation clearing is confined only to those areas required for Project operations.
- Noxious weeds should be controlled within the Project Site.
- Rehabilitation and landscaping should utilise local native plant species that provide forage opportunities for nectarivorous and frugivorous birds and bats.

The author also supports the use of the flora species recommended by Idyll Spaces (2008) for use in rehabilitation and landscaping. It is considered that the establishment of these flora species would provide habitat to wetland fauna species that occur in the locality and improve the overall habitat within the Project Site.

### 5.2 Pipeline Corridors

The proposed northern pipeline corridor passes through a narrow band of *Lophostemon confertus* – *Banksia integrifolia* Dry Woodland located within the road reserve of Tweed Coast Road. Idyll Spaces (2008) describes this remnant as being highly disturbed. i.e. all woody vegetation is young, apparently being regeneration from a major clearing event ca 30 years ago.



This remnant contains *Banksia integrifolia* a nectar producing plant utilised by such species as the TSC Act Threatened Common Blossom Bat. It also contains *Allocasuarina littoralis* a specific food tree species of the Glossy Black Cockatoo, however, it is considered that the trees are too young to be presently providing suitable fruit for this bird to forage on.

It is understood that no clearing would be undertaken during the laying of the pipelines within the proposed northern pipeline corridor. In the event that the alternative northern pipeline corridor is utilised it is also expected no clearing would be required. However, in the event that any individuals of either *Banksia integrifolia* or *Allocasuarina littoralis* are required to be removed, these species should be replaced.

As indicated previously, no clearing would be required for the proposed eastern pipeline corridor. The pipelines would be laid adjacent a proposed road which is currently being assessed under a separate development application. An assessment of fauna has been separately assessed for the proposed road within the report titled “Assessment of impacts of proposed filling of land and construction of a haul road on Threatened and other significant vertebrate fauna at West Kingscliff – December 2004” (Kendall & Kendall, 2004). Additionally, no clearing would be required in the event the alternative eastern pipeline corridor is utilised.

The proposed eastern pipeline corridor passes through an area on Lots 26C and 26D where Wallum Froglets have been recorded (see **Figure 8**). The installation of the pipeline would not require the removal of habitat, however, the pipes may create a barrier to movement for the froglet. Therefore it is recommended that a series of earth ramps and or underpasses be created along the pipeline in this area to facilitate the opportunity for movement by the Wallum Froglet across the pipeline.

## 6 ASSESSMENT OF IMPACTS

### 6.1 Habitat Removal

The vegetation communities present within the Study Area provide the basis of the habitat available to fauna species. **Table 6** provides a breakdown of the areas of each vegetation community as described by Idyll Spaces (2008) which would be disturbed / cleared as a result of the Project.

**Table 6**  
**Areas of Vegetation Communities to be disturbed within the Study Area**

	Community	Approximate area to be cleared (ha)	Approximate extent in Study Area (ha)
1	<i>Casuarina glauca</i> Woodland	0.5	0.5
2	<i>Casuarina glauca</i> Swamp Open Forest (EEC)	0.0	3.9
3	<i>Melaleuca quinquenervia</i> Swamp Open Forest (EEC)	0.0	26.7
4	<i>Setaria sp</i> Grassland (exotic grassland)	50.0	83.9
5	<i>Casuarina glauca</i> and Rainforest tree plantings	0.0	0.6
6	<i>Melicope elleryana</i> Swamp Woodland	0.0	3.6
7	<i>Corymbia intermedia</i> Open Forest	0.0	0.1
8	<i>Hemarthria uncinata</i> - <i>Ischaemum australe</i> Grassland	0.0	7.6
9	<i>Baumea rubiginosa</i> - <i>Phragmites australis</i> Mixed Grassland-Sedgeland	0.0	11.8
10	Drains & Aquatic Vegetation	0.1	0.5
	Total	50.6	139.2

(Source: Modified after Idyll Spaces, 2008 – Table 3)

## 6.2 Impact on Fauna

### 6.2.1 Impact on Fauna Occurring in the Locality

Considering the disturbed nature of the Project Site and minor area of native habitat that would be disturbed by the Project and as no clearing would be required for the pipeline corridors it is considered the Project would have little impact on fauna that occur in the locality of the Study Area.

As discussed in Idyll Spaces (2008), the *Setaria* grassland which comprises the majority of the Project Site, is not a native vegetation community and has not intrinsic conservation value. **Table 6** shows that only 0.6ha of native vegetation would be disturbed/cleared as a result of the Project. As the proposed northern and eastern pipeline corridors would be laid beside existing or approved roads, no clearing of vegetation would be undertaken in these areas.

In the event that the alternative northern or eastern pipeline corridors are required (eg. suitable agreements with surrounding landholders or the proposed road is not approved), the pipelines would be laid across existing cleared areas and would avoid any existing trees.

As the Project would involve retention of open space areas and establishment of wetland flora species adjoining the finalised lake, many of the fauna species that currently use the Study Area would continue to use the Study Area following completion of operations.

It is therefore assessed that the Project would have minimal negative impact upon the fauna within the locality.

### 6.2.2 Impact on Regionally Occurring Fauna

The NSW government conducted a Comprehensive Resource Assessment (CRA) that identified priority fauna species for northeastern NSW. These include Threatened species listed under the TSC Act whose distribution covers northeast NSW and other identified priority species for northeast NSW. They are species, which meet at least one of the following criteria.

- Northeast NSW represents a significant part of their NSW distributional range.
- Known or presumed threatening processes may be impacting on the species in northeast NSW.
- The species is listed on the schedules of the TSC Act.

The following northeast NSW priority species have been recorded within 5km of the Study Area on the DECC wildlife atlas.

- Wallum Froglet (*Crinia tinnula*).
- Black Bittern (*Ixobrychus flavicollis*).
- Black-necked Stork (*Ephippiorhynchus asiaticus*).
- Osprey (*Pandion haliaetus*).
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*).
- Common Planigale (*Planigale maculata*).
- Koala (*Phascolarctos cinereus*).

- Black Flying-fox (*Pteropus alecto*).
- Grey-headed Flying-fox (*Pteropus poliocephalus*).
- Common Blossom-bat (*Syconycteris australis*).
- Little Bentwing-bat (*Miniopterus australis*).
- Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*).

All of these species are listed on the TSC schedules and hence they are not only important from a regional perspective but also from a statewide perspective and are discussed in the following section.

Nevertheless considering the lack of important habitat attributes on the Study Area for the above listed species and the minor amount of vegetation that would be removed along the proposed eastern pipeline corridor as part of the proposed road compared to the area of vegetation to be retained in the adjoining locality, it is the author's opinion that the Project would not significantly impact on the regions fauna habitat values.

In regard to the proposed eastern pipeline corridor it is acknowledged that this corridor contains identified key habitat (Scotts 2003). A small amount of this habitat would be removed as part of the proposed road (subject to separate development approval), however it is the author's opinion that the minor extent of the clearing required compared to the area of habitat to be retained south of the corridor on Lots 26C and 26D is such that the regional impact of removal of the habitat would be negligible on the regions fauna. It is important to note that the Project does not propose the clearing of any vegetation within the proposed or alternative pipeline corridors.

## **6.3 TSC Act Assessment**

### **6.3.1 Environmental Planning and Assessment Act 1979 – Part 3A Assessment**

This report was prepared using the draft Guidelines for Threatened Species Assessment (DEC 2005) prepared under Part 3A of the *Environmental Planning and Assessment (EP&A) Act 1979* which states that:

*“The objective of the assessment process is to provide information to enable decision makers to ensure that developments deliver the following environmental outcomes.*

- 1. Maintain or improve biodiversity values (i.e. there is no net impact on Threatened species or native vegetation).*
- 2. Conserve biological diversity and promote ecologically sustainable development.*
- 3. Protect areas of high conservation value (including areas of critical habitat).*
- 4. Prevent the extinction of Threatened species.*
- 5. Protect the long-term viability of local populations of a species, population or ecological community.*
- 6. Protect aspects of the environment that are matters of national environmental significance.”*

The draft guideline provides a five step assessment process, which includes:

1. preliminary assessment – to determine the likelihood of the Study Area containing Threatened species; (see Section 4.1)
2. field survey and assessment - to ensure that a reliable assessment of the presence or absence of Threatened species can be made; (see Sections 3.2 and 4.5)
3. evaluation of impacts – to identify the magnitude and extent of impacts, and the significance of the impacts as related to the conservation importance of the habitat, individuals and populations likely to be affected; (see Section 6.1)
4. avoid, mitigate and then offset – including the description and justification of measures to mitigate any adverse effects and consideration of offset strategies if necessary; and (see Section 5)
5. key thresholds – justification of the Project based on whether the Project will maintain biodiversity, the long-term viability or accelerate extinction of a species, population or community and any adverse effects on critical habitat (see Section 6.2).

In the absence of specific assessment methodologies, matters of consideration including the '7-part test' as described within the Threatened Species Assessment Guidelines (DECC 2007) for assessment under Section 5A of the EP&A Act have been used to evaluate the potential impacts of the Project.

This assessment includes the following considerations.

#### *Pre-construction, construction and occupation/maintenance phases*

It is envisaged that initial construction would occur over a short period, and that occupation would continue for up to 20 years.

#### *On-site and off-site impacts, including location, installation, operation and maintenance of auxiliary infrastructure and fire management zones*

It is expected that the impacts of the proposed action would be confined to the area of the Project Site, as:

- the extraction sites and processing area would be fenced, bunded, and access would be controlled;
- the extraction sites and processing area would be surrounded by a planted setback area in which weeds would be controlled; and
- the extraction site would be progressively rehabilitated with non-invasive species throughout the life of the Project.

#### *All direct and indirect impacts*

Direct impacts are expected to be limited to periodic loss of vegetation cover and relocation of topsoil and organic material predominantly within the extraction sites (Idyll Spaces, 2008). However, as discussed above, this is considered to have little impact on Threatened fauna species.

Indirect impacts may include an increase in the density of exotic grass and weed infestations on the Project Site.

*The frequency and duration of each known or likely impact/action.*

Direct impacts arising from loss of vegetation cover and relocation of topsoil and organic material predominantly within the extraction sites, and indirect impacts such as an increase in the density of exotic grass and weed infestations, would be ongoing for the life of the Project, estimated as 20 years.

*The total impact, which can be attributed to that action over the entire geographic area affected, and over time*

Similar activities are currently being undertaken adjoining the Project Site to the southwest. A wastewater treatment plant is also being developed on land to the northwest of the Project Site. As these Projects are on previously cleared land of little habitat value for native fauna species. The total impact in the geographic area over time is not expected to be of any greater magnitude than that currently approved.

*The sensitivity of the receiving environment*

There is no evidence to indicate that the receiving environment might be sensitive to the impacts of the proposed action.

*The degree of confidence with which the impacts of the action are known and understood*

The long history of disturbance on the Project Site has significantly lowered the fauna habitat value of the Project Site. Therefore, the impacts of The Proposal on fauna can confidently be predicted to be minimal.

### **6.3.2 Key Threatening Processes and Threat Abatement Plans**

Schedule 3 of the TSC Act lists “key threatening processes” identified by the NSW Scientific Committee, the list of gazetted key threatening processes is available on the DECC threatened species website. This list was reviewed on 28 March 2008.

The following key threatening processes or proposed key threatening processes are considered to be currently operating within the Study Area.

- Predation by feral cats - key threatening process declaration, although not recorded within the Study Area feral cats are expected to occur.
- Predation by the European Red Fox - key threatening process declaration, the European Red Fox was recorded within the Study Area during the field survey.
- Predation by the Plague Minnow (*Gambusia holbrooki*) - key threatening process declaration, Plague Minnow were recorded in the drains within the Study Area.
- Invasion and establishment of the Cane Toad - proposed key threatening process declaration, the Cane Toad was recorded within the Study Area during the field survey.

It is expected that the Project would not significantly contribute to the listed key threatening processes, namely:

- clearing of native vegetation;
- lantana camara (proposed key threatening process); and
- invasion of native plant communities by exotic perennial grasses,

to the extent that a significant impact would occur on Threatened species known to occur on or near the Study Area or considered possible or likely to occur within the Study Area.

The TSC Act requires that the DECC (NPWS) prepare a threat abatement plan for each key threatening process. To date, the NPWS has prepared two threat abatement plans these being:

- Threat Abatement Plan for Predation by the Red Fox (*Vulpes vulpes*), (NPWS 2001); and
- Threat Abatement Plan for Predation by *Gambusia holbrooki* – The Plague Minnow. (NPWS 2003).

It is considered that predation by the Red Fox is currently operating within the Study Area. It is also considered that the future land use to be created by the Project will lower the habitat available for the Red Fox. Furthermore, it is considered that the Project is consistent with the objectives of the plan and that high priority TSC Act Threatened species identified in the plan are not considered likely to occur within the Study Area.

It is considered that predation by the plague minnow is currently operating within the Study Area. This key threatening process originated due to the predation of Threatened frog species by Plague Minnow, however, no Threatened frog species were recorded within the Study Area or are considered likely to occur within the Study Area. It is also considered that the final to be created by the Project will increase the habitat available for the Plague Minnow and hence it is expected that the lake would not become suitable habitat for Threatened frog species. No ameliorative measures are recommended to control the Plague Minnow as the threat abatement plan recognises that such measures are generally ineffective.

### 6.3.3 Recovery Plans

A full list of the final and draft recovery plans for TSC Act Threatened species prepared by the (DECC) is available on the DECC Threatened species website. This list was reviewed on 28 March 2008. The recovery plans which may have some relevance to the Project due to the listing of Threatened species in the locality of the Study Area as indicated on **Table 2** or predicted occurrence as indicated on **Table 4** are:

- Barking Owl - draft recovery plan;
- Koala - draft recovery plan;
- Large Forest Owls - draft recovery plan; and
- Mitchell's Rainforest Snail - recovery plan.

These plans are referred to in the individual “7 Part Tests” attached as **Appendix 6**.

#### 6.3.4 Test of Significance (7 Part Test)

Individual “7 Part Tests” have been prepared separately for each TSC Act Threatened species confirmed as occurring within the Study Area, or considered as likely or possible to occur within the Study Area. These are provided in **Appendix 6**. The 7 Part Tests completed are consistent with the DECC Threatened Species Assessment Guidelines (DECC 2007) as published in the NSW Government Gazette on 25 January 2008.

### 6.4 EPBC Act Matters and Assessment

#### 6.4.1 Introduction

A search of the DEWR EPBC Act Protected Matters Report conducted on 20 February 2006 indicated that there are no world heritage properties, no national heritage places, no wetlands of international significance (Ramsar Sites) or any Threatened ecological communities known or predicted to occur within 5km of the Study Area. The search did indicate that 42 Threatened species and 30 migratory species are predicted or known to occur within 5km of the Study Area.

Species from this search (i.e. non marine species etc) considered relevant to the Study Area and surrounding habitat are listed in **Table 4**. However, the search is not comprehensive and other migratory species covered by the provisions of the EPBC Act have also been assessed. As the Study Area may provide habitat for some EPBC Act Threatened and or migratory species an assessment of the significance of the potential impact of the Project on these species using the administrative guidelines is provided in the following subsections.

In regard to other requirements of the EPBC Act it can be stated that the Project will not affect a Commonwealth marine area and is not a nuclear action.

#### 6.4.2 EPBC Act Threatened Species Recovery Plans

There has been no recovery plan prepared for the Grey-headed Flying-fox, an EPBC Act vulnerable species, recorded flying over the Study Area. A number of other EPBC Act Threatened species are considered, as listed in **Table 4**, as likely to occur in the Study Area. Of these species, recovery plans have been prepared for the Swift Parrot and Regent Honeyeater. It is considered that the Project is not inconsistent with the actions described in the plans as the Study Area does not contain favoured habitat for either species as described in their respective recovery plans. For other EPBC Act Threatened species listed in **Table 4**, no recovery plans have been prepared. However, supplements to assist in providing administrative guideline assessments have been prepared for the Grey-headed Flying-fox and Spotted-tailed Quoll and are referred to below.

#### 6.4.3 Impact on EPBC Act Threatened Species (Administrative Guidelines)

The guidelines to the EPBC Act utilise eight tests to examine whether an action has, would have, or is likely to have a significant impact on a federally listed endangered or vulnerable species, and therefore, whether the action would need to be referred to the Commonwealth Environment Minister.

**Table 4** provides a list of EPBC Act species confirmed or considered as possible occurrences within the Study Area. The Grey-headed Flying-fox was observed flying over the Study Area during the field surveys, this species is listed as vulnerable under the provisions of the EPBC Act. Other EPBC Act Threatened species listed in **Table 4** are not considered likely occurrences. The eight tests have therefore been applied to the Grey-headed Flying-fox as follows.

**(a) Does, will, or is the activity likely to lead to a long-term decrease in the size of a population/ important population?**

It is considered that the Study Area does not contain important habitat resources for the Grey-headed Flying-fox. Therefore, the Project is not likely to lead to a long-term decrease in the size of the Grey-headed Flying-fox.

**(b) Does, will, or is the activity likely to reduce the area of occupancy of the species/important population?**

As the area to be cleared is already substantially disturbed and is small compared to the range of the Grey-headed Flying-fox, it is considered that the Project is unlikely to reduce the area of occupancy for the Grey-headed Flying-fox.

**(c) Does, will, or is the activity likely to fragment an existing population/important population into two or more populations?**

As the Grey-headed Flying-fox is a highly mobile flying species, the Project is very unlikely to fragment the existing Grey-headed Flying-fox population into two or more populations.

**(d) Does, will, or is the activity likely to adversely affect habitat critical to the survival of a species?**

The Study Area does not contain known or potential important habitat for the Grey-headed Flying-fox or other potentially occurring EPBC Act Threatened species. The Project is therefore unlikely to adversely affect habitat critical to the survival of a species.

**(e) Does, will, or is the activity likely to disrupt the breeding cycle of a population/important population?**

The Study Area does not contain known or potential important breeding habitat for the Grey-headed Flying-fox or other potentially occurring EPBC Act Threatened species. The Project is therefore unlikely to disrupt the breeding cycle of the Grey-headed Flying-fox or other potentially occurring EPBC Act Threatened species.

**(f) Does, will, or is the activity likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

The Study Area currently is in a highly disturbed state. Therefore, the Project will not further modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the Grey-headed Flying-fox or other potentially occurring EPBC Act Threatened species is likely to decline.

**(g) Does, will, or is the activity likely to result in invasive species that are harmful to endangered/vulnerable species becoming established in the endangered/vulnerable species' habitat?**

Invasive species harmful to potential endangered/vulnerable species' habitat are already well established in the Study Area. It is considered that the Project would not lead to further establishment of invasive species.



**(h) Does, will, or is the activity likely to interfere with the recovery of the species?**

The Study Area currently is in a highly disturbed state therefore the Project will not further interfere with the recovery of the Grey-headed Flying-fox or other potentially occurring EPBC Act Threatened species.

**6.4.4 Impact on EPBC Act Migratory Species**

Migratory species listed in **Appendix 3** and **Table 5** can be identified as occurring in two groups, the first being those species for which the Study Area or surrounding area may provide suitable habitat, and those species for which the Study Area or nearby area does not provide suitable habitat. The second group are identified as having a “Nil” possibility of occurring within the Study Area and are not further discussed in this report. The first group can be further divided into:

- locally occurring resident species likely to use the wetland habitat attributes of the Study Area and adjoining areas;
- non-breeding Asian migrants likely to use wetland attributes eg Latham’s Snipe;
- non-breeding migrant aerial insectivores from Asia eg White-throated Needletails;
- resident birds of prey that are wide-ranging at low density, with relatively large foraging ranges, and likely to use open areas eg Black-shouldered Kite, Whistling Kite, Spotted Harrier, Little Eagle, Brown Falcon, Hobby, Kestrel) water bodies and wetlands, open forest (Baza, Square-tailed Kite, goshawks, Sparrowhawk, Wedge-tailed Eagle);
- small birds likely to breed in habitats of the Study Area eg Rainbow Bee-eater (riparian sand banks and other open sandy areas), Leaden Flycatcher and Rufous Songlark in adjoining forest and woodland (Higgins 1999); and
- small birds of wet eucalypt forest and swamp sclerophyll forest likely to pass through the Study Area and adjoining areas as they seasonally move up and down eastern Australia eg Black-faced Monarch, Spectacled Monarch, Rufous Fantail.

The guidelines to the EPBC Act also utilise the following tests to examine whether an action has, would have, or is likely to have a significant impact on a terrestrial migratory species listed under the provisions of the EPBC Act.

**(a) Does, would, or is the activity likely to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species?**

No. As the Study Area is already highly modified the Project is unlikely to substantially further modify, destroy or isolate an area of important habitat of any of the migratory species considered as possible occurrences in the Study Area (**Table 4**).

**(b) Does, would, or is the activity likely to result in invasive species that is harmful to the migratory species becoming established\* in an area of important habitat of the migratory species?**

No. The activity is not of the type that is likely to result in invasive species that is harmful to the migratory species listed in **Table 4** becoming established in an area of important habitat of the migratory species.

**(c) Does, would, or is the activity likely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species?**

No. As the Study Area does not contain important habitat for the migratory species listed in **Table 4** the Project is unlikely to disrupt their lifecycles.

## **6.5 SEPP 44 Koala Assessment**

The Study Area does not contain any eucalypt trees, therefore, the Study Area is not considered possible Koala habitat. In regard to SEPP 44, as the Study Area does not contain eucalypt trees, the percentage of Schedule 2 tree species within the Study Area is 0%. Therefore the Study Area is not potential Koala habitat as defined in the SEPP.

## **6.6 NPWS Key Habitats and Corridors**

A search of the Canri website (<http://www.canri.nsw.gov.au/>) indicated that the Project Site lies to the west of the Cudgen – Wommin regional corridor identified in the NSW NPWS key habitats and corridor study, (see **Figure 7**).

This corridor was derived from the following fauna assemblages.

- wet escarpment foothills.
- moist escarpment foothills UNC.
- dry coastal foothills UNC.
- coastal complex UNC.

The Project Site also does not contain any identified key habitat. However, the proposed and alternative eastern pipeline corridors traverse the Cudgen – Wommin regional corridor and the proposed eastern pipeline corridor passes through an area of identified key habitat. As the laying of the pipelines would not require the clearing of any vegetation and would not restrict the passage of fauna species, it is considered that there would be no significant impacts upon the regional corridor or key habitat.

## **7 CONCLUSION**

It is considered that past land uses have severely modified the fauna habitat within the Study Area to the extent that the Study Area has little native fauna habitat value. Nevertheless impact assessments using the Section 4A assessment of the EP&A Act i.e. a “seven part test” have been prepared for TSC Act Threatened species likely to occur on or in the vicinity of the Study Area. These assessments indicate that the Project will not have a significant impact on these species provided that the recommended ameliorative measures are implemented. Likewise an assessment using the “Environmental Guidelines” under the EPBC Act for migratory and Threatened species recorded on or in the vicinity of the Study Area, or considered likely to occur on or near the Study Area, indicated that the Project will not cause a significant impact on these species and hence the referral of the Project to the Commonwealth Environment Minister is not considered necessary.

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# APPENDICES

(No. of pages excluding this page = 131)

Appendix 1	TSC Act Threatened Fauna Species as listed on the DECC Website
Appendix 2	Threatened Fauna Species and Likely Occurrence in the Study Area
Appendix 3	List of Birds under the Migratory Provisions of the EPBC Act
Appendix 4	Field Survey Species List
Appendix 5	EPBC Protected Matters Report
Appendix 6*	Seven Part Tests for TSC Act Threatened Fauna Species -Study Area

\* Note: Not included within hard copy. A copy has been provided on the Project CD.

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# Appendix 1

## TSC Act Threatened Fauna Species as listed on the DECC Website

(No. of pages excluding this page = 3)



## Appendix 1

### TSC Act Threatened fauna species potentially/known to occur in the Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area as listed on the DECC Threatened species website

Page 1 of 3

Threatened species known or predicted to occur in the Murwillumbah (Qld - Southeast Hills and Ranges) CMA sub-region				
Scientific Name	Common Name	Type of species	Level of Threat	Known or Predicted to occur
<i>Aepyprymnus rufescens</i>	Rufous Bettong	Animal > Marsupials	Vulnerable	Known
<i>Amaurornis olivaceus</i>	Bush-hen	Animal > Birds	Vulnerable	Known
<i>Anseranas semipalmata</i>	Magpie Goose	Animal > Birds	Vulnerable	Known
<i>Argyreus hyperbius</i>	Laced Fritillary	Animal > Invertebrates	Endangered	Known
<i>Assa darlingtoni</i>	Pouched Frog	Animal > Amphibians	Vulnerable	Known
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Animal > Birds	Vulnerable	Known
<i>Burhinus grallarius</i>	Bush Stone-curlew	Animal > Birds	Endangered	Known
<i>Cacophis harriettae</i>	White-crowned Snake	Animal > Reptiles	Vulnerable	Predicted
<i>Calidris alba</i>	Sanderling	Animal > Birds	Vulnerable	Known
<i>Calidris tenuirostris</i>	Great Knot	Animal > Birds	Vulnerable	Known
<i>Calyptrorhynchus banksii</i>	Red-tailed Black-Cockatoo	Animal > Birds	Vulnerable	Known
<i>Calyptrorhynchus lathamii</i>	Glossy Black-cockatoo	Animal > Birds	Vulnerable	Known
<i>Caretta caretta</i>	Loggerhead Turtle	Animal > Reptiles	Endangered	Known
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Animal > Marsupials	Vulnerable	Predicted
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Animal > Bats	Vulnerable	Predicted
<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat	Animal > Bats	Vulnerable	Predicted
<i>Charadrius leschenaultii</i>	Greater Sand-plover	Animal > Birds	Vulnerable	Known
<i>Charadrius mongolus</i>	Lesser Sand-plover	Animal > Birds	Vulnerable	Known
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	Animal > Reptiles	Vulnerable	Known
<i>Coracina lineata</i>	Barred Cuckoo-shrike	Animal > Birds	Vulnerable	Known
<i>Crinia tinnula</i>	Wallum Froglet	Animal > Amphibians	Vulnerable	Known
<i>Cyclopsitta diophthalma coxeni</i>	Double-eyed Fig-Parrot	Animal > Birds	Endangered	Known
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Animal > Marsupials	Vulnerable	Known
<i>Dermochelys coriacea</i>	Leathery Turtle	Animal > Reptiles	Vulnerable	Predicted
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Animal > Birds	Endangered	Known
<i>Erythrorhynchus radiatus</i>	Red Goshawk	Animal > Birds	Endangered	Known
<i>Esacus neglectus</i>	Beach Stone-curlew	Animal > Birds	Endangered	Known
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Animal > Bats	Vulnerable	Predicted
<i>Grus rubicundus</i>	Brolga	Animal > Birds	Vulnerable	Known
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	Animal > Birds	Vulnerable	Known

## Appendix 1

TSC Act Threatened fauna species potentially/known to occur in the Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area as listed on the DECC Threatened species website

Page 2 of 3

Threatened species known or predicted to occur in the Murwillumbah (Qld - Southeast Hills and Ranges) CMA sub-region				
Scientific Name	Common Name	Type of species	Level of Threat	Known or Predicted to occur
<u><i>Haematopus longirostris</i></u>	<u>Pied Oystercatcher</u>	Animal > Birds	Vulnerable	Known
<u><i>Hoplocephalus stephensii</i></u>	<u>Stephens' Banded Snake</u>	Animal > Reptiles	Vulnerable	Known
<u><i>Irediparra gallinacea</i></u>	<u>Comb-crested Jacana</u>	Animal > Birds	Vulnerable	Known
<u><i>Ixobrychus flavicollis</i></u>	<u>Black Bittern</u>	Animal > Birds	Vulnerable	Known
<u><i>Lathamus discolor</i></u>	<u>Swift Parrot</u>	Animal > Birds	Endangered	Known
<u><i>Lichenostomus fasciocularis</i></u>	<u>Mangrove Honeyeater</u>	Animal > Birds	Vulnerable	Known
<u><i>Limicola falcinellus</i></u>	<u>Broad-billed Sandpiper</u>	Animal > Birds	Vulnerable	Predicted
<u><i>Limosa limosa</i></u>	<u>Black-tailed Godwit</u>	Animal > Birds	Vulnerable	Known
<u><i>Litoria brevipalmata</i></u>	<u>Green-thighed Frog</u>	Animal > Amphibians	Vulnerable	Predicted
<u><i>Litoria olongburensis</i></u>	<u>Olongburra Frog</u>	Animal > Amphibians	Vulnerable	Known
<u><i>Long-nosed potoroo</i></u> - <u>endangered population</u>	<u>Long-nosed potoroo population at Cobaki Lakes and Tweed Heads West</u>	Animal > Endangered Populations	Endangered Population	Known
<u><i>Lophoictinia isura</i></u>	<u>Square-tailed Kite</u>	Animal > Birds	Vulnerable	Known
<u><i>Maccullochella ikei</i></u>	<u>Eastern cod</u>	Animal > Fish	Endangered	Known
<u><i>Menura alberti</i></u>	<u>Albert's Lyrebird</u>	Animal > Birds	Vulnerable	Known
<u><i>Miniopterus australis</i></u>	<u>Little Bentwing-bat</u>	Animal > Bats	Vulnerable	Known
<u><i>Miniopterus schreibersii oceanensis</i></u>	<u>Eastern Bentwing-bat</u>	Animal > Bats	Vulnerable	Known
<u><i>Mixophyes iteratus</i></u>	<u>Giant Barred Frog</u>	Animal > Amphibians	Endangered	Known
<u><i>Monarcha leucotis</i></u>	<u>White-eared Monarch</u>	Animal > Birds	Vulnerable	Known
<u><i>Mormopterus beccarii</i></u>	<u>Beccari's Freetail-bat</u>	Animal > Bats	Vulnerable	Known
<u><i>Mormopterus norfolkensis</i></u>	<u>Eastern Freetail-bat</u>	Animal > Bats	Vulnerable	Known
<u><i>Myotis adversus</i></u>	<u>Large-footed Myotis</u>	Animal > Bats	Vulnerable	Known
<u><i>Nannoperca oxleyana</i></u>	<u>Oxleyan pygmy perch</u>	Animal > Fish	Endangered	Known
<u><i>Ninox connivens</i></u>	<u>Barking Owl</u>	Animal > Birds	Vulnerable	Known
<u><i>Ninox strenua</i></u>	<u>Powerful Owl</u>	Animal > Birds	Vulnerable	Known
<u><i>Nyctimene robinsoni</i></u>	<u>Eastern Tube-nosed Bat</u>	Animal > Bats	Vulnerable	Known
<u><i>Nyctophilus bifax</i></u>	<u>Eastern Long-eared Bat</u>	Animal > Bats	Vulnerable	Known
<u><i>Pandion haliaetus</i></u>	<u>Osprey</u>	Animal > Birds	Vulnerable	Known
<u><i>Petaurus australis</i></u>	<u>Yellow-bellied Glider</u>	Animal > Marsupials	Vulnerable	Known
<u><i>Petaurus norfolcensis</i></u>	<u>Squirrel Glider</u>	Animal > Marsupials	Vulnerable	Known
<u><i>Phascolarctos cinereus</i></u>	<u>Koala</u>	Animal > Marsupials	Vulnerable	Known

### Appendix 1

TSC Act Threatened fauna species potentially/known to occur in the Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area as listed on the DECC Threatened species website

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#### Threatened species known or predicted to occur in the Murwillumbah (Qld - Southeast Hills and Ranges) CMA sub-region

Scientific Name	Common Name	Type of species	Level of Threat	Known or Predicted to occur
<i>Planigale maculata</i>	Common Planigale	Animal > Marsupials	Vulnerable	Known
<i>Podargus ocellatus</i>	Marbled Frogmouth	Animal > Birds	Vulnerable	Known
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	Animal > Birds	Vulnerable	Known
<i>Potorous tridactylus</i>	Long-nosed Potoroo	Animal > Marsupials	Vulnerable	Known
<i>Pseudomys gracilicaudatus</i>	Eastern Chestnut Mouse	Animal > Rodents	Vulnerable	Known
<i>Pteropus alecto</i>	Black Flying-fox	Animal > Bats	Vulnerable	Known
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Animal > Bats	Vulnerable	Known
<i>Ptilinopus magnificus</i>	Wompoo Fruit-dove	Animal > Birds	Vulnerable	Known
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove	Animal > Birds	Vulnerable	Known
<i>Ptilinopus superbus</i>	Superb Fruit-dove	Animal > Birds	Vulnerable	Known
<i>Rostratula benghalensis</i>	Painted Snipe	Animal > Birds	Endangered	Known
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Animal > Bats	Vulnerable	Known
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Animal > Bats	Vulnerable	Known
<i>Sterna albifrons</i>	Little Tern	Animal > Birds	Endangered	Known
<i>Stictonetta naevosa</i>	Freckled Duck	Animal > Birds	Vulnerable	Known
<i>Syconycteris australis</i>	Common Blossom-bat	Animal > Bats	Vulnerable	Known
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail	Animal > Invertebrates	Endangered	Known
<i>Thylogale stigmatica</i>	Red-legged Pademelon	Animal > Marsupials	Vulnerable	Known
<i>Todiramphus chloris</i>	Collared Kingfisher	Animal > Birds	Vulnerable	Known
<i>Tyto capensis</i>	Grass Owl	Animal > Birds	Vulnerable	Known
<i>Tyto novaehollandiae</i>	Masked Owl	Animal > Birds	Vulnerable	Known
<i>Tyto tenebricosa</i>	Sooty Owl	Animal > Birds	Vulnerable	Known
<i>Xanthomyza phrygia</i>	Regent Honeyeater	Animal > Birds	Endangered	Known
<i>Xenus cinereus</i>	Terek Sandpiper	Animal > Birds	Vulnerable	Known

# Appendix 2

## Threatened Fauna Species and Likely Occurrence within the Study Area

(No. of pages excluding this page = 20)

## APPENDIX 2

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
Long-nosed potoroo - endangered population	Long-nosed potoroo population at Cobaki Lakes and Tweed Heads West	E (pop)	The population prefers habitat characterised by dense groundcover for shelter proximate to open areas for foraging. These include mallee heathland, Tree Broom heathland, Scribbly Gum/Swamp Mahogany forest and She-oak heathland. Long-nosed Potoroos are generally restricted to areas with an annual rainfall greater than 760 mm where they inhabit dry and wet sclerophyll forests and woodland with a heathy understorey with the preferred habitat in north eastern NSW being dry and wet open shrubland. Long-nosed Potoroos breed throughout the year with peaks at the end of winter or early spring, and again in late summer. Females tend to begin breeding at one year of age and a single pouch young is reared at a time. Individuals can live for up to seven years in the wild.	Nil – The Study Area is not within the distributional limit of the population
<i>Argyreus hyperbius</i>	Laced Fritillary	E	Laced Fritillary is found in open swampy coastal habitat. Eggs are laid singly on a leaf of the caterpillar's food plant a native Violet, <i>Viola betonicifolia</i> . The food plant occurs in ground level vegetation in swampy areas beneath grasses and Lomandra. Many former sites have been destroyed and records now only occur from a few widely separated sites. Adults feed from flowers and fly during most months.	Unlikely - The occurrence of <i>Viola betonicifolia</i> on the Study Area is unlikely (Elks G. pers comm.)
<i>Nannoperca oxleyana</i>	Oxleyan Pygmy Perch	E	Swamps with prolific sedge growth, gently flowing streams and dune lakes in areas of coastal heathland (Allen et al 2002), Lotic and lentic habitats within wallum ecosystems, most creek sites have riparian cover various extensive leaf litter beds, emergent macrophytes and sub-merged species provide in stream cover ( Pusey et al 2004).	Nil - No suitable water body occurs as habitat for this species within the Study Area.
<i>Maccullochella ikei</i>	Eastern cod	E	Eastern cod are often found in clear, flowing streams with rocky beds and deep holes. They are generally found in areas that have plenty of boulders or large woody debris (snags). Riparian vegetation, large boulders and snags provide a complex array of habitats for each stage of the cod life cycle and influence the quality and quantity of food and shelter. Eastern cod are sexually mature at 4 or 5 years old, when 700g to 1.5kg. The breeding season is in spring and spawning commences when water temperatures rise above 16oC. Breeding fish are territorial and aggressive. Cod lay large (3mm) strongly adhesive eggs onto hard surfaces, probably rocks and logs in the wild. The number of eggs produced is relatively low and similar to Murray cod (3.2 7.6 eggs/gram of female bodyweight). Hatching begins at 8 days and is complete 12 days after fertilisation at 17oC – 20oC. Larvae start feeding on zooplankton 12 days after hatching. Eastern cod prey upon other fish, frogs, crustaceans and snakes. Zooplankton and aquatic insects are the main food source for eastern cod larvae.	Nil - No suitable water body occurs as habitat for this species within the Study Area.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	Giant Barred Frogs forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer. Females lay eggs onto moist creek banks or rocks above water level, from where tadpoles drop into the water when hatched. Tadpoles grow to a length of 80 mm and take up to 14 months before changing into frogs. When not breeding the frogs disperse hundreds of metres away from streams. They feed primarily on large insects and spiders.	Nil - No suitable water body occurs as habitat for this species within the Study Area.
<i>Caretta caretta</i>	Loggerhead Turtle	E	Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The female comes ashore to lay her eggs in a hole dug on the beach in tropical regions during the warmer months.	Nil - No suitable habitat for this species occurs within the Study Area.
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water on a variety of prey including fish, frogs, eels, turtles, crabs and snakes. Breeds in late summer in the north, and early summer further south. A large nest, up to 2 m in diameter, is made in a live or dead tree, in or near a freshwater swamp. Two to four eggs are laid; incubation is by both parents.	Possible - Occasionally may forage within the Study Area.
<i>Erythrotriorchis radiatus</i>	Red Goshawk	E	In NSW, the Red Goshawk is mainly found along or near watercourses, in swamp forest and woodlands on the coastal plain. It favours patches of dense forest interspersed with open woodland or cleared land and often frequents forest edges.	Unlikely - Although suitable habitat appears to occur close to the Study Area the closest record of this species occurring to the Study Area is 20kms and this was in 1985.
<i>Rostratula benghalensis</i>	Painted Snipe	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Possible - Suitable habitat occurs at the eastern end of the eastern pipeline corridors.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	Nil - No suitable habitat for this species within the Study Area.
<i>Esacus neglectus</i>	Beach Stone-curlew	E	Occurs on open, undisturbed beaches, islands, reefs, and estuarine intertidal sandflats and mudflats; beaches with estuaries or mangroves nearby are preferred; may also frequent river mouths, offshore sandbars and rock platforms. Individuals forage with slow deliberate heron-like actions. The diet consists of crabs and other marine invertebrates. Less strictly nocturnal than the Bush Stone-curlew. Breeding occurs from September to November, with nests being located on sandbanks, spits or islands in estuaries, among mangroves, or in sand surrounded by short grasses and scattered casuarinas. One egg is laid, and both parents care for the young until independence is reached at seven to twelve months.	Nil - No suitable habitat for this species within the Study Area.
<i>Sterna albifrons</i>	Little Tern	E	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. The nest is a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles. Both parents incubate up to three well-camouflaged eggs for up to 22 days, aggressively defending the nest against intruders until the young fledge at 17 - 19 days. Often seen feeding in flocks, foraging for small fish, crustaceans, insects, annelids and molluscs by plunging in the shallow water of channels and estuaries, and in the surf on beaches, or skipping over the water surface with a swallow-like flight.	Nil - No suitable habitat for this species within the Study Area.
<i>Cyclopsitta diophthalma coxeni</i>	Double-eyed Fig-Parrot	E	Usually recorded from drier rainforests and adjacent wetter eucalypt forest but rarely seen due to its small size and cryptic habits. Also found in the wetter lowland rainforests that are now largely cleared in NSW. The bird shows a decided preference for fig trees, but also feeds on other fruiting rainforest species.	Nil - No suitable habitat for this species within the Study Area.
<i>Lathamus discolor</i>	Swift Parrot	E	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> . Return to home foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum <i>E. globulus</i> .	Unlikely – Favoured food tree species not present on the Study Area.



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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	The Regent Honeyeater is a flagship Threatened woodland bird whose conservation will benefit a large suite of other Threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises : <i>E. microcarpa</i> , <i>E. punctata</i> , <i>E. polyanthemos</i> , <i>E. mollucana</i> , <i>Corymbia robusta</i> , <i>E. crebra</i> , <i>E. caleyi</i> , <i>Corymbia maculata</i> , <i>E. mckieana</i> , <i>E. macrorhyncha</i> , <i>E. laevopinea</i> , and <i>Angophora floribunda</i> . Nectar and fruit from the mistletoes <i>A. miquelii</i> , <i>A. pendula</i> , <i>A. cambagei</i> are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings. A shrubby understorey is an	Unlikely – Favoured food tree species not present on the Study Area.
<i>Xanthomyza phrygia</i> (Cont'd)	Regent Honeyeater	E	important source of insects and nesting material. Colour-banding of Regent Honeyeater has shown that the species can undertake large-scale nomadic movements in the order of hundreds of kilometres. However, the exact nature of these movements is still poorly understood. It is likely that movements are dependent on spatial and temporal flowering and other resource patterns. To successfully manage the recovery of this species a full understanding of the habitats used in the non-breeding season is critical. There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria. An open cup-shaped nest is constructed of bark, grass, twigs and wool by the female. Two or three eggs are laid and incubated by the female for 14 days. Nestlings are brooded and fed by both parents at an average rate of 23 times per hour and fledge after 16 days. Fledglings fed by both parents 29 times per hour.	

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail	E	Remnant areas of lowland subtropical rainforest and swamp forest on alluvial soils. Slightly higher ground around the edges of wetlands with palms and fig trees are particularly favoured habitat. Typically found amongst leaf litter on the forest floor, and occasionally under bark in trees. Active at night and feeds on leaf litter, fungi and lichen.	Unlikely - marginal habitat occurs at the eastern end of the proposed eastern pipeline corridor and along the alternative eastern pipeline corridor.
<i>Assa darlingtoni</i>	Pouched Frog	V	Montane forests in northern NSW and south-eastern Queensland (Anstis 2002).	Nil - No suitable water body occurs as habitat for this species within the Study Area.
<i>Crinia tinnula</i>	Wallum Froglet	V	Wallum Froglets are found only in acid paperbark swamps and sedge swamps of the coastal "wallum" country. The species is a late winter breeder. Males call in choruses from within sedge tussocks or at the water edge.	Known to occur at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor - No suitable habitat elsewhere for this species within the Study Area.
<i>Litoria brevipalmata</i>	Green-thighed Frog	V	Green-thighed Frogs occur in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. Breeding occurs following heavy rainfall in late spring and summer, with frogs aggregating around grassy semi-permanent ponds and flood-prone grassy areas. The frogs are thought to forage in leaf-litter.	Unlikely - Systematic field surveys after rain events failed to locate the species in suitable habitat at the eastern end of the eastern pipeline corridors, (Kendall & Kendall 2004); no suitable habitat for this species elsewhere on the Study Area.
<i>Litoria olongburensis</i>	Olongburra Frog	V	Paperbark swamps and sedge swamps of the coastal "wallum country". Wallum is a Banksia dominated lowland heath ecosystem characterised by acidic waterbodies. Olongburra Frogs are usually found amongst sedges and rushes in coastal wetlands.	Unlikely - Systematic field surveys after rain events failed to locate the species at the eastern end of the eastern pipeline corridors, (Kendall & Kendall 2004); no preferred habitat for this species on the Study Area.
<i>Dermochelys coriacea</i>	Leathery Turtle	V	Occurs in inshore and offshore marine waters. Rarely breeds in Australia, with the nearest regular nesting sites being the Solomon Islands and Malayan Archipelago. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW. Number of sightings in southern waters suggest species actively seeks temperate feeding grounds, rather than occurring only as stray vagrants. Feed on jellyfish.	Nil - No suitable habitat for this species occurs within the Study Area.
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	V	Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. The Three-toed Snake-tooth Skink lives in loose soil, leaf litter and rotting logs, and feeds on earthworms and beetle grubs.	Nil - No suitable habitat for this species occurs within the Study Area.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Cacophis harriettae</i>	White-crowned Snake	V	Favours low to mid-elevation dry eucalypt forest and woodland, particularly areas with a varied and well-developed litter layer, where their prey of small lizards may be more abundant. Also occasionally found in moist eucalypt forest and coastal heathland.	Unlikely - Favoured habitat not present within the Study Area.
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake	V	Rainforest and eucalypt forests and rocky areas up to 950 m in altitude. Stephens' Banded Snake is nocturnal, and shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day. At night it hunts frogs, lizards, birds and small mammals.	Nil - No suitable habitat for this species within the Study Area.
<i>Stictonetta naevosa</i>	Freckled Duck	V	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates. Nesting usually occurs between October and December but can take place at other times when conditions are favourable. Nests are usually located in dense vegetation at or near water level.	Unlikely - Low possibility of the species using the Study Area during inland droughts
<i>Anseranas semipalmata</i>	Magpie Goose	V	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	Possible - Occasionally may forage within the Study Area.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	V	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes ( <i>Typha</i> spp.) and spikerushes ( <i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch.	Unlikely - Due to lack of suitable habitat with permanent deeper water)

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Ixobrychus flavicollis</i>	Black Bittern	V	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again. Generally solitary, but occurs in pairs during the breeding season, from December to March. Like other bitterns, but unlike most herons, nesting is solitary. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young.	Possible - Suitable habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.
<i>Grus rubicundus</i>	Brolga	V	Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged. They feed using their heavy straight bill as a crowbar to probe the ground or turn it over, primarily on sedge roots and tubers. They will also take large insects, crustaceans, molluscs and frogs. The famous Brolga dance is apparently at least in part a courtship or bonding display where a pair or many pairs face each other, crouch down and stretch upwards, trumpet, leap and toss grass and sticks into the air. The nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water. Two eggs are laid from winter to autumn.	Possible - Occasionally may forage within the Study Area.
<i>Lophoictinia isura</i>	Square-tailed Kite	V	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km <sup>2</sup> . Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Possible - Suitable habitat occurs close to the Study Area.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Pandion haliaetus</i>	Osprey	V	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. Incubation of 2-3 eggs, usually by the female, is about 40 days. Female remains with young almost until they fly, usually after about nine weeks in the nest.	Possible - The Osprey may occasionally fly over the Study Area.
<i>Amauornis olivaceus</i>	Bush-hen	V	Occurs in a variety of coastal wetlands from mangroves, lagoons and swamps, to river margins and creeks running through rainforest. It has also been recorded away from water in dense low vegetation, including Bladey Grass and the introduced Lantana.	Known to occur in suitable habitat at the eastern end of the proposed eastern pipeline corridor. Suitable habitat for this species occurs along the alternative eastern pipeline corridor but is not present elsewhere within the Study Area.
<i>Calidris alba</i>	Sanderling	V	Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands. Generally occurs in small flocks, however may associate freely with other waders. Individuals run behind receding waves, darting after insects, larvae and other small invertebrates in the sand, then dart back up the beach as each wave breaks. Also feeds on plants, seeds, worms, crustaceans, spiders, jellyfish and fish, foraging around rotting heaps of kelp, at the edges of shallow pools on sandspits and on nearby mudflats. Roosts on bare sand, behind clumps of beach-cast kelp or in coastal dunes. Breeding occurs in the Northern Hemisphere.	Nil - No suitable habitat for this species within the Study Area.
<i>Calidris tenuirostris</i>	Great Knot	V	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. Most birds return north in March and April, however some individuals may stay over winter in Australia. Forages for food by methodically thrusting its bill deep into the mud to search for invertebrates, such as bivalve molluscs, gastropods, polychaete worms and crustaceans.	Nil - No suitable habitat for this species within the Study Area.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V	Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches. The species is an active forager, typically feeding by rapidly and repeatedly jabbing its bill into soft wet mud. Feeding also occurs while wading, often in water so deep that they have to submerge their heads and necks in order to probe the underlying mud. Their diet includes insects, crustaceans, molluscs, worms and seeds. Individuals are strongly migratory and only mildly gregarious when not breeding. Large flocks are seldom recorded and birds are often either encountered alone or feeding with other waders such as Red-necked Stints or Curlew Sandpipers.	Nil - No suitable habitat for this species within the Study Area.
<i>Limosa limosa</i>	Black-tailed Godwit	V	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works. Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Roosts and loafs on low banks of mud, sand and shell bars. Frequently recorded in mixed flocks with Bar-tailed Godwits.	Nil - No suitable habitat for this species within the Study Area.
<i>Xenus cinereus</i>	Terek Sandpiper	V	In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species. Breaks up into smaller flocks or even solitary birds when feeding in open intertidal mudflats. The diet includes worms, crabs and other crustaceans, small shellfish and the adults and larvae of various flies, beetles and water-bugs. Feeding is undertaken by moving rapidly and erratically over soft, wet mud, pecking or probing at the surface.	Nil - No suitable habitat for this species within the Study Area.
<i>Irediparra gallinacea</i>	Comb-crested Jacana	V	Inhabits permanent wetlands with a good surface cover of floating vegetation, especially water-lilies. Pairs and family groups forage across floating vegetation, walking with a characteristic bob and flick, or flying low with toes dangling behind. They feed primarily on insects and other invertebrates, as well as some seeds and other vegetation. Breeds in spring and summer in NSW, in a nest of floating vegetation. The male builds the nest, incubates the eggs and broods the young. Females defend up to four mated males and their territories (the floating vegetation around their nest) from other females. Young birds will dive and stay submerged with just their nostrils exposed for a very long time. Adults will also dive for safety on occasion.	Nil - No suitable habitat for this species within the Study Area.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.	Nil - No suitable habitat for this species within the Study Area.
<i>Haematopus longirostris</i>	Pied Oystercatcher	V	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones. Two to three eggs are laid between August and January. The female is the primary incubator and the young leave the nest within several days.	Nil - No suitable habitat for this species within the Study Area.
<i>Charadrius leschenaultii</i>	Greater Sand-plover	V	Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; begin foraging activity on wet ground at low tide, usually away from the edge of the water; individuals may forage and roost with other waders. Diet includes insects, crustaceans, polychaete worms and molluscs. Prey is detected visually by running a short distance, stopping to look, then running to collect the prey.	Nil - No suitable habitat for this species within the Study Area.
<i>Charadrius mongolus</i>	Lesser Sand-plover	V	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water edge. Diet includes insects, crustaceans, molluscs and marine worms. Prey is usually detected visually with the birds making short, quick runs, with abrupt stops to lunge at the ground or look for prey.	Nil - No suitable habitat for this species within the Study Area.
<i>Ptilinopus magnificus</i>	Wompoo Fruit-dove	V	Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Feeds on a diverse range of tree and vine fruits and is locally nomadic - following ripening fruit; some of its feed trees rely on species such as the this to distribute their seeds. Feeds alone, or in loose flocks at any height in the canopy. Despite its plumage, can be remarkably cryptic as it feeds, with the call and falling fruit being an indication of its presence. The nest is a typical pigeon nest - a flimsy platform of sticks on a thin branch or a palm frond, often over water, usually 3 - 10 m above the ground. Breeds in spring and early summer; a single white egg is laid. Most often seen in mature forests, but also found in remnant and regenerating rainforest. Aspects of its behaviour such as social behaviour and structure, movements and breeding biology have not been well-studied.	Occasionally possible - some rainforest fruit-bearing plants may occur in the swamp sclerophyll woodland on the eastern pipeline corridors and they may attract occasional foraging visits from these fruit eating pigeons.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove	V	Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits. Some populations are migratory in response to food availability - numbers in north-east NSW increase during spring and summer then decline in April or May.	Occasionally possible - some rainforest fruit-bearing plants may occur in the swamp sclerophyll woodland on the eastern pipeline corridors and they may attract occasional foraging visits from these fruit eating pigeons.
<i>Ptilinopus superbus</i>	Superb Fruit-dove	V	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic. There are records of single birds flying into lighted windows and lighthouses, indicating that birds travel at night. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn. Breeding takes place from September to January. The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species. The male incubates the single egg by day, the female incubates at night.	Occasionally possible - some rainforest fruit-bearing plants may occur in the swamp sclerophyll woodland on the eastern pipeline corridors and they may attract occasional foraging visits from these fruit eating pigeons.
<i>Calyptorhynchus banksii</i>	Red-tailed Black-Cockatoo	V	Red-tailed Black-Cockatoos are found in a wide variety of habitats. In coastal north-east NSW they have been recorded in dry open forest and areas of mixed rainforest/eucalypt forest.	Unlikely - minor amount of non favoured habitat within the Study Area
<i>Calyptorhynchus lathami</i>	Glossy Black-cockatoo	V	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak ( <i>Allocasuarina littoralis</i> ), Forest She-oak ( <i>A. torulosa</i> ) or Drooping She-oak ( <i>A. verticillata</i> ) occur. Feeds almost exclusively on the seeds of several species of she-oak ( <i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. One or two eggs are laid between March and August.	Nil - No suitable habitat for this species within the Study Area.



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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Ninox connivens</i>	Barking Owl	V	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large eucalypts. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum ( <i>Eucalyptus camaldulensis</i> ), White Box ( <i>E. albens</i> ), (Red Box) <i>E. polyanthemos</i> and Blakely's Red Gum ( <i>E. blakelyi</i> ). Breeding occurs during late winter and early spring.	Possible - Minor amount of marginal foraging habitat only within the Study Area
<i>Ninox strenua</i>	Powerful Owl	V	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine <i>Syncarpia glomulifera</i> , Black She-oak <i>Allocasuarina littoralis</i> , Blackwood <i>Acacia melanoxylon</i> , Rough-barked Apple <i>Angorophora floribunda</i> , Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of eucalypt species. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. For example in southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute almost all of the prey for a pair of Powerful Owls. Birds comprise about 10% of the diet, with flying foxes important in some areas. As most prey species require hollows and a shrub layer, these are important habitat components for the owl. Pairs of Powerful Owls are believed to have high fidelity to a small number of hollow-bearing nest trees and will defend a large home range of 400-1450 ha. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. During the breeding season, the male Powerful Owl roosts in a "grove" of up to 20-30 trees, situated within 100-200 metres of the nest tree where the female shelters. Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter, but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two dull white eggs and incubation lasts approximately 38 days.	Unlikely - Minor amount of marginal foraging habitat only within the Study Area

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Tyto capensis</i>	Grass Owl	V	Grass Owls are found in areas of tall grass, including grass tussocks in swampy areas, grassy plains, swampy heath, and cane grass, or sedges on flood plains. They rest by day on a trampled platform in a large tussock or other heavy growth. If disturbed they burst out of cover, flying rather slowly, before dropping straight down again into cover. They also nest in trodden-down grass.	Likely - Suitable habitat occurs within the Study Area.
<i>Tyto novaehollandiae</i>	Masked Owl	V	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Possible - Minor amount of marginal foraging habitat only within the Study Area
<i>Tyto tenebricosa</i>	Sooty Owl	V	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum ( <i>Pseudocheirus peregrinus</i> ) or Sugar Glider ( <i>Petaurus breviceps</i> ). Nests in very large tree-hollows.	Nil - No suitable habitat for this species within the Study Area.
<i>Podargus ocellatus</i>	Marbled Frogmouth	V	Prefers subtropical rainforest spending most time in deep, wet, sheltered gullies frequently containing stands of Bangalow Palms. Less frequently it occurs in higher elevation temperate rainforests and wet eucalypt forest with a well-developed rainforest understorey.	Nil - No suitable habitat for this species within the Study Area.
<i>Todiramphus chloris</i>	Collared Kingfisher	V	Collared Kingfishers are virtually restricted to mangroves and other estuarine habitats and mainly occur about the mouths of the larger coastal rivers. They are frequently observed perched on rock walls, jetties, piles and tidal flats and sometimes occur in parks and gardens along foreshores. Nests are usually in a hollow in a mangrove tree or drilled into termite nests in a large eucalypt or paperbark adjacent to mangroves.	Nil - No suitable habitat for this species within the Study Area.
<i>Menura alberti</i>	Albert's Lyrebird	V	Mixed rainforest and wet open forest, frequently dominated by Brush Box. In winter birds commonly forage in moist forest on ridges between wetter forest.	Nil - No suitable habitat for this species within the Study Area.
<i>Lichenostomus fasciularis</i>	Mangrove Honeyeater	V	Primary habitat is mangrove forest but the species also occurs in other near-coastal forests and woodlands, including casuarina and paperbark swamp forests. It sometimes frequents adjacent shrublands and woodlands dominated by banksias and eucalypts. It sometimes visits gardens in coastal towns.	Unlikely - No suitable habitat near the Study Area.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Flight is laborious so birds prefer to hop to the top of a tree and glide down to the next one. Birds are generally unable to cross large open areas. Live in family groups that consist of a breeding pair and young from previous breeding seasons. A group may consist of up to fifteen birds. All members of the family group remain close to each other when foraging. A soft "chuck" call is made by all birds as a way of keeping in contact with other group members. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. Build and maintain several conspicuous, dome-shaped stick nests about the size of a football. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, and old nests are often dismantled to build new ones. Breed between July and February. Usually two to three eggs are laid and incubated by the female. During incubation, the adult male and several helpers in the group may feed the female as she sits on the nest. Young birds are fed by all other members of the group. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year. Territorial disputes with neighbouring groups are frequent and may last up to several hours, with much calling, chasing and occasional fighting.	Unlikely - marginal habitat occurs along the alternative eastern pipeline corridor.
<i>Monarcha leucotis</i>	White-eared Monarch	V	In NSW this species occurs primarily in coastal rainforest, swamp forest and wet eucalypt forest. It appears to favour rainforest edges where trees are frequently covered with vines and through the canopy of more extensive patches of rainforest.	Likely - Suitable habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.
<i>Coracina lineata</i>	Barred Cuckoo-shrike	V	Rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. They are usually seen in pairs or small flocks foraging among foliage of trees for insects and fruit. They are active birds, frequently moving from tree to tree.	Possible - Some rainforest fruit-bearing plants may occur in the swamp sclerophyll woodland on the alternative eastern pipeline corridor and they may attract occasional foraging visits from this species.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and may raid possum and glider dens and prey on roosting birds. Use latrine sites, often on flat rocks among boulder fields and rocky cliff-faces; these may be visited by a number of individuals; latrine sites can be recognised by the accumulation of the sometimes characteristic twisty-shaped faeces deposited by animals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares; usually traverse their ranges along densely vegetated creeklines. Average litter size is five; both sexes mature at about one year of age	Possible - Suitable habitat occurs along the alternative eastern pipeline corridor
<i>Planigale maculata</i>	Common Planigale	V	Common Planigales inhabit rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water. They are active at night and during the day shelter in saucer-shaped nests built in crevices, hollow logs, beneath bark or under rocks. They are fierce carnivorous hunters and agile climbers, preying on insects and small vertebrates, some nearly their own size. They breed from October to January. The female builds a nest lined with grass, eucalypt leaves or shredded bark.	Likely - Suitable habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.
<i>Phascolarctos cinereus</i>	Koala	V	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery. Females breed at two years of age and produce one young per year.	Unlikely - marginal habitat occurs along the alternative eastern pipeline corridor.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum ( <i>Pseudocheirus peregrinus</i> ) dreys or thickets of vegetation, (eg. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. Young can be born whenever food sources are available, however most births occur between late spring and early autumn. Agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal. Frequently spends time in torpor especially in winter, with body curled, ears folded and internal temperature close to the surroundings.	Possible - Suitable habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.
<i>Petaurus australis</i>	Yellow-bellied Glider	V	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive V-shaped scar. Live in small family groups of two - six individuals and are nocturnal. Den, often in family groups, in hollows of large trees. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	Nil - No suitable habitat for this species within the Study Area.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Possible - presence of wattles in marginal habitat along the alternative eastern pipeline corridor.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Aepyprymnus rufescens</i>	Rufous Bettong	V	Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter. They sleep during the day in cone-shaped nests constructed of grass in a shallow depression at the base of a tussock or fallen log. At night they feed on grasses, herbs, seeds, flowers, roots, tubers, fungi and occasionally insects.	Unlikely - marginal habitat occurs along the alternative eastern pipeline corridor
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. Often digs small holes in the ground in a similar way to bandicoots. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha. Breeding peaks typically occur in late winter to early summer and a single young is born per litter. Adults are capable of two reproductive bouts per annum.	Possible - Suitable habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor
<i>Thylogale stigmatica</i>	Red-legged Pademelon	V	Inhabits forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. Wet gullies with dense, shrubby ground cover provide shelter from predators. In NSW, rarely found outside forested habitat. They disperse from dense shelter areas to feed from late afternoon to early morning, favouring native grasses and herbs on the edge of the forest. Also known to feed on fruits, young seedling leaves and stems, fungi and ferns.	Nil - No suitable habitat for this species within the Study Area.
<i>Pseudomys gracilicaudatus</i>	Eastern Chestnut Mouse	V	In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps. In the tropics it is more an animal of grassy woodlands. Optimal habitat appears to be in vigorously regenerating heathland burnt from 18 months to four years previously. By the time the heath is mature, the larger Swamp Rat becomes dominant, and Eastern Chestnut Mouse numbers drop again. Feeds at night via runways through the grassy and sedge understorey, within an area of less than half a hectare. It has a broad diet of grass stems, invertebrates, fungi and seeds, with the relative significance of each component varying seasonally. Up to three litters are produced from spring to autumn; this strategy allows rapid build-up of numbers in years following fire.	Possible - marginal habitat occurs at the eastern end of the eastern pipeline corridors and along the alternative eastern pipeline corridor.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat	V	Favour streamside habitats within coastal subtropical rainforest and moist eucalypt forests with a well-developed rainforest understorey. They feed mainly on fruit and nectar from trees in the rainforest canopy and sometimes come close to human settlement to visit flowering or fruiting trees.	Nil - No suitable habitat for this species within the Study Area.
<i>Pteropus alecto</i>	Black Flying-fox	V	Large communal day-time camps in remnants of coastal subtropical rainforest or swamp forest, often with Grey-headed Flying-foxes. Bats fly out at dusk to feed on rainforest fruits as well as nectar and pollen from flowering eucalypts, paperbarks and banksias. When native foods are scarce, particularly during drought, they take fruit from orchards.	Likely - Recorded flying over the Study Area although no suitable foraging habitat or suitable camp sites occur within the Study Area
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, birth and the rearing of young. Annual mating commences in January and a single young is born each October or November. Site fidelity to camps is high with some caps being used for over a century. Travel up to 50 km to forage. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops and can inflict severe crop damage.	Likely - Recorded flying over the Study Area although, suitable foraging habitat occurs along the alternative eastern pipeline corridor and at the eastern end of the eastern pipeline corridors however is lacking elsewhere within the Study Area.
<i>Syconycteris australis</i>	Common Blossom-bat	V	Common Blossom-bats often roost in littoral rainforest and feed on flowers in adjacent heathland and paperbark swamps. They roost individually in foliage of the sub-canopy, changing roost sites daily, and return to favoured feeding sites on consecutive nights.	Likely - Suitable foraging habitat occurs along the alternative eastern pipeline corridor and at the eastern end of the eastern pipeline corridors however is lacking elsewhere within the Study Area.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	Likely - Recorded flying over the Study Area although no suitable sheltering habitat occurs within the Study Area.

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat	V	A range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses. They can also occur in towns and cities. Roost mainly in tree hollows but relatively large colonies have been found under house roofs in urban areas in Queensland.	Possible - Suitable foraging habitat occurs within the Study Area.
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Solitary and probably insectivorous.	Possible - Suitable foraging habitat occurs within the Study Area.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin ( <i>Hirundo ariel</i> ), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.	Nil - No suitable habitat for this species within the Study Area.
<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat	V	In NSW the Hoary Wattled Bat occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Because it flies fast below the canopy level, forests with naturally sparse understorey layers may provide the best habitat.	Nil - No suitable habitat for this species within the Study Area.
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	Possible - Suitable foraging habitat occurs within the Study Area.
<i>Miniopterus australis</i>	Little Bentwing-bat	V	Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats ( <i>M. schreibersii</i> ) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	Likely - Suitable foraging habitat occurs within the Study Area.



## APPENDIX 2

### Information from the DECC website on Threatened fauna species listed in Appendix 1 and an indication of the likely occurrence of each species within the Study Area

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Scientific Name	Common Name	TSC Act Status	Habitat	Likelihood of Occurrence within the Study Area (author's opinion)
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.	Likely Suitable foraging habitat occurs within the Study Area.
<i>Myotis adversus</i>	Large-footed Myotis	V	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	Likely Suitable foraging habitat occurs within the Study Area.
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark.	Likely Suitable foraging habitat occurs within the Study Area.
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.	Likely Suitable foraging habitat occurs within the Study Area.

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# Appendix 3

## List of Birds under the Migratory Provisions of the EPBC Act

(No. of pages excluding this page = 2)

**Appendix 3 - List of birds covered under the migratory provisions of the EPBC Act  
(<http://www.environment.gov.au/biodiversity/migratory/list.html>)**

- All species in the family Accipitridae for which Australia is a Range State;
- All species in the family Anatidae for which Australia is a Range State;
- All species in the family Charadriidae for which Australia is a Range State;
- All species in the family Falconidae for which Australia is a Range State;
- All species in the family Muscicapidae (*sensu lato*), including the sub-family Sylviinae, formerly listed as the family Sylviidae, for which Australia is a Range State;
- All species in the family Phoenicopteridae for which Australia is a Range State;
- All species in the family Recurvirostridae for which Australia is a Range State;
- All species in the family Scolopacidae, including the sub-family Phalaropodinae, formerly listed as the family Phalaropodidae, for which Australia is a Range State;
- All species in the genus Grus for which Australia is a Range State; and

The following species:

*Acrocephalus arundinaceus*  
*Anas clypeata*  
*Anas querquedula*  
*Anous stolidus*  
*Aplonis fusca*  
*Apus pacificus*  
*Ardeola ibis*  
*Arenaria interpres*  
*Bubulcus ibis* (*Ardeola ibis*)  
*Cacatua pastinator pastinator*  
*Calidris acuminata*  
*Calidris alba*  
*Calidris alpina*  
*Calidris bairdii*  
*Calidris canutus*  
*Calidris ferruginea*  
*Calidris mauri*  
*Calidris melanotos*  
*Calidris ruficollis*  
*Calidris subminuta*  
*Calidris tenuirostris*  
*Calonectris leucomelas*  
*Calyptorhynchus banksii graptogyne*  
*Capella hardwickii* (*Gallinago hardwickii*)  
*Capella megala* (*Gallinago megala*)  
*Capella stenura* (*Gallinago stenura*)  
*Charadrius asiaticus*  
*Charadrius dubius*  
*Charadrius hiaticula*  
*Charadrius leschenaultii*  
*Charadrius mongolus*  
*Charadrius veredus*  
*Chlidonias leucoptera*  
*Chlidonias niger*

*Columba vitiensis godmanae*  
*Coracina tenuirostris melvillensis*  
*Crex crex*  
*Crocethia alba* (*Calidris alba*)  
*Cuculus saturatus*  
*Cyanoramphus novaezelandiae cookii*  
*Cyanoramphus novaezelandiae erythrotis*  
*Cyanoramphus novaezelandiae*  
*subflavescens*  
*Dasyornis broadbenti littoralis*  
*Diomedea amsterdamensis*  
*Diomedea bulleri*  
*Diomedea cauta*  
*Diomedea chlororhynchos*  
*Diomedea chrysostoma*  
*Diomedea epomophora*  
*Diomedea exulans*  
*Diomedea exulans*  
*Diomedea immutabilis*  
*Diomedea melanophris*  
*Dromaius baudinianus*  
*Dromaius minor*  
*Drymodes supercilialis colcloughi*  
*Egretta alba*  
*Egretta sacra*  
*Erythrura gouldiae*  
*Falcunculus frontatus whitei*  
*Fregata andrewsi*  
*Fregata ariel*  
*Fregata minor*  
*Gallicolumba norfolciensis*  
*Gallinago hardwickii*  
*Gallinago megala*  
*Gallinago stenura*

<i>Geopsittacus occidentalis</i>	<i>Procellaria aequinoctialis</i>
<i>Gerygone insularis</i>	<i>Procellaria aequinoctialis conspicillata</i>
<i>Glareola maldivarum</i>	<i>Procellaria cinerea</i>
<i>Grus antigone</i>	<i>Procellaria parkinsoni</i>
<i>Haliaeetus leucogaster</i>	<i>Procellaria westlandica</i>
<i>Hemiphaga novaeseelandiae spadicea</i>	<i>Psephotus chrysoterygius</i>
<i>Hirundapus caudacutus</i>	<i>Psephotus pulcherrimus</i>
<i>Hirundo rustica</i>	<i>Psittaculirostris diophthalma coxeni</i>
<i>Hirundo striolata</i>	<i>Pterodroma leucoptera leucoptera</i>
<i>Hydrophasianus chirurgus</i>	<i>Pterodroma solandri</i>
<i>Hydroprogne caspia</i>	<i>Puffinus carneipes</i>
<i>Hydroprogne tschegrava (Hydroprogne caspia)</i>	<i>Puffinus griseus</i>
<i>Ixobrychus sinensis</i>	<i>Puffinus leucomelas (Calonectris leucomelas)</i>
<i>Lalage leucopyga leucopyga</i>	<i>Puffinus pacificus</i>
<i>Leipoa ocellata</i>	<i>Puffinus tenuirostris</i>
<i>Lichenostomus melanops cassidix</i>	<i>Rallina fasciata</i>
<i>Limicola falcinellus</i>	<i>Rallus pectoralis clelandi</i>
<i>Limnodromus semipalmatus</i>	<i>Rallus philippensis maquariensis</i>
<i>Limosa lapponica</i>	<i>Rhipidura cervina</i>
<i>Limosa limosa</i>	<i>Rostratula benghalensis</i>
<i>Macronectes giganteus</i>	<i>Stercorarius longicauda</i>
<i>Macronectes halli</i>	<i>Stercorarius maccormicki</i>
<i>Manorina melanotos</i>	<i>Stercorarius parasiticus</i>
<i>Merops ornatus</i>	<i>Stercorarius pomarinus</i>
<i>Motacilla alba</i>	<i>Sterna albifrons</i>
<i>Motacilla cinerea</i>	<i>Sterna anaethetus</i>
<i>Motacilla citreola</i>	<i>Sterna hirundo</i>
<i>Motacilla flava</i>	<i>Sterna hirundo hirundo (populations breeding in the Western Palearctic)</i>
<i>Neophema chrysogaster</i>	<i>Sterna paradisaea (Atlantic populations)</i>
<i>Nestor productus</i>	<i>Sterna sumatrana</i>
<i>Ninox novaeseelandiae albaria</i>	<i>Stipiturus malachurus intermedius</i>
<i>Ninox novaeseelandiae undulata</i>	<i>Sula abbotti</i>
<i>Notornis alba</i>	<i>Sula dactylatra</i>
<i>Numenius arquata</i>	<i>Sula leucogaster</i>
<i>Numenius borealis (Numenius minutus)</i>	<i>Sula sula</i>
<i>Numenius madagascariensis</i>	<i>Thalasseus bengalensis (Sterna bengalensis)</i>
<i>Numenius minutus</i>	<i>Tringa brevipes</i>
<i>Numenius phaeopus</i>	<i>Tringa glareola</i>
<i>Oceanites oceanicus</i>	<i>Tringa hypoleucos</i>
<i>Oceanodroma leucorhoa</i>	<i>Tringa incana (Tringa brevipes)</i>
<i>Pandion haliaetus</i>	<i>Tringa nebularia</i>
<i>Pardalotus quadragintus</i>	<i>Tringa stagnatilis</i>
<i>Petrophassa smithii blaawi</i>	<i>Tringa terek</i>
<i>Pezoporus wallicus flaviventris</i>	<i>Tringa totanus</i>
<i>Phaethon lepturus</i>	<i>Tryngites subruficollis</i>
<i>Phalaropus fulicarius</i>	<i>Tryngites subruficollis</i>
<i>Phalaropus lobatus</i>	<i>Turdus poliocephalus poliocephalus</i>
<i>Philomachus pugnax</i>	<i>Turdus xanthopus vinitinctus</i>
<i>Phoebetria fusca</i>	<i>Xanthomyza phrygia</i>
<i>Phoebetria palpebrata</i>	<i>Xenus cinereus (Tringa terek)</i>
<i>Phylloscopus borealis</i>	<i>Zosterops albogularis</i>
<i>Plegadis falcinellus</i>	<i>Zosterops strenua</i>
<i>Plegadis falcinellus</i>	
<i>Pluvialis dominica</i>	
<i>Pluvialis squatarola</i>	
<i>Poecilodryas superciliosa cerviniventris</i>	

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# Appendix 4

## Field Survey Species List

(No. of pages excluding this page = 8)

Appendix 4 - Field species list

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Class Name	Family Name	Scientific Name	Common Name	EPBC Migratory	NSW Legal Status	Project Site and Northern Pipeline	Proposed Eastern Pipeline
Fish		<i>Gambusia holbrooki</i>	Plague Minnow		I	X	X
Amphibia	Myobatrachidae	<i>Crinia signifera</i>	Common Eastern Froglet		P	X	X
Amphibia	Myobatrachidae	<i>Crinia tinnula</i>	Wallum Froglet		V		X
Amphibia	Myobatrachidae	<i>Limnodynastes peronii</i>	Striped Marsh Frog		P	X	X
Amphibia	Myobatrachidae	<i>Uperoleia fusca</i>	Dusky Toadlet		P	X	
Amphibia	Hylidae	<i>Litoria fallax</i>	Eastern Dwarf Tree Frog		P	X	X
Amphibia	Hylidae	<i>Litoria gracilenta</i>	Dainty Tree Frog		P		X
Amphibia	Hylidae	<i>Litoria nasuta</i>	Rocket Frog		P	X	X
Amphibia	Hylidae	<i>Litoria peronii</i>	Peron's Tree Frog		P	X	
Amphibia	Bufo	<i>Bufo marinus</i>	Cane Toad		I	X	X
Reptilia	Chelidae	<i>Chelodina longicollis</i>	Eastern Snake-necked Turtle		P		X
Reptilia	Agamidae	<i>Physignathus lesueurii</i>	Eastern Water Dragon		P	X	X
Reptilia	Scincidae	<i>Lampropholis delicata</i>	Dark-flecked Garden Sunskink		P	X	X
Reptilia	Typhlopidae	<i>Ramphotyphlops nigriscens</i>	Blackish Blind Snake		P		X
Reptilia	Colubridae	<i>Dendrelaphis punctulata</i>	Green Tree Snake		P		X
Reptilia	Elapidae	<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake		P		X
Reptilia	Elapidae	<i>Tropidechis carinatus</i>	Rough-scaled Snake		P		X
Aves	Phasianidae	<i>Coturnix ypsilophora</i>	Brown Quail		P	X	
Aves	Anatidae	<i>Anas gracilis</i>	Grey Teal	EPBC Act Migratory	P	X	
Aves	Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck	EPBC Act Migratory	P	X	X
Aves	Anatidae	<i>Anas superciliosa hybrid</i>	Pacific Black Duck hybrid		P	X	
Aves	Anatidae	<i>Chenonetta jubata</i>	Australian Wood Duck	EPBC Act Migratory	P	X	X
Aves	Anatidae	<i>Dendrocygna arcuata</i>	Wandering Whistling-Duck	EPBC Act Migratory	P	X	X
Aves	Anatidae	<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck	EPBC Act Migratory	P	X	



**Appendix 4 - Field species list**

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<b>Class Name</b>	<b>Family Name</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>EPBC Migratory</b>	<b>NSW Legal Status</b>	<b>Project Site and Northern Pipeline</b>	<b>Proposed Eastern Pipeline</b>
Aves	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		P	X	
Aves	Anhingidae	<i>Anhinga melanogaster</i>	Darter		P	X	
Aves	Phalacrocoracidae	<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant		P	X	
Aves	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		P	X	
Aves	Ardeidae	<i>Ardea alba</i>	Great Egret	EPBC Act Migratory	P	X	
Aves	Ardeidae	<i>Ardea ibis</i>	Cattle Egret	EPBC Act Migratory	P	X	X
Aves	Ardeidae	<i>Ardea intermedia</i>	Intermediate Egret		P	X	
Aves	Ardeidae	<i>Egretta novaehollandiae</i>	White-faced Heron		P	X	
Aves	Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen Night Heron		P	X	X
Aves	Threskiornithidae	<i>Platalea regia</i>	Royal Spoonbill		P	X	
Aves	Threskiornithidae	<i>Threskiornis molucca</i>	Australian White Ibis		P	X	X
Aves	Threskiornithidae	<i>Threskiornis spinicollis</i>	Straw-necked Ibis		P	X	
Aves	Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk	EPBC Act Migratory	P		X
Aves	Accipitridae	<i>Haliastur indus</i>	Brahminy Kite	EPBC Act Migratory	P	X	
Aves	Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite	EPBC Act Migratory	P	X	X
Aves	Rallidae	<i>Amaurornis olivaceus</i>	Bush-hen		V		X
Aves	Rallidae	<i>Gallinula tenebrosa</i>	Dusky Moorhen		P	X	
Aves	Rallidae	<i>Gallirallus philippensis</i>	Buff-banded Rail		P	X	X
Aves	Rallidae	<i>Porphyrio porphyrio</i>	Purple Swamphen		P	X	X
Aves	Scolopacidae	<i>Gallinago hardwickii</i>	Latham's Snipe	EPBC Act Migratory	P		X
Aves	Scolopacidae	<i>Tringa stagnatilis</i>	Marsh Sandpiper	EPBC Act Migratory	P		X
Aves	Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt	EPBC Act Migratory	P	X	
Aves	Charadriidae	<i>Vanellus miles</i>	Masked Lapwing	EPBC Act Migratory	P	X	X

Appendix 4 - Field species list

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Class Name	Family Name	Scientific Name	Common Name	EPBC Migratory	NSW Legal Status	Project Site and Northern Pipeline	Proposed Eastern Pipeline
Aves	Laridae	<i>Larus novaehollandiae</i>	Silver Gull		P	X	
Aves	Laridae	<i>Sterna bergii</i>	Crested Tern		P		X
Aves	Columbidae	<i>Geopelia humeralis</i>	Bar-shouldered Dove		P	X	X
Aves	Columbidae	<i>Geophaps lophotes</i>	Crested Pigeon		P	X	X
Aves	Cacatuidae	<i>Cacatua roseicapilla</i>	Galah		P	X	X
Aves	Cacatuidae	<i>Cacatua sanguinea</i>	Little Corella		P	X	X
Aves	Cacatuidae	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo		P		X
Aves	Psittacidae	<i>Platycercus adscitus eximius</i>	Eastern Rosella		P	X	X
Aves	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet		P	X	X
Aves	Psittacidae	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		P	X	X
Aves	Cuculidae	<i>Chalcites lucidus</i>	Shining Bronze-Cuckoo		P	X	
Aves	Cuculidae	<i>Chrysococcyx minutillus</i>	Little Bronze-Cuckoo		P		X
Aves	Cuculidae	<i>Eudynamys orientalis</i>	Pacific Koel		P		X
Aves	Cuculidae	<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo		P		X
Aves	Centropodidae	<i>Centropus phasianinus</i>	Pheasant Coucal		P		X
Aves	Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth		P		X
Aves	Halcyonidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra		P	X	X
Aves	Halcyonidae	<i>Todiramphus sanctus</i>	Sacred Kingfisher		P		X
Aves	Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	EPBC Act Migratory	P	X	X
Aves	Coraciidae	<i>Eurystomus orientalis</i>	Dollarbird		P		X
Aves	Maluridae	<i>Malurus cyaneus</i>	Superb Fairy-wren		P	X	X
Aves	Maluridae	<i>Malurus lamberti</i>	Variegated Fairy-wren		P		X
Aves	Maluridae	<i>Malurus melanocephalus</i>	Red-backed Fairy-wren		P	X	

**Appendix 4 - Field species list**

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<b>Class Name</b>	<b>Family Name</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>EPBC Migratory</b>	<b>NSW Legal Status</b>	<b>Project Site and Northern Pipeline</b>	<b>Proposed Eastern Pipeline</b>
Aves	Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote		P	X	
Aves	Acanthizidae	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		P	X	X
Aves	Acanthizidae	<i>Acanthiza pusilla</i>	Brown Thornbill		P		X
Aves	Acanthizidae	<i>Gerygone olivacea</i>	White-throated Gerygone		P	X	X
Aves	Acanthizidae	<i>Sericornis frontalis</i>	White-browed Scrubwren		P		X
Aves	Meliphagidae	<i>Anthochaera chrysoptera</i>	Little Wattlebird		P		X
Aves	Meliphagidae	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater		P	X	
Aves	Meliphagidae	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater		P	X	
Aves	Meliphagidae	<i>Lichmera indistincta</i>	Brown Honeyeater		P	X	X
Aves	Meliphagidae	<i>Manorina melanocephala</i>	Noisy Miner		P	X	X
Aves	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's Honeyeater		P	X	X
Aves	Meliphagidae	<i>Myzomela sanguinolenta</i>	Scarlet Honeyeater		P		X
Aves	Meliphagidae	<i>Philemon citreogularis</i>	Little Friarbird		P		X
Aves	Meliphagidae	<i>Philemon corniculatus</i>	Noisy Friarbird		P		X
Aves	Meliphagidae	<i>Phylidonyris nigra</i>	White-cheeked Honeyeater		P		X
Aves	Meliphagidae	<i>Plectrohyna lanceolata</i>	Striped Honeyeater		P	X	X
Aves	Petroicidae	<i>Eopsaltria australis</i>	Eastern Yellow Robin		P		X
Aves	Eupetidae	<i>Psophodes olivaceus</i>	Eastern Whipbird		P	X	X
Aves	Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush		P		X
Aves	Pachycephalidae	<i>Pachycephala pectoralis</i>	Golden Whistler		P	X	
Aves	Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler		P	X	X
Aves	Dicruridae	<i>Dicrurus bracteatus</i>	Spangled Drongo		P	X	X
Aves	Dicruridae	<i>Grallina cyanoleuca</i>	Magpie-lark		P	X	X

Appendix 4 - Field species list

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Class Name	Family Name	Scientific Name	Common Name	EPBC Migratory	NSW Legal Status	Project Site and Northern Pipeline	Proposed Eastern Pipeline
Aves	Dicruridae	<i>Myiagra rubecula</i>	Leaden Flycatcher		P		X
Aves	Dicruridae	<i>Rhipidura albiscapa</i>	Grey Fantail		P	X	
Aves	Dicruridae	<i>Rhipidura leucophrys</i>	Willie Wagtail		P	X	
Aves	Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		P		X
Aves	Campephagidae	<i>Coracina tenuirostris</i>	Cicadabird	EPBC Act Migratory	P		X
Aves	Campephagidae	<i>Lalage leucomela</i>	Varied Triller		P		X
Aves	Oriolidae	<i>Oriolus sagittatus</i>	Olive-backed Oriole		P		X
Aves	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian Figbird		P	X	X
Aves	Artamidae	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow		P		X
Aves	Artamidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird		P	X	X
Aves	Artamidae	<i>Cracticus torquatus</i>	Grey Butcherbird		P		X
Aves	Artamidae	<i>Gymnorhina tibicen</i>	Australian Magpie		P	X	X
Aves	Artamidae	<i>Strepera graculina</i>	Pied Currawong		P	X	X
Aves	Corvidae	<i>Corvus orru</i>	Torresian Crow		P	X	X
Aves	Motacillidae	<i>Anthus australis</i>	Australian Pipit		P	X	
Aves	Estrildidae	<i>Lonchura castaneothorax</i>	Chestnut-breasted Mannikin		P	X	
Aves	Estrildidae	<i>Neochmia modesta</i>	Plum-headed Finch		P	X	
Aves	Estrildidae	<i>Neochmia temporalis</i>	Red-browed Finch		P	X	X
Aves	Estrildidae	<i>Taeniopygia bichenovii</i>	Double-barred Finch		P	X	
Aves	Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird		P	X	X
Aves	Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow		P	X	
Aves	Hirundinidae	<i>Petrochelidon nigricans</i>	Tree Martin		P	X	
Aves	Sylviidae	<i>Acrocephalus stentoreus</i>	Clamorous Reed-Warbler	EPBC Act Migratory	P	X	

**Appendix 4 - Field species list**

Page 6 of 8

<b>Class Name</b>	<b>Family Name</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>EPBC Migratory</b>	<b>NSW Legal Status</b>	<b>Project Site and Northern Pipeline</b>	<b>Proposed Eastern Pipeline</b>
Aves	Sylviidae	<i>Cisticola exilis</i>	Golden-headed Cisticola	EPBC Act Migratory	P	X	X
Aves	Sylviidae	<i>Megalurus timoriensis</i>	Tawny Grassbird	EPBC Act Migratory	P	X	
Aves	Zosteropidae	<i>Zosterops lateralis</i>	Silvereye		P	X	X
Aves	Sturnidae	<i>Acridotheres tristis</i>	Common Myna		I	X	
Mammalia	Peramelidae	<i>Isodon macrourus</i>	Northern Brown Bandicoot		P	X	X
Mammalia	Peramelidae	<i>Perameles nasuta</i>	Long-nosed Bandicoot		P		X
Mammalia	Pseudocheiridae	<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum		P	X	
Mammalia	Phalangeridae	<i>Trichosurus caninus</i>	Mountain Brushtail Possum		P		X
Mammalia	Macropodidae	<i>Wallabia bicolor</i>	Swamp Wallaby		P		X
Mammalia	Pteropodidae	<i>Pteropus alecto</i>	Black Flying-fox		V	X	
Mammalia	Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox		V	X	X
Mammalia	Molossidae	<i>Mormopterus sp.2</i>	Little Freetail bat (Probable)		P	X	
Mammalia	Molossidae	<i>Nyctinomus australis</i>	White-striped Freetail-bat	US (Confident)	P	X	
Mammalia	Molossidae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail Bat	US (Confident)	V	X	
Mammalia	Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat (Possible)	US (Possible)	P	X	
Mammalia	Vespertilionidae	<i>Miniopterus australis</i>	Little Bent-wing Bat	US (Confident)	V		X
Mammalia	Vespertilionidae	<i>Mormopterus beccarii</i>	Beccari's Mastiff Bat	US (Probable)	V*		X
Mammalia	Vespertilionidae	<i>Mormopterus norfolkensis</i>	Eastern Freetail Bat	US (Probable)	V		X
Mammalia	Vespertilionidae	<i>Mormopterus sp.2</i>	Little Freetail Bat	US (Probable)	P	X	
Mammalia	Vespertilionidae	<i>Myotis adversus</i>	Large-footed Myotis	US (Possible) Field Confident	V		X
Mammalia	Vespertilionidae	<i>Nyctophilus sp.</i>	Unidentified Long-eared Bat	US (Probable)	P		X

Appendix 4 - Field species list

Page 7 of 8

Class Name	Family Name	Scientific Name	Common Name	EPBC Migratory	NSW Legal Status	Project Site and Northern Pipeline	Proposed Eastern Pipeline
Mammalia	Vespertilionidae	<i>Scotorepens orion</i>	Eastern Broad-nosed Bat	US (Confident Excav Possible pipeline)	P	X	X
Mammalia	Vespertilionidae	<i>Vespadelus pumilus</i>	Eastern Forest Bat		P		X
Mammalia	Muridae	<i>Melomys cervinipes</i>	Fawn-footed Melomys		P		X
Mammalia	Muridae	<i>Mus musculus</i>	House Mouse		I	X	
Mammalia	Muridae	<i>Rattus fuscipes</i>	Bush Rat		P	X	X
Mammalia	Muridae	<i>Rattus lutreolus</i>	Swamp Rat		P	X	
Mammalia	Muridae	<i>Rattus rattus</i>	Black Rat		I		X
Mammalia	Leporidae	<i>Lepus capensis</i>	Brown Hare		I	X	
Mammalia	Canidae	<i>Vulpes vulpes</i>	Fox		I	X	X
Mammalia		<i>Bos taurus</i>	Cattle (feral)		I		X
		<i>Evening Brown butterfly</i>	Evening Brown butterfly		U		X
		<i>Unidentified microbat</i>	Unidentified microbat		P/V		X
		<i>Unidentified microbat</i>	Unidentified skink		P		X
			Australian Crow Butterfly		U		X
			Blue Tiger Butterfly		U		X
			Blue Triangle Butterfly		U		X
			Christmas Beetle		U		X
			Common Aeroplane Butterfly		U		X
			Common Jezabel Butterfly		U	X	
			Damselfly		U		X
			Dragonflies variety of colours		U		X
			Garden orb weaver		U		X
			Huntsmans spider		U		X
			Lace wing (ant lion)		U		X

**Appendix 4 - Field species list**

Page 8 of 8

<b>Class Name</b>	<b>Family Name</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>EPBC Migratory</b>	<b>NSW Legal Status</b>	<b>Project Site and Northern Pipeline</b>	<b>Proposed Eastern Pipeline</b>
			Leaf Brown Butterfly		U		X
			Meadow Argus Butterfly		U		X
			Monarch Butterfly		U		X
			Native Cockroach		U		X
			Orchard Swallowtail Butterfly		U		X
			Small Land Snail		U		X

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# Appendix 5

## EPBC Protected Matters Report

(No. of pages excluding this page = 17)

## Appendix 6 - EPBC Protected Matters Report

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### Protected Matters Search Tool

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6 March 2007 07:29

# *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.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at <http://www.environment.gov.au/atlas> may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

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**Search Type:** Point  
**Buffer:** 10 km  
**Coordinates:** -28.2556,153.547

**Report Contents:** [Summary](#)  
[Details](#)  
[Matters of NES](#)  
[Other matters protected by the EPBC Act](#)  
[Extra Information](#)  
[Caveat](#)  
[Acknowledgments](#)

## *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 – see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>.

<b>World Heritage Properties:</b>	None
<b>National Heritage Places:</b>	None
<b><u>Wetlands of International Significance:</u></b> (Ramsar Sites)	1
<b><u>Commonwealth Marine Areas:</u></b>	Relevant
<b>Threatened Ecological Communities:</b>	None
<b><u>Threatened Species:</u></b>	55
<b><u>Migratory Species:</u></b>	33

## *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. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

<b><u>Commonwealth Lands:</u></b>	3
<b>Commonwealth Heritage Places:</b>	None
<b><u>Places on the RNE:</u></b>	3
<b><u>Listed Marine Species:</u></b>	64
<b><u>Whales and Other Cetaceans:</u></b>	13
<b>Critical Habitats:</b>	None
<b>Commonwealth Reserves:</b>	None

## *Extra Information*

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

<b><u>State and Territory Reserves:</u></b>	6
<b>Other Commonwealth Reserves:</b>	None
<b><u>Regional Forest Agreements:</u></b>	2

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# Details

## Matters of National Environmental Significance

Wetlands of International Significance [ [Dataset Information](#) ]  
(Ramsar Sites)

[MORETON BAY](#)

Within same catchment as Ramsar site

Commonwealth Marine Areas [ [Dataset Information](#) ]

Approval may be required for a proposed activity that is likely to have a significant impact on the environment in a Commonwealth Marine Area, when the action is outside the Commonwealth Marine Area, or the environment anywhere when the action is taken within the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Within 12 Nautical Mile Limit

Within 3 Nautical Mile Limit

Threatened Species [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
<b>Birds</b>		
<a href="#">Cyclopsitta diophthalma coxeni</a> * Coxen's Fig-Parrot	Endangered	Species or species habitat likely to occur within area
<a href="#">Diomedea dabbenena</a> * Tristan Albatross	Endangered	Foraging may occur within area
<a href="#">Lathamus discolor</a> * Swift Parrot	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes giganteus</a> * Southern Giant-Petrel	Endangered	Species or species habitat may occur within area

<u><i>Macronectes halli</i></u> *	Vulnerable	Species or species habitat may occur within area
Northern Giant-Petrel		
<u><i>Poephila cincta cincta</i></u> *	Endangered	Species or species habitat likely to occur within area
Black-throated Finch (southern)		
<u><i>Pterodroma neglecta neglecta</i></u> *	Vulnerable	Species or species habitat may occur within area
Kermadec Petrel (western)		
<u><i>Rostratula australis</i></u> *	Vulnerable	Species or species habitat may occur within area
Australian Painted Snipe		
<u><i>Thalassarche impavida</i></u> *	Vulnerable	Species or species habitat may occur within area
Campbell Albatross		
<u><i>Turnix melanogaster</i></u> *	Vulnerable	Species or species habitat likely to occur within area
Black-breasted Button-quail		
<u><i>Xanthomyza phrygia</i></u> *	Endangered	Species or species habitat may occur within area
Regent Honeyeater		
<b>Frogs</b>		
<u><i>Litoria olongburensis</i></u> *	Vulnerable	Species or species habitat likely to occur within area
Wallum Sedge Frog		
<u><i>Mixophyes iteratus</i></u> *	Endangered	Species or

Southern Barred Frog, Giant Barred Frog

species habitat  
likely to occur  
within area

### Insects

*Phyllodes imperialis (southern subsp. - ANIC 3333)*\*  
a moth

Endangered

Species or  
species habitat  
likely to occur  
within area

### Mammals

*Balaenoptera musculus*\*  
Blue Whale

Endangered

Species or  
species habitat  
may occur within  
area

*Chalinolobus dwyeri*\*  
Large-eared Pied Bat, Large Pied Bat

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)

Endangered

Species or  
species habitat  
may occur within  
area

*Eubalaena australis*\*  
Southern Right Whale

Endangered

Species or  
species habitat  
likely to occur  
within area

*Megaptera novaeangliae*\*  
Humpback Whale

Vulnerable

Congregation or  
aggregation  
known to occur  
within area

*Potorous tridactylus tridactylus*\*  
Long-nosed Potoroo (SE mainland)

Vulnerable

Species or  
species habitat  
may occur within  
area

*Pteropus poliocephalus*\*  
Grey-headed Flying-fox

Vulnerable

Roosting known  
to occur within  
area

*Xeromys myoides*\*  
Water Mouse, False Water Rat

Vulnerable

Species or  
species habitat  
likely to occur  
within area



## Reptiles

*Caretta caretta* \*

Loggerhead Turtle

Endangered Breeding  
known to  
occur within  
area

*Chelonia mydas* \*

Green Turtle

Vulnerable Species or  
species  
habitat may  
occur within  
area

*Coeranoscincus reticulatus* \*

Three-toed Snake-tooth Skink

Vulnerable Species or  
species  
habitat may  
occur within  
area

*Dermochelys coriacea* \*

Leathery Turtle, Leatherback Turtle, Luth

Vulnerable Species or  
species  
habitat may  
occur within  
area

*Lepidochelys olivacea* \*

Pacific Ridley, Olive Ridley

Endangered Species or  
species  
habitat may  
occur within  
area

## Sharks

*Carcharias taurus (east coast population)* \*

Grey Nurse Shark (east coast population)

Critically  
Endangered Species or  
species  
habitat may  
occur within  
area

*Carcharodon carcharias* \*

Great White Shark

Vulnerable Species or  
species  
habitat may  
occur within  
area

*Rhincodon typus* \*

Whale Shark

Vulnerable Species or  
species  
habitat may  
occur within  
area

## Snails, slugs

[\*Thersites mitchellae\*](#) \*

Mitchell's Rainforest Snail

Critically Endangered Species or species  
habitat likely to occur  
within area

## Plants

[\*Acronychia littoralis\*](#) \*

Scented Acronychia

Endangered Species or species  
habitat likely to occur  
within area

[\*Austromyrtus fragrantissima\*](#) \*

Scale Myrtle, Sweet Myrtle

Endangered Species or species  
habitat likely to occur  
within area

[\*Baloghia marmorata\*](#) \*

Marbled Balogia, Jointed Baloghia

Vulnerable Species or species  
habitat likely to occur  
within area

[\*Bosistoa selwynii\*](#) \*

Heart-leaved Bosistoa

Vulnerable Species or species  
habitat likely to occur  
within area

[\*Bosistoa transversa\*](#) \*

Three-leaved Bosistoa

Vulnerable Species or species  
habitat likely to occur  
within area

[\*Corokia whiteana\*](#) \*

Vulnerable Species or species  
habitat likely to occur  
within area

[\*Cryptocarya foetida\*](#) \*

Stinking Cryptocarya, Stinking Laurel

Vulnerable Species or species  
habitat likely to occur  
within area

[\*Davidsonia pruriens\* var. \*jerseyana\*](#) \*

Davidson's Plum, Ooray

Endangered Species or species  
habitat likely to occur  
within area

[\*Davidsonia\* sp. \*Mullumbimby-Currumbin Ck \(A.G.Floyd 1595\)\*](#) \*

Endangered Species or species  
habitat likely to occur  
within area

[\*Desmodium acanthocladum\*](#) \*

Thorny Pea

Vulnerable Community likely to  
occur within area

[\*Diospyros mabacea\*](#) \*

Red-fruited Ebony, Silky Persimmon, Ebony

Endangered Species or species  
habitat likely to occur  
within area

[\*Diploglottis campbellii\*](#) \*

Small-leaved Tamarind

Endangered Species or species  
habitat likely to occur  
within area

<a href="#"><i>Endiandra floydii</i></a> *	Endangered	Species or species habitat likely to occur within area
Floyd's Walnut		
<a href="#"><i>Endiandra hayesii</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Rusty Rose Walnut, Velvet Laurel		
<a href="#"><i>Floydia praealta</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Ball Nut, Possum Nut, Big Nut, Beefwood		
<a href="#"><i>Hicksbeachia pinnatifolia</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak		
<a href="#"><i>Macadamia tetraphylla</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut		
<a href="#"><i>Marsdenia longiloba</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Clear Milkvine		
<a href="#"><i>Ochrosia moorei</i></a> *	Endangered	Species or species habitat likely to occur within area
Southern Ochrosia		
<a href="#"><i>Randia moorei</i></a> *	Endangered	Species or species habitat likely to occur within area
Spiny Gardenia		
<a href="#"><i>Symplocos baeuerlenii</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Small-leaved Hazelwood, Shrubby Hazelwood		
<a href="#"><i>Syzygium hodgkinsoniae</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Smooth-bark Rose Apple, Red Lilly Pilly		
<a href="#"><i>Syzygium moorei</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple		
<a href="#"><i>Tinospora tinosporoides</i></a> *	Vulnerable	Species or species habitat likely to occur within area
Arrow-head Vine		

Migratory Species [ <a href="#">Dataset Information</a> ]		Type of Presence
Status		

## Migratory Terrestrial Species

### Birds

*Cyclopsitta diophthalma coxeni*

Coxen's Fig-Parrot

Migratory Species or species habitat likely to occur within area

*Haliaeetus leucogaster*

White-bellied Sea-Eagle

Migratory Species or species habitat likely to occur within area

*Hirundapus caudacutus*

White-throated Needletail

Migratory Species or species habitat may occur within area

*Merops ornatus*

Rainbow Bee-eater

Migratory Species or species habitat may occur within area

*Monarcha melanopsis*

Black-faced Monarch

Migratory Breeding may occur within area

*Monarcha trivirgatus*

Spectacled Monarch

Migratory Breeding likely to occur within area

*Myiagra cyanoleuca*

Satin Flycatcher

Migratory Breeding likely to occur within area

*Rhipidura rufifrons*

Rufous Fantail

Migratory Breeding may occur within area

*Xanthomyza phrygia*

Regent Honeyeater

Migratory Species or species habitat may occur within area

## Migratory Wetland Species

### Birds

*Gallinago hardwickii*

Latham's Snipe, Japanese Snipe

Migratory Species or species habitat may occur within area

*Nettapus coromandelianus albipennis*

Australian Cotton Pygmy-goose

Migratory Species or species habitat may occur within area

*Numenius phaeopus*

Whimbrel

Migratory Species or species habitat likely to occur within area

*Rostratula benghalensis s. lat.*

Painted Snipe

Migratory Species or species habitat may occur within area

## Migratory Marine Birds

### *Diomedea dabbenena*

Tristan Albatross

Migratory Foraging may occur within area

### *Macronectes giganteus*

Southern Giant-Petrel

Migratory Species or species habitat may occur within area

### *Macronectes halli*

Northern Giant-Petrel

Migratory Species or species habitat may occur within area

### *Puffinus leucomelas*

Streaked Shearwater

Migratory Species or species habitat may occur within area

### *Puffinus pacificus*

Wedge-tailed Shearwater

Migratory Breeding known to occur within area

### *Thalassarche impavida*

Campbell Albatross

Migratory Species or species habitat may occur within area

## Migratory Marine Species

### Mammals

#### *Balaenoptera edeni*

Bryde's Whale

Migratory Species or species habitat may occur within area

#### *Balaenoptera musculus* \*

Blue Whale

Migratory Species or species habitat may occur within area

#### *Dugong dugon*

Dugong

Migratory Species or species habitat likely to occur within area

#### *Eubalaena australis* \*

Southern Right Whale

Migratory Species or species habitat likely to occur within area

#### *Lagenorhynchus obscurus*

Dusky Dolphin

Migratory Species or species habitat may occur within area

#### *Megaptera novaeangliae* \*

Humpback Whale

Migratory Congregation or aggregation known to occur within area

#### *Orcinus orca*

Killer Whale, Orca

Migratory Species or species habitat may occur within area

#### *Sousa chinensis*

Indo-Pacific Humpback Dolphin

Migratory Species or species habitat may occur within area

### Reptiles

#### *Caretta caretta* \*

Loggerhead Turtle

Migratory Breeding known to occur within area

#### *Chelonia mydas* \*

Green Turtle

Migratory Species or species habitat may occur within area

*Dermochelys coriacea* \*

Leathery Turtle, Leatherback Turtle, Luth

Migratory

Species or species habitat  
may occur within area

*Lepidochelys olivacea* \*

Pacific Ridley, Olive Ridley

Migratory

Species or species habitat  
may occur within area

**Sharks**

*Carcharodon carcharias*

Great White Shark

Migratory

Species or species habitat  
may occur within area

*Rhincodon typus*

Whale Shark

Migratory

Species or species habitat  
may occur within area

## *Other Matters Protected by the EPBC Act*

Listed Marine Species [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
---	--------	------------------

**Birds**

*Anseranas semipalmata*

Magpie Goose

Listed - overfly  
marine area

Species or species habitat  
may occur within area

*Apus pacificus*

Fork-tailed Swift

Listed - overfly  
marine area

Species or species habitat  
may occur within area

*Ardea alba*

Great Egret, White Egret

Listed - overfly  
marine area

Species or species habitat  
may occur within area

*Ardea ibis*

Cattle Egret

Listed - overfly  
marine area

Breeding likely to occur  
within area

*Calonectris leucomelas*

Streaked Shearwater

Listed

Species or species habitat  
may occur within area

*Catharacta skua*

Great Skua

Listed

Species or species habitat  
may occur within area

*Diomedea dabbenena*

Tristan Albatross

Listed

Foraging may occur within  
area

*Gallinago hardwickii*

Latham's Snipe, Japanese Snipe

Listed - overfly  
marine area

Species or species habitat  
may occur within area

*Haliaeetus leucogaster*

White-bellied Sea-Eagle

Listed

Species or species habitat  
likely to occur within area

*Hirundapus caudacutus*

White-throated Needletail

Listed - overfly  
marine area

Species or species habitat  
may occur within area

*Larus novaehollandiae*

Silver Gull

Listed

Breeding known to occur  
within area

<u><i>Lathamus discolor</i></u> *	Listed - overfly	Species or species habitat
Swift Parrot	marine area	may occur within area
<u><i>Macronectes giganteus</i></u>	Listed	Species or species habitat
Southern Giant-Petrel		may occur within area
<u><i>Macronectes halli</i></u>	Listed	Species or species habitat
Northern Giant-Petrel		may occur within area
<u><i>Merops ornatus</i></u>	Listed - overfly	Species or species habitat
Rainbow Bee-eater	marine area	may occur within area
<u><i>Monarcha melanopsis</i></u>	Listed - overfly	Breeding may occur within
Black-faced Monarch	marine area	area
<u><i>Monarcha trivirgatus</i></u>	Listed - overfly	Breeding likely to occur
Spectacled Monarch	marine area	within area
<u><i>Myiagra cyanoleuca</i></u>	Listed - overfly	Breeding likely to occur
Satin Flycatcher	marine area	within area
<u><i>Nettapus coromandelianus albipennis</i></u>	Listed - overfly	Species or species habitat
Australian Cotton Pygmy-goose	marine area	may occur within area
<u><i>Numenius phaeopus</i></u>	Listed	Species or species habitat
Whimbrel		likely to occur within area
<u><i>Puffinus pacificus</i></u>	Listed	Breeding known to occur
Wedge-tailed Shearwater		within area
<u><i>Rhipidura rufifrons</i></u>	Listed - overfly	Breeding may occur within
Rufous Fantail	marine area	area
<u><i>Rostratula benghalensis s. lat.</i></u>	Listed - overfly	Species or species habitat
Painted Snipe	marine area	may occur within area
<u><i>Sterna albifrons</i></u>	Listed	Breeding may occur within
Little Tern		area
<u><i>Sterna bergii</i></u>	Listed	Breeding known to occur
Crested Tern		within area
<u><i>Thalassarche chlororhynchos</i></u>	Listed	Species or species habitat
Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross		may occur within area
<u><i>Thalassarche impavida</i></u>	Listed	Species or species habitat
Campbell Albatross		may occur within area
<b>Mammals</b>		
<u><i>Dugong dugon</i></u>	Listed	Species or species habitat
Dugong		likely to occur within area

### Ray-finned fishes

<a href="#"><i>Acentronura tentaculata</i></a> Hairy Pygmy Pipehorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Campichthys tryoni</i></a> Tryon's Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys amplexus</i></a> Fijian Banded Pipefish, Brown-banded Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys ocellatus</i></a> Orange-spotted Pipefish, Ocellated Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Festucalex cinctus</i></a> Girdled Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Filicampus tigris</i></a> Tiger Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Halicampus grayi</i></a> Mud Pipefish, Gray's Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Hippichthys cyanospilos</i></a> Blue-speckled Pipefish, Blue-spotted Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Hippichthys heptagonus</i></a> Madura Pipefish, Reticulated Freshwater Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Hippichthys penicillus</i></a> Beady Pipefish, Steep-nosed Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Hippocampus kelloggi</i></a> Kellogg's Seahorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Hippocampus kuda</i></a> Spotted Seahorse, Yellow Seahorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Hippocampus planifrons</i></a> Flat-face Seahorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Hippocampus whitei</i></a> White's Seahorse, Crowned Seahorse, Sydney Seahorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Lissocampus runa</i></a> Javelin Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Maroubra perserrata</i></a> Sawtooth Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Micrognathus andersonii</i></a> Anderson's Pipefish, Shortnose Pipefish	Listed	Species or species habitat may occur within area



<a href="#"><i>Micrognathus brevirostris</i></a> Thorn-tailed Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Microphis manadensis</i></a> Manado River Pipefish, Manado Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Solegnathus dunckeri</i></a> Duncker's Pipehorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Solegnathus hardwickii</i></a> Pipehorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Solegnathus spinosissimus</i></a> Spiny Pipehorse, Australian Spiny Pipehorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Solenostomus cyanopterus</i></a> Blue-finned Ghost Pipefish, Robust Ghost Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Solenostomus paradoxus</i></a> Harlequin Ghost Pipefish, Ornate Ghost Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Stigmatopora nigra</i></a> Wide-bodied Pipefish, Black Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Syngnathoides biaculeatus</i></a> Double-ended Pipehorse, Alligator Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Trachyrhamphus bicoarctatus</i></a> Bend Stick Pipefish, Short-tailed Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Urocampus carinirostris</i></a> Hairy Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Vanacampus margaritifer</i></a> Mother-of-pearl Pipefish	Listed	Species or species habitat may occur within area
<b>Reptiles</b>		
<a href="#"><i>Astrotia stokesii</i></a> Stokes' Seasnake	Listed	Species or species habitat may occur within area
<a href="#"><i>Caretta caretta</i></a> * Loggerhead Turtle	Listed	Breeding known to occur within area
<a href="#"><i>Chelonia mydas</i></a> * Green Turtle	Listed	Species or species habitat may occur within area
<a href="#"><i>Dermochelys coriacea</i></a> * Leathery Turtle, Leatherback Turtle, Luth	Listed	Species or species habitat may occur within area
<a href="#"><i>Hydrophis elegans</i></a> Elegant Seasnake	Listed	Species or species habitat may occur within area
<a href="#"><i>Lepidochelys olivacea</i></a> * Pacific Ridley, Olive Ridley	Listed	Species or species habitat may occur within area

<a href="#"><i>Pelamis platurus</i></a> Yellow-bellied Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
<a href="#"><i>Balaenoptera acutorostrata</i></a> Minke Whale	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Balaenoptera edeni</i></a> Bryde's Whale	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Balaenoptera musculus</i></a> * Blue Whale	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Delphinus delphis</i></a> Common Dolphin	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Eubalaena australis</i></a> * Southern Right Whale	Cetacean	Species or species habitat likely to occur within area
<a href="#"><i>Grampus griseus</i></a> Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Lagenorhynchus obscurus</i></a> Dusky Dolphin	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Megaptera novaeangliae</i></a> * Humpback Whale	Cetacean	Congregation or aggregation known to occur within area
<a href="#"><i>Orcinus orca</i></a> Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Sousa chinensis</i></a> Indo-Pacific Humpback Dolphin	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Stenella attenuata</i></a> Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area
<a href="#"><i>Tursiops aduncus</i></a> Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
<a href="#"><i>Tursiops truncatus s. str.</i></a> Bottlenose Dolphin	Cetacean	Species or species habitat may occur within area

Commonwealth Lands [ [Dataset Information](#) ]

Communications, Information Technology and the Arts  
- Telstra Corporation Limited

Defence

Unknown

Places on the RNE [ [Dataset Information](#) ] Note that not all Indigenous sites may be listed.

**Historic**

[Fingal Head Lighthouse NSW](#)

## Natural

[Cook Island Nature Reserve NSW](#)

[Stotts Island Nature Reserve NSW](#)

# *Extra Information*

State and Territory Reserves [ [Dataset Information](#) ]

Cook Island Aquatic Reserve, NSW

Cook Island Nature Reserve, NSW

Cudgen Nature Reserve, NSW

Stotts Island Nature Reserve, NSW

Tweed Estuary Nature Reserve, NSW

Ukerebagh Nature Reserve, NSW

Regional	Forest	Agreements	[ <a href="#">Dataset</a> <a href="#">Information</a> ]
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Note that all RFA areas including those still under consideration have been included.

South East Queensland RFA, Queensland

Upper North East NSW RFA, New South Wales

## *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 [migratory](#) and [marine](#) provisions of the Act have been mapped.

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.

# Acknowledgments

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

- [New South Wales National Parks and Wildlife Service](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Water and Environment, Tasmania](#)
- [Department of Environment and Heritage, South Australia Planning SA](#)
- [Parks and Wildlife Commission of the Northern Territory](#)
- [Environmental Protection Agency, Queensland](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [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](#)
- Other groups and individuals

[ANUCLiM Version 1.8, Centre for Resource and Environmental Studies, Australian National University](#) was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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# Appendix 6

## Seven Part Tests for TSC Act Threatened Fauna Species – Study Area

(No. of pages excluding this page = 55)

\* Note: Not included within hard copy. A copy has been provided on the Project CD.

**List of Individual TSC Act Threatened Fauna Species for which seven part tests have been prepared – Project Site**

Magpie Goose (*Anseranas semipalmate*)  
Black-necked Stork (*Ephippiorhynchus asiaticus*)  
Brolga (*Grus rubicundus*)  
Square-tailed Kite (*Lophoictinia isura*)  
Osprey (*Pandion haliaetus*)  
Grass Owl (*Tyto capensis*)  
Masked Owl (*Tyto novaehollandiae*)  
Barking Owl (*Ninox connivens*)  
Black Flying-fox (*Pteropus alecto*)  
Grey-headed Flying-fox (*Pteropus poliocephalus*)  
Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)  
Beccari's Freetail-bat (*Mormopterus beccarii*)  
Eastern Freetail-bat (*Mormopterus norfolkensis*)  
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)  
Eastern Long-eared Bat (*Nyctophilus bifax*)  
Greater Broad-nosed Bat (*Scoteanax rueppellii*)



## Appendix 6 - Seven Part Tests for Individual TSC Act Threatened Fauna Species -Study Area

### Magpie Goose (*Anseranas semipalmate*)

The Magpie Goose is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### Local Occurrence

The Magpie Goose is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

#### Habitat

Mainly found in shallow wetlands (less than 1m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.

#### Likelihood of Occurrence within the Study Area

It is considered that the Magpie Goose may occasionally forage within the Study Area.

#### Threats

The DECC Threatened species website identifies the following threats on the Magpie Goose.

- Inappropriate hydrological regimes of wetland habitats through drainage of swamps, ponds, dams and other wetlands for agricultural and other human purposes.
- Degradation of habitat through water pollution (e.g. salinity, chemicals, eutrophication).
- Modification of habitat and nest loss from trampling and overgrazing.
- Predation on eggs and goslings.
- Too-frequent burning of wetlands.

#### Impact of the Project

The Project will involve the removal of approximately 50ha of potential foraging habitat of the Magpie Goose.

## Consideration

No known local population occurs on the Study Area. It is considered that due to the mobile nature of this species one population of this species occurs within its distributional range within northeast NSW. Considering that the Study Area does not contain breeding habitat for the species, nor is the species known to shelter or roost in the vicinity of the Study Area and that the Project will not contribute further to the recognised threatening processes on the species it is considered that the removal of 50ha of potential foraging habitat of the species it is very unlikely that the Project would have an adverse effect on the life cycle of the Magpie Goose such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Magpie Goose listed on Schedule 1 of the TSC Act.

- (c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
  - (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces (2008) for consideration of this factor.

- (d) in relation to the habitat of a Threatened species, population or ecological community:**
- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Magpie Goose, the majority of which is disturbed *Setaria* sp Grassland.

- (i) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Magpie Goose as habitat within the Study Area and in the locality is already fragmented. It is considered that the Magpie Goose would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

- (i) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,**

The DECC Threatened species profile for the Magpie Goose on the DECC Threatened Species website provides the following table indicating important habitat for the Magpie Goose.

Habitat	Details
Breeding habitat	Emergent vegetation above water 60-100 cm deep
Foraging habitat	Open grasslands, pastures, shallow wetlands or crops, vegetated dams, mangroves or flood plains.
Shelter/roosting/refuge habitat	Trees, dead or alive
Time of year species identifiable (if flora) or best detected (if fauna)	All year

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by the Magpie Goose. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Magpie Goose Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

- (f) **whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Magpie Goose. No relevant threat abatement plan exists for the key threatening process that may affect the Magpie Goose.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty> pe is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant

effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Magpie Goose occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Black-necked Stork (*Ephippiorhynchus asiaticus*)**

The Black-necked Stork is listed as endangered on Schedule 1 of the TSC Act.

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

#### **Local Occurrence**

The Black-necked Stork is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area (DECC Threatened species website) and there 5 records of the species within 5km of the Study Area on the DECC wildlife atlas the closest being approx. 4.1km from the Study Area.

## **Habitat**

This bird inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water on a variety of prey including fish, frogs, eels, turtles, crabs and snakes. Breeds in late summer in the north, and early summer further south. A large nest, up to 2 m in diameter, is made in a live or dead tree, in or near a freshwater swamp. Two to four eggs are laid; incubation is by both parents.

## **Likelihood of Occurrence within the Study Area (author's opinion)**

It is considered that the Black-necked Stork may occasionally forage within the Study Area when it is inundated with floodwaters.

## **Threats**

The DECC Threatened species website identifies the following threats on the Black-necked Stork:

- Loss of wetland habitat through clearing and draining for flood mitigation, agriculture and residential development;
- Degradation of wetland habitats through pollution and salinisation; and
- Modification of natural wetlands through changes in natural water flow regimes.

## **Impact of the Project**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Black-necked Stork. The Black-necked Stork is not known to breed in the vicinity of the Study Area.

## **Consideration**

No known local population occurs within the Study Area. It is considered that due to the mobile nature of this species one population of this species occurs within its distributional range within northeast NSW. Considering that the Study Area does not contain breeding habitat for the species, nor is the species known to shelter or roost in the vicinity of the Study Area it is considered that although the Project is a recognised threatening process on the Black-necked Stork i.e. the removal of wetland habitat this is insufficient to cause a significant loss of potential foraging habitat for the Black-necked Stork to the extent that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Black-necked Stork listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

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

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Black-necked Stork, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Black-necked Stork as habitat within the Study Area and in the locality is already fragmented. It is considered that the Black-necked Stork would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

**(ii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,**

The DECC Threatened species profile for the Black-necked Stork on the DECC Threatened Species website provides the following table indicating important habitat for the Black-necked Stork.

The DECC Threatened species profile for the Black-necked Stork on the DECC Threatened Species website provides the following table indicating important habitat for the Black-necked Stork.

Habitat	Details
Breeding habitat	Live or dead tree in or near foraging habitat.
Foraging habitat	Swamps, mangroves, mudflats, floodplains, saltmarsh or farm dams.
Shelter/roosting/refuge habitat	as per foraging and breeding habitat
Time of year species identifiable (if flora) or best detected (if fauna)	All year

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Black-necked Storks. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Black-necked Stork Population.

**whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),**

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(e) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Black-necked Stork. No relevant threat abatement plan exists for the key threatening process that may affect the Black-necked Stork.

**(f) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty> pe is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*

- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Black-necked Stork occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Brolga (*Grus rubicundus*)**

The Brolga is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Brolga is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area (DEC Threatened Species website 2006), however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

#### **Habitat**

Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged. They feed using their heavy bill to probe the ground or turn it over, primarily on sedge roots and tubers. They will also take large insects, crustaceans, molluscs and frogs. The nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water. Two eggs are laid from winter to autumn. (DEC Threatened Species website 2006)

#### **Likelihood of Occurrence within the Study Area**

It is considered that the Brolga may occasionally forage within the Study Area when it is inundated with floodwaters.

#### **Threats**

The DECC Threatened species website identifies the following threats on the Brolga:

- At least in former times, Brolgas were poisoned and shot because of their feeding incursions into crops, following drainage of swamps;
- Loss of wetland habitat through clearing and draining for flood mitigation and agriculture.

#### **Impact of Project**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Brolga. The Brolga is not known to breed in the vicinity of the Study Area.

#### **Consideration**

No known local population occurs within the Study Area. It is considered that due to the mobile nature of this species one population of this species occurs within its distributional range within northeast NSW. Considering that the Study Area does not contain breeding habitat for the species, nor is the



species known to shelter or roost in the vicinity of the Study Area and that the Project will not contribute further to the recognised threatening processes on the species it is considered that the removal of approx 50ha of potential marginal foraging habitat of the species that it is very unlikely that the Project would have an adverse effect on the life cycle of the Brolga such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Brolga listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**  
**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**  
**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Brolga, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Brolga as habitat within the Study Area and in the locality is already fragmented. It is considered that the Brolga would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Brolga on the DECC Threatened Species website provides the following table indicating important habitat for the Brolga.

Habitat	Details
Breeding habitat	Shallow (< 50 cm) wetlands and margins of deeper waterbodies with emergent vegetation
Foraging habitat	As per vegetation types or mudflats, grasslands, cultivated areas or stubble

Shelter/roosting/refuge habitat	As per breeding and foraging habitat
Time of year species identifiable (if flora) or best detected (if fauna)	All year

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Brolgas. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Brolga Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been prepared for the Brolga. No relevant threat abatement plan exists for the key threatening process that may affect the Brolga.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+doctype> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Brolga occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

#### **Square-tailed Kite (*Lophoictinia isura*)**

The Square-tailed Kite is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Square-tailed Kite is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

#### **Habitat**

Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. It is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km<sup>2</sup>. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.

#### **Likelihood of Occurrence within the Study Area**

It is considered that a minor amount of potential foraging habitat occurs within the Study Area and that the Square-tailed Kite may occasionally forage over the Study Area. The Square-tailed Kite is not known to nest near the Study Area.

#### **Threats**

The DECC Threatened species website identifies the following threats on the Square-tailed Kite:

- Clearing, logging, burning, and grazing of habitats resulting in a reduction in nesting and feeding resources;
- Disturbance to or removal of potential nest trees near watercourses; &
- Illegal egg collection and shooting.

### **Impact of Project**

The Project will be limited to the removal of approximately 0.5ha of potential but not preferred habitat of the Square-tailed Kite.

### **Consideration**

Considering the small size and low quality of the habitat to be removed compared to the species home range it is considered very unlikely that the Project would have an adverse effect on the life cycle of the Square-tailed Kite such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Square-tailed Kite listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**  
**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**  
**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 1.3ha of potential foraging habitat of the Square-tailed Kite.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Square-tailed Kite as habitat within the Study Area and in the locality is already fragmented. It is considered that the Square-tailed Kite would be capable of moving between the fragmented habitats as it

currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Square-tailed Kite on the DECC Threatened Species website provides the following table indicating important habitat for the Square-tailed Kite.

Habitat	Details
Breeding habitat	Mature living trees
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	As per vegetation type
Time of year species identifiable (if flora) or best detected (if fauna)	all year

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Square-tailed Kites. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Square-tailed Kite Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

- (f) **whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Square-tailed Kite. No relevant threat abatement plan exists for the key threatening process that may affect the Square-tailed Kite.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+doctype> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Square-tailed Kite occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Osprey (*Pandion haliaetus*)**

The Osprey is listed as vulnerable on Schedule 2 of the TSC Act.

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

### **Local Occurrence**

The Osprey is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area and there 67 records of the species within 5km of the Study Area on the DECC wildlife atlas the closest being approx. 1.0 from the Study Area.

### **Habitat**

Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. . Incubation of 2-3 eggs, usually by the female, is about 40 days. Female remains with young almost until they fly, usually after about nine weeks in the nest.

### **Likelihood of Occurrence within the Study Area**

It is considered that the Osprey may occasionally fly over the Study Area.

### **Threats**

The DECC Threatened species website identifies the following threats on the Osprey:

- Removal of large trees near the coast that could be used as nest sites;
- Disturbances to water quality, such as from the disposal of treated effluent or stormwater runoff, that increases turbidity in feeding areas; &
- Ingestion of fish containing discarded fishing tackle.

### **Impact of Project**

It is considered that the Project will not impact on Osprey habitat.

### **Consideration**

As it is considered that the Project will not impact on Osprey habitat it is considered that very unlikely that the Project would have an adverse effect on the life cycle of the Osprey such that the viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Osprey listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will not remove Osprey habitat.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Osprey as habitat within the Study Area and in the locality is already fragmented. It is considered that the Osprey would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Osprey on the DECC Threatened Species website provides the following table indicating important habitat for the Osprey.

Habitat	Details
Breeding habitat	Emergent living or dead trees or artificial towers within 3 km of foraging habitat
Foraging habitat	Open protected water
Shelter/roosting/refuge habitat	Structures on shorelines as vantage points for hunting and for resting
Time of year species identifiable (if flora) or best detected (if fauna)	all year

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Ospreys. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Osprey Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**



A recovery plan has been not been prepared for the Osprey. No relevant threat abatement plan exists for the key threatening process that may affect the Osprey.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty+pe> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Osprey occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Grass Owl (*Tyto capensis*)**

The Grass Owl is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Grass Owl is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area and there 3 records of the species within 5km of the Study Area on the DECC wildlife atlas the closest being approx. 1.7km from the Study Area.

#### **Habitat**

Grass Owls are found in areas of tall grass, including grass tussocks in swampy areas, grassy plains, swampy heath, and cane grass, or sedges on flood plains. They shelter during the day on a trampled platform in a large tussock or other heavy growth. They also nest in trodden-down grass.

#### **Likelihood of Occurrence within the Study Area**

Suitable habitat occurs within the Study Area however field survey over several seasons failed to confirm their presence within the Study Area.

#### **Threats**

The DECC Threatened species website identifies the following threats on the Grass Owl:

- Loss of suitable habitat due to grazing, agriculture and development;
- Disturbance and habitat degradation by stock;
- Use of pesticides in agriculture to control rodent populations thereby reducing seasonal food sources for owls, and potentially poisoning owls; &
- Frequent burning, which reduces ground cover.

It is also considered that predation by foxes could be a threat to Grass Owls. Foxes were recorded on several occasions within the Study Area during the field survey. Their presence may have detracted from the value of the Study Area as Grass Owl habitat.

#### **Impact of Project**

The Project will be limited to the removal of approximately 50ha of potential habitat of the Grass Owl.

#### **Consideration**

No known local Grass Owl population occurs within the Study Area. It is considered that due to the mobile nature of this species one population of this species occurs within its distributional range within northeast NSW. Although the Project is a recognised threatening process on the Grass Owl it is considered that Grass Owls are not using the potential habitat within the Study Area, therefore it is considered that the removal of the potential habitat will not cause the Grass Owl population which is known to use habitat in the vicinity of the Study Area to be placed at risk of extinction.

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

There are no endangered populations of the Grass Owl listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**  
**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**  
**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential habitat of the Grass Owl, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Grass Owl as habitat within the Study Area and in the locality is already fragmented. It is considered that the Grass Owl would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Grass Owl on the DECC Threatened Species website provides the following table indicating important habitat for the Grass Owl.

Habitat	Details
Breeding habitat	As per vegetation type in vegetation <2 m high and >90 % projected foliage

	cover
<b>Foraging habitat</b>	Open, treeless habitats or marshy ground vegetated with tussocks of grass or low heath or recently harvested paddocks or cane fields.
<b>Shelter/roosting/refuge habitat</b>	As per foraging and breeding on the ground
<b>Time of year species identifiable (if flora)</b>	All year
<b>or best detected (if fauna)</b>	

It is considered that the Study Area is potential habitat. Although slashing, grazing and the potential predation by foxes has diminished the importance of the habitat to the locally occurring Grass Owl population

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Grass Owl. No relevant threat abatement plan exists for the key threatening process that may affect the Grass Owl.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty> pe is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Grass Owl occurring on and in the vicinity of the Study Area it is considered that the key threatening process predation by the European red fox is currently operating within the Study Area. A threat abatement plan has been prepared for this key threatening process it is considered that the Project is not inconsistent with the objectives of the plan, which primarily focus on fox control.

### **Masked Owl (*Tyto novaehollandiae*)**

The Masked Owl is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Masked Owl is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

#### **Habitat**

The Masked Owl lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.

#### **Likelihood of Occurrence within the Study Area**

The Masked Owl is considered a possible as the Study Area some marginal foraging habitat.

## Threats

The DECC Threatened species website identifies the following threats on the Masked Owl:

- Loss of mature hollow-bearing trees and changes to forest and woodland structure, which leads to fewer such trees in the future;
- Clearing of habitat for grazing, agriculture, forestry or other development;
- A combination of grazing and regular burning is a threat, through the effects on the quality of ground cover for mammal prey, particularly in open, grassy forests;
- Secondary poisoning from rodenticides; &
- Being hit by vehicles.

## Impact of Project

The Project will be limited to the removal of approximately 50ha of potential Masked Owl preferred habitat.

## Consideration

No known local population occurs within the Study Area. It is considered that due to the mobile nature of this species one population of this species occurs within its distributional range within northeast NSW. As the Study Area does not contain breeding habitat for the species, nor is the species known to shelter or roost in the vicinity of the Study Area and that the Project is not a threatening process on the Masked Owl it is considered that the removal of a minor area of marginal foraging habitat will not lead to the extinction of a potentially occurring viable local population of the species.

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

There are no endangered populations of the Masked Owl listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Masked Owl, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Masked Owl as habitat within the Study Area and in the locality is already fragmented. It is considered that the Masked Owl would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Masked Owl on the DECC Threatened Species website provides the following table indicating important habitat for the Masked Owl.

Habitat	Details
Breeding habitat	Hollows > 40cm diameter in live or dead trees or caves or recesses in cliffs
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	Trees, caves or recesses in cliffs or occasionally buildings.

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Masked Owls. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Masked Owl Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A draft recovery plan has been prepared for the large forest owls. As the Study Area is not known habitat and as the potential habitat within the Study Area is considered marginal it is considered that the Project is not inconsistent with the objectives of the draft plan.

No relevant threat abatement plan exists for the key threatening process that may affect the Masked Owl.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty+pe> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Masked Owl occurring on and in the vicinity of the Study Area it is considered that the key threatening process predation by the European red fox is currently operating within the Study Area. The fox would provide competition for potential prey of the Masked Owl. A threat abatement plan has been prepared for this key threatening process it is considered that



the Project is not inconsistent with the objectives of the plan, which primarily focus on fox control.

### **Barking Owl (*Ninox connivens*)**

The Barking Owl is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Barking Owl is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area and there is 1 record of the species within 5km of the Study Area on the DECC wildlife atlas this being approx. 4.3km from the Study Area.

#### **Habitat**

This species inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large eucalypts. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (*Eucalyptus camaldulensis*), White Box (*E. albens*), (Red Box) *E. polyanthemos* and Blakelys Red Gum (*E. blakelyi*). Breeding occurs during late winter and early spring.

#### **Likelihood of Occurrence within the Study Area**

It is considered that the Barking Owl is a possible occurrence within the Study Area as the Study Area contains a minor amount of marginal potential foraging habitat.

#### **Threats**

The DECC Threatened species website identifies the following threats on the Barking Owl:

- Clearing and degradation of habitat, mostly through cultivation, intense grazing and the establishment of exotic pastures;
- Inappropriate forest harvesting practices that have changed forest structure and removed old growth hollow-bearing trees;
- Firewood harvesting resulting in the removal of old trees; &
- Too-frequent fire, which causes degradation of understorey vegetation, which provides habitat and foraging substrate for prey species.

#### **Impact of Project**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Barking Owl, the majority of which is disturbed *Setaria* sp Grassland.

### **Consideration**

Although clearing within the Study Area will remove habitat it is considered that the habitat does not contain important breeding habitat or known important sheltering habitat but is marginal potential foraging habitat. Considering the small area of potential foraging habitat to be removed compared to the area over which Barking Owls is known to forage it is considered that the impact of the Project on the potentially occurring local population would be insufficient to have an adverse effect on the life cycle of the species such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Barking Owl listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

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

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50.6ha of potential foraging habitat of the Barking Owl, the majority of which is disturbed *Setaria* sp Grassland approximately 0.5ha of treed vegetation will be removed.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Barking Owl as habitat within the Study Area and in the locality is already fragmented. It is considered that the Barking Owl would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Barking Owl on the DECC Threatened Species website provides the following table indicating important habitat for the Barking Owl.

Habitat	Details
Breeding habitat	Live or dead trees with hollows > 20 cm
Foraging habitat	As per vegetation types and up to 250 m from these into adjoining grassland
Shelter/roosting/refuge habitat	living trees
Time of year species identifiable (if flora) or best detected (if fauna)	all year

It is considered that the Study Area does not provide potential breeding habitat, as the Study Area does not contain tree hollows. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Barking Owls. The DECC Threatened species website indicates that the Barking Owl forages over a very wide variety of vegetation classes. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to a potentially occurring Barking Owl Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A draft recovery plan has been prepared for the Barking Owl. As the Study Area is not known habitat for the Barking Owl nor is it considered to contain important potential habitat for the Barking Owl it is considered that the Project is not inconsistent with the objectives and actions described in the plan.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+doctype> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant

effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Barking Owl it is considered that predation of Cane Toads by Barking Owls could have a impact on a potentially occurring Barking Owl population. However it is considered that this impact would be already throughout the locality.

### **Black Flying-fox (*Pteropus alecto*)**

The Black Flying-fox is listed as vulnerable on Schedule 2 of the TSC Act.

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

### **Local Occurrence**

The Black Flying-fox is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area and there 32 records of the species within 5km of the Study Area on the DECC wildlife atlas the closest being approx. 0.4km from the Study Area. The Black Flying-fox was recorded flying over the Study Area during the field survey.

### **Habitat**

Large communal day-time camps in remnants of coastal subtropical rainforest or swamp forest, often with Grey-headed Flying-foxes. Bats fly out at dusk to feed on rainforest fruits as well as nectar and pollen from flowering eucalypts, paperbarks and banksias. When native foods are scarce, particularly during drought, they take fruit from orchards.

### **Likelihood of Occurrence within the Study Area (author's opinion)**

Confirmed - Recorded flying over the Study Area, minor area of marginal foraging habitat occurs within the Study Area, no suitable camp sites for the species occurs within the Study Area.

### **Threats**

The DECC Threatened species website identifies the following threats on the Black Flying-fox:

- Clearing and fragmentation of rainforest and swamp forest remnants used for roost sites, mostly as the result of urban development;
- Loss of forest areas used for feeding, particularly winter feeding areas, through agriculture, intensive forestry and urban development;
- Deliberate destruction and disturbance of flying-foxes including shooting of individuals and harassment and attempted re-location of camps near urban areas;
- Conversion of old-growth forests, woodlands and shrublands to young, even-aged stands as a result of intensive forestry and too-frequent burning; &
- Invasion of habitat by introduced weeds.

### **Impact of Project**

The Project will not remove important habitat utilised by the Black Flying-fox, the treed area to be removed (approx 1.3ha) only contains a very limited amount of marginal foraging habitat and no sheltering habitat.

### **Consideration**

Considering that the Project will not remove significant Black Flying-fox habitat it is considered that the Project would not have an adverse effect on the life cycle of the Black Flying-fox such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Black Flying-fox listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

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

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will not remove habitat of the Black Flying-fox.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Black Flying-fox as habitat within the Study Area and in the locality is already fragmented. It is considered that the Black Flying-fox would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Black Flying-fox on the DECC Threatened Species website provides the following table indicating important habitat for the Black Flying-fox.

Habitat	Details
Breeding habitat	Canopy trees associated with rainforest, or coastal scrub or riparian or estuarine communities and with sufficient forage resources available within 40km.
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	Patches of forest with canopy trees within 40 kilometres of forage resource. Or camps listed in the roosting database on the profiles.
Time of year identifiable (if species flora) or best detected (if fauna)	When forage habitat fruiting or flowering. Look in known camps.

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Black Flying-foxes. The DECC Threatened species website indicates that the Black Flying-fox forages over a very wide variety of vegetation classes. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Black Flying-fox Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Becarri's Free-tail Bat. No relevant threat abatement plan exists for the key threatening process that may affect the Becarri's Free-tail Bat.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+doctype> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*

- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Black Flying-fox occurring in the on and in the vicinity of the Study Area it is considered that none of the above key threatening process are relevant.

### **Grey-headed Flying-fox (*Pteropus poliocephalus*)**

The Grey-headed Flying-fox is listed as vulnerable on Schedule 2 of the TSC Act.

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

### **Local Occurrence**

The Grey-headed Flying-fox is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area\* and there 22 records of the species within 5km of the Study Area on the DECC wildlife atlas the closest being approx. 0.4km from the Study Area. The Grey-headed Flying-fox was recorded flying over the Study Area during the field survey.

### **Habitat**

Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, birth and the rearing of young. Annual mating commences in January and a single young is born each October or November. Site fidelity to camps is high with some caps being used for over a century. Travel up to 50 km to forage. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops and can inflict severe crop damage.

### **Likelihood of Occurrence within the Study Area**

Confirmed - Recorded flying over the Study Area, minor area of marginal foraging habitat occurs within the Study Area, no suitable camp sites for the species occurs within the Study Area.

### **Threats**

The DECC Threatened species website identifies the following threats on the Grey-headed Flying-fox:

- Loss of foraging habitat;
- Disturbance of roosting sites;
- Unregulated shooting; &



- Electrocution on powerlines.

### Consideration

Considering that the Project will not remove Grey-headed Flying-fox habitat it is considered that the Project would not have an adverse effect on the life cycle of the Grey-headed Flying-fox such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Grey-headed Flying-fox listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

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

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will not remove Grey-headed Flying-fox habitat.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Grey-headed Flying-fox as habitat within the Study Area and in the locality is already fragmented.

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

The DECC Threatened species profile for the Grey-headed Flying-fox on the DECC Threatened Species website provides the following table indicating important habitat for the Grey-headed Flying-fox.

Habitat	Details
Breeding habitat	Canopy trees associated with rainforest, or coastal scrub or riparian or estuarine communities and with sufficient forage resources available within 40km.
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	Patches of forest with canopy trees within 40 kilometres of forage resource. Or camps listed in the roosting database on the profiles.
Time of year species identifiable (if flora) or best detected (if fauna)	When forage habitat fruiting and/or flowering. Look in known camps.

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Grey-headed Flying-foxes. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Grey-headed Flying-fox Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Grey-headed Flying-fox. No relevant threat abatement plan exists for the key threatening process that may affect the Grey-headed Flying-fox.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+doctype> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;

- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Grey-headed Flying-fox occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)**

The Yellow-bellied Sheathtail-bat is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Yellow-bellied Sheathtail-bat is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area. The Yellow-bellied Sheathtail Bat was recorded flying over the Study Area during the field survey.

#### **Habitat**

Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are

unknown; there is speculation about a migration to southern Australia in late summer and autumn.

### **Likelihood of Occurrence within the Study Area**

Confirmed - Recorded flying over the Study Area although no suitable sheltering habitat occurs within the Study Area. The records of the Yellow-bellied Sheathtail Bat were attained soon after sunset indicating that the Yellow-bellied Sheathtail Bat must be roosting near the Study Area. It is suspected that the Yellow-bellied Sheathtail Bat may be roosting in either or both of two senescent red gums which are located on the golf driving range to the north of the Study Area.

### **Threats**

The DECC Threatened species website identifies the following threats on the Yellow-bellied Sheathtail Bat:

- Disturbance to roosting and summer breeding sites;
- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions;
- Loss of hollow-bearing trees; clearing and fragmentation of forest and woodland habitat;
- Pesticides and herbicides may reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores.

### **Impact of Project**

The Project will be limited to the modification of approximately 50ha of potential foraging habitat of the Yellow-bellied Sheathtail Bat. It is expected that the open spaces including the water body will continue to provide potential foraging habitat for the Yellow-bellied Sheathtail Bat.

### **Consideration**

Considering the small size and low quality of the habitat to be removed compared to the species home range it is considered very unlikely that the Project would have an adverse effect on the life cycle of the Yellow-bellied Sheathtail Bat such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Yellow-bellied Sheathtail Bat listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

- (d) in relation to the habitat of a Threatened species, population or ecological community:**
  - (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Yellow-bellied Sheathtail Bat, the majority of which is disturbed Setaria sp Grassland.

- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Yellow-bellied Sheathtail Bat as habitat within the Study Area and in the locality is already fragmented. It is considered that the Yellow-bellied Sheathtail Bat would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Yellow-bellied Sheathtail Bat on the DECC Threatened Species website provides the following table indicating important habitat for the Yellow-bellied Sheathtail Bat.

Habitat	Details
Breeding habitat	Live and dead hollow-bearing trees
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	Live or dead hollow-bearing trees , or under exfoliating bark, or in burrows of terrestrial mammals in treeless areas or bird nests or sugar glider nests
Time of year species identifiable (if flora) or best detected (if fauna)	All year

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Yellow-bellied Sheathtail Bats. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Yellow-bellied Sheathtail Bat Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Yellow-bellied Sheathtail Bat. No relevant threat abatement plan exists for the key threatening process that may affect the Yellow-bellied Sheathtail Bat.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+doctype> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*

- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Yellow-bellied Sheath-tail Bat occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Beccari's Freetail-bat (*Mormopterus beccarii*)**

The Beccari's Freetail-bat is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Beccari's Freetail-bat is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

#### **Habitat**

A range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses. They can also occur in towns and cities. Roost mainly in tree hollows but relatively large colonies have been found under house roofs in urban areas in Queensland.

#### **Likelihood of Occurrence within the Study Area (author's opinion)**

It is considered that the Beccari's Freetail-bat is a possible occurrence within the Study Area as the Study Area contains potential foraging habitat.

#### **Threats**

The DECC Threatened species website identifies the following threats on the Becarri's Free-tail Bat:

- Clearing of forest and woodland habitat for agricultural, residential and infrastructure development;
- Loss of hollow-bearing trees used for roosting and maternity sites as the result dieback, too frequent burning and forest management favouring younger stands; &
- Use of pesticides.

#### **Impact of Project**

The Project will be limited to the removal of approximately 64.8ha of potential foraging habitat of the Beccari's Freetail-bat, the majority of which (63.5ha) is disturbed *Setaria* sp Grassland.

#### **Consideration**

Considering the small size and low quality of the habitat to be removed compared to the species home range it is considered very unlikely that the Project would have an adverse effect on the life cycle of the Beccari's Freetail-bat such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Beccari's Free-tail Bat listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

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

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Becarri's Free-tail Bat, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Becarri's Free-tail Bat as habitat within the Study Area and in the locality is already fragmented. It is considered that the Becarri's Free-tail Bat would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Becarri's Free-tail Bat on the DECC Threatened Species website provides the following table indicating important habitat for the Becarri's Free-tail Bat.

Habitat	Details
Breeding habitat	Live or dead trees with hollows > 20 cm
Foraging habitat	As per vegetation types and up to 250 m from these into adjoining grassland
Shelter/roosting/refuge habitat	living trees



**Time of year species identifiable (if  
flora)** all year  
**or best detected (if fauna)**

It is considered that the Study Area does not provide potential breeding habitat, as the Study Area does not contain tree hollows. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Becarri's Free-tail Bat. The DECC Threatened species website indicates that the Becarri's Free-tail Bat forages over a very wide variety of vegetation classes. The Project will remove only a relatively small area of potential foraging habitat, which is therefore considered not important to a potentially occurring Becarri's Free-tail Bat Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been prepared for the Becarri's Free-tail Bat. No relevant threat abatement plan exists for the key threatening process that may affect the Becarri's Free-tail Bat.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+doctype> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species

known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Becarri's Free-tail Bat it is considered that none of the above key threatening process are relevant to the Becarri's Free-tail Bat.

#### **Eastern Freetail-bat (*Mormopterus norfolkensis*)**

The Eastern Freetail-bat is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Eastern Freetail-bat is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

#### **Habitat**

Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Solitary and probably insectivorous.

#### **Likelihood of Occurrence within the Study Area**

It is considered that the Study Area provides limited suitable foraging habitat for the Eastern Freetail-bat and is therefore considered possible to occur within the Study Area.

## Threats

The DECC Threatened species website identifies the following threats on the Eastern Freetail-bat:

- Loss of foraging habitat;
- Loss of hollow-bearing trees; and
- Application of pesticides in or adjacent to foraging areas.

## Impact of Project

The Project will be limited to the modification of approximately 50ha of potential foraging habitat of the Eastern Freetail-bat. It is expected that the open spaces including the water body will continue to provide potential foraging habitat for the Eastern Freetail-bat.

## Consideration

No known local population occurs within the Study Area. Considering that the Study Area does not contain breeding or roosting habitat for the species, nor is the species known to roost in the vicinity of the Study Area and that the Project will not significantly contribute further to the recognised threatening processes on the species it is considered that the modification of approx 50ha of potential foraging habitat of the species that it is very unlikely that the Project would have an adverse effect on the life cycle of the Eastern Freetail-bat such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Eastern Freetail-bat listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the modification of approximately 50ha of potential foraging habitat of the Eastern Freetail-bat, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Eastern Freetail-bat as habitat within the Study Area and in the locality is already fragmented. It is considered that the Eastern Freetail-bat would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Eastern Freetail-bat on the DECC Threatened Species website provides the following table indicating important habitat for the Eastern Freetail-bat.

Habitat	Details
Breeding habitat	Likely to be as per roosting habitat
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	Roost in tree hollows; also use loose bark or man-made structures.
Time of year species identifiable (if flora) or best detected (if fauna)	all year

It is considered that the Study Area does not provide potential breeding habitat. The Project will remove only a relatively small area of potential foraging habitat, which is therefore considered not important to the Eastern Freetail-bat Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Eastern Freetail-bat. No relevant threat abatement plan exists for the key threatening process that may affect the Eastern Freetail-bat.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Eastern Freetail-bat occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

#### **Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)**

The Eastern False Pipistrelle is listed as vulnerable on Schedule 2 of the TSC Act.

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

## Local Occurrence

The Eastern False Pipistrelle is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

## Habitat

Prefers moist habitats, with trees taller than 20 m, but found in a great variety of vegetation types. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.

## Likelihood of Occurrence within the Study Area

It is considered that the Study Area provides limited potential suitable foraging habitat for the Eastern False Pipistrelle and is therefore considered possible to occur within the Study Area.

## Threats

The DECC Threatened species website identifies the following threats on the Eastern False Pipistrelle:

- Disturbance to winter roosting and breeding sites;
- Loss of trees for foraging and hollow-bearing trees for roosting; &
- Application of pesticides in or adjacent to foraging areas.

## Impact of Project

The Project will be limited to the modification of approximately 50ha of potential foraging habitat of the Eastern False Pipistrelle. It is expected that the open spaces including the water body will continue to provide potential foraging habitat for the Eastern False Pipistrelle.

## Consideration

No known local population occurs within the Study Area. Considering that the Study Area does not contain breeding or roosting habitat for the species, nor is the species known to roost in the vicinity of the Study Area and that the Project will not contribute further to the recognised threatening processes on the species it is considered that the modification of approx 50ha of potential marginal foraging habitat of the species that it is very unlikely that the Project would have an adverse effect on the life cycle of the Eastern False Pipistrelle such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Eastern False Pipistrelle listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

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

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Eastern False Pipistrelle, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Eastern False Pipistrelle as habitat within the Study Area and in the locality is already fragmented. It is considered that the Eastern False Pipistrelle would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Eastern False Pipistrelle on the DECC Threatened Species website provides the following table indicating important habitat for the Eastern False Pipistrelle.

Habitat	Details
Breeding habitat	Likely to be as per roosting habitat
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	roosts in live or dead hollow-bearing trees, under bark, caves buildings.
Time of year species identifiable (if flora) or best detected (if fauna)	Mid spring-mid autumn

It is considered that the Study Area does not provide potential breeding habitat. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Eastern False Pipistrelle Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Eastern False Pipistrelle. No relevant threat abatement plan exists for the key threatening process that may affect the Eastern False Pipistrelle.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty> pe is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*



- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Eastern False Pipistrelle occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Eastern Long-eared Bat (*Nyctophilus bifax*)**

The Eastern Long-eared Bat is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Eastern Long-eared Bat is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, there are two records of the species within 5km of the Study Area on the DECC wildlife atlas, this being approx 3.9km from the corridor.

#### **Habitat**

Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark.

#### **Likelihood of Occurrence within the Study Area**

It is considered that the Study Area provides limited suitable foraging habitat for the Eastern Long-eared Bat and is therefore considered possible to occur within the Study Area. Churchill (1998) indicates that the Eastern Long-eared Bat tends to forage along the edge of the tree canopy rather than within the foliage.

#### **Threats**

The DECC Threatened species website identifies the following threats on the Eastern Bentwing-bat Bat:

- Use of pesticides;
- Clearing, fragmentation and isolation of lowland subtropical rainforest, wet and swamp eucalypt forest and coastal scrub, particularly forest and scrub close to the coast, for agricultural, residential and other development;

- Loss of hollow-bearing trees and stands of palms and rainforest trees used for roosting and maternity sites; &
- Invasion of habitat by weeds, particularly by Bitou Bush on the coast.

### Impact of Project

The Project will be limited to the removal of approximately 1.3 ha of treed habitat, which would be considered potential foraging habitat for the Eastern Long-eared Bat.

### Consideration

Considering the small size and low quality of the habitat to be removed compared to the species home range it is considered very unlikely that the Project would have an adverse effect on the life cycle of the Eastern Long-eared Bat such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Eastern Long-eared Bat listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 1.3ha of potential foraging habitat of the Eastern Long-eared Bat.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Eastern Long-eared Bat as habitat within the Study Area and in the locality is already fragmented.

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

The DECC Threatened species profile for the Eastern Long-eared Bat on the DECC Threatened Species website provides the following table indicating important habitat for the Eastern Long-eared Bat.

Habitat	Details
Breeding habitat	Rainforest
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	roosts in dense tree foliage or under bark in tree hollows
Time of year species identifiable (if flora) or best detected (if fauna)	all year

It is considered that the Study Area does not provide potential breeding habitat. It is also considered that the sparse nature of the treed vegetation communities to be removed within the Study Area would not be suitable habitat for sheltering by Eastern Long-eared Bats. The Project will remove only a relatively small area of marginal foraging habitat, which is therefore considered not important to the Eastern Long-eared Bat population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been prepared for the Eastern Long-eared Bat. No relevant threat abatement plan exists for the key threatening process that may affect the Eastern Long-eared Bat.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty> is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and

- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*
- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Eastern Long-eared Bat occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.

### **Greater Broad-nosed Bat (*Scoteanax rueppellii*)**

The Greater Broad-nosed Bat is listed as vulnerable on Schedule 2 of the TSC Act.

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

#### **Local Occurrence**

The Greater Broad-nosed Bat is known to occur in Murwillumbah subregion of the Northern Rivers Catchment Authority Management Area, however there are no records of the species within 5km of the Study Area on the DECC wildlife atlas.

#### **Habitat**

Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

### **Likelihood of Occurrence within the Study Area**

It is considered that the Study Area provides limited potential suitable foraging habitat for the Greater Broad-nosed Bat and is therefore considered possible to occur within the Study Area.

### **Threats**

The DECC Threatened species website identifies the following threats on the Greater Broad-nosed Bat:

- Disturbance to roosting and summer breeding sites;
- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions;
- Loss of hollow-bearing trees;
- Pesticides and herbicides may reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores; &
- Changes to water regimes are likely to impact food resources, as is the use of pesticides and herbicides near waterways.

### **Impact of Project**

The Project will be limited to the modification of approximately 50ha of potential foraging habitat of the Eastern False Pipistrelle. It is expected that the open spaces including the water body will continue to provide potential foraging habitat for the Eastern False Pipistrelle.

### **Consideration**

No known local population occurs within the Study Area. Considering that the Study Area does not contain breeding or roosting habitat for the species, nor is the species known to roost in the vicinity of the Study Area and that the Project will not contribute further to the recognised threatening processes on the species it is considered that the modification of approx 50ha of potential foraging habitat of the species that it is very unlikely that the Project would have an adverse effect on the life cycle of the Greater Broad-nosed Bat such that a viable local population of the species would be likely to be placed at risk of extinction.

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

There are no endangered populations of the Greater Broad-nosed Bat listed on Schedule 1 of the TSC Act.

**(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

As all endangered ecological communities are vegetation communities see accompanying flora report by Idyll Spaces 2008 for consideration of this factor.

**(d) in relation to the habitat of a Threatened species, population or ecological community:**  
**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

The Project will be limited to the removal of approximately 50ha of potential foraging habitat of the Greater Broad-nosed Bat, the majority of which is disturbed *Setaria* sp Grassland.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,**

The Project is not likely to further fragment or isolate potential habitat for the Greater Broad-nosed Bat as habitat within the Study Area and in the locality is already fragmented. It is considered that the Greater Broad-nosed Bat would be capable of moving between the fragmented habitats as it currently exists in the Study Area and it is also considered that the Project will not further exacerbate this disturbance.

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

The DECC Threatened species profile for the Greater Broad-nosed Bat on the DECC Threatened Species website provides the following table indicating important habitat for the Greater Broad-nosed Bat.

Habitat	Details
Breeding habitat	Likely to be as per roosting habitat
Foraging habitat	As per vegetation type
Shelter/roosting/refuge habitat	Live or dead hollow-bearing trees, under exfoliating bark, or buildings
Time of year species identifiable (if flora) or best detected (if fauna)	Mid spring to mid autumn

It is considered that the Study Area does not provide potential breeding habitat. The Project will modify only a relatively small area of potential foraging habitat, which is therefore considered not important to the Greater Broad-nosed Bat Population.

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

Critical habitat as listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Conservation does not occur in the Study Area.

**(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has been not been prepared for the Greater Broad-nosed Bat. No relevant threat abatement plan exists for the key threatening process that may affect the Greater Broad-nosed Bat.

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

The list of gazetted and proposed key threatening processes available from <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes+by+docty> pe is attached to the main report as **Appendix 6**.

The proposed action includes native vegetation clearance, which is recognised as a key threatening process, requiring the preparation of a threat abatement plan by the NSW National Parks and Wildlife Service.

As no threat abatement plan has yet been prepared, it is not possible to review the proposed activity in light of the plan. Meanwhile, clearing of native vegetation should be considered as a threatening process in a generic sense *ie*: is the Proposed action likely to have a significant effect on Threatened species, populations or ecological communities, or their habitats, and in particular, would it:

- cause fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity; and
- lead to soil and bank erosion, increased salinity and loss of productive land.

Based on this assessment it is considered that, with respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act Threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

The following listed or proposed key threatening processes are considered to be either operating currently within the Study Area or it is considered that the Project has the potential to contribute to the processes.

- Invasion and establishment of the cane toad - proposed key threatening process declaration \*
- Invasion of native plant communities by exotic perennial grasses - key threatening process declaration \*
- Lantana camara - proposed key threatening process declaration \*
- Predation by the European red fox - key threatening process declaration \*

- Predation by the plague minnow (*Gambusia holbrooki*) - key threatening process declaration \*

In regard to the Greater Broad-nosed Bat occurring on and in the vicinity of the Study Area it is considered that in relation to the Project none of the above key threatening process are relevant.