ARROW BOWEN PIPELINE

Terrestrial Fauna Assessment

Arrow Bowen Pipeline Pty Ltd

October 2011

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Frontispiece – The Vulnerable Squatter Pigeon (*Geophaps scripta scripta*), recorded commonly on the ABP project site.

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Definitions

Critically Endangered	Designated as 'Critically Endangered' under the EPBC Act. Refer to definition of 'EPBC Act conservation status' for meaning of Critically Endangered under the Act
Ecological Community	An assemblage of species occupying a particular area
Endangered	Designated as 'Endangered' under the EPBC Act, NC Act and / or VM Act. Refer to definitions of 'EPBC Act conservation status', 'NC Act conservation status' and 'VM Act conservation status' for meaning of Endangered under each Act
EPBC Act conservation status	Under the EPBC Act, listed threatened species and ecological communities are assigned a conservation status of 'extinct in the wild', 'Critically Endangered', 'Endangered' or 'Vulnerable'. Definitions of these terms under the EPBC Act are as follows: Extinct in the wild • it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range or • It has not been recorded in its known and / or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form. Critically Endangered • It is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria. Endangered • it is not Critically Endangered and • It is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria. Vulnerable • it is not Critically Endangered or Endangered and • It is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Habitat	An area or areas permanently, periodically or occasionally occupied by a species, population or ecological community, including any and all biotic and abiotic features of the area or areas occupied
HDD	Horizontal Directional Drilling - Directional boring, commonly called horizontal directional drilling or HDD, is a steerable trenchless method of installing underground pipes, conduits and cables in an arc along a prescribed bore path by using a surface launched drilling rig, with minimal impact on the surrounding area. Directional boring is used when trenching or excavating is not practical.

KP	• Refers to Kilometre Point along each pipeline route. For the AB mainline – AB is the prefix for kilometre point; AB0 indicating the most northern point and AB478 indicating the most southern point. • For the EL – EL is the prefix for kilometre point; EL0 indicating the most northern point and EL52 indicating the most southern point. • For the SL – SL is the prefix for kilometre point; SL0 indicating the most western point and SL25.8 indicating the most eastern point. • For the DL – DL is the prefix for kilometre point; DL0 indicating the most western point and DL25.7 indicating the most eastern point.
Least Concern	Designated as 'Least Concern' under the VM Act. Refer to definition of 'VM Act status' for meaning of 'Least Concern' under the Act.
Migratory species	Species listed as 'Migratory' under the EPBC Act
NC Act conservation status	Under the NC Act, protected species are assigned a conservation status of 'Extinct in the wild', 'Endangered', 'Vulnerable', 'Near Threatened', or 'Least Concern'. Definitions of these terms under the NC Act are as follows: Extinct in the wild • there have been thorough searches conducted for the wildlife and • it has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife. Endangered • there have not been thorough searches conducted for the wildlife and the wildlife has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife or • the habitat or distribution of the wildlife has been reduced to an extent that the wildlife may be in danger of extinction or • the population size of the wildlife has declined, or is likely to decline, to an extent that the wildlife may be in danger of extinction or • the survival of the wildlife in the wild is unlikely if a threatening process continues. Vulnerable • its population is decreasing because of threatening processes or • its population has been seriously depleted and its protection is not secured or • its population, while abundant, is at risk because of threatening processes or • its population is low or localised or depends on limited habitat that is at risk because of threatening processes. Near Threatened • the population size or distribution of the wildlife is small and may become smaller or • the population size of the wildlife has declined, or is likely to decline, at a • rate higher than the usual rate for population changes

	for the wildlife or • the survival of the wildlife in the wild is affected to an extent that the wildlife is in danger of becoming vulnerable. Least Concern • the wildlife is common or abundant and is likely to survive in the wild. Native wildlife may be prescribed as Least Concern wildlife even if: • the wildlife is the subject of a threatening process or the population size or distribution of the wildlife has declined or • there is insufficient information about the wildlife to conclude whether the wildlife is common or abundant or likely to survive in the wild.
Near Threatened	Designated as 'Near Threatened' under the NC Act. Refer to definition of 'NC Act conservation status' for meaning of Near threatened under the NC Act.
Non-remnant vegetation	Vegetation that is not mapped as remnant vegetation by DERM and / or which fails to meet DERM's criteria for 'remnant vegetation' (see definition of 'remnant vegetation', below). This includes regrowth, heavily thinned or logged vegetation and significantly disturbed vegetation that fails to meet the structural and / or floristic characteristics of remnant vegetation. It also includes urban and cropping land. Non-remnant vegetation may retain significant biodiversity values (Neldner *et al.* 2005).
project area	Refers to the area that may be impacted on directly or indirectly by the proposed Arrow Bown Pipeline project
project site	Pipeline easement or pipeline lease
Regional Ecosystem	A vegetation community, within a bioregion, that is consistently associated with a particular combination of geology, landform and soil. Regional Ecosystems (REs) may be classified under schedules 1–3 of the *Vegetation Management Regulation 2000* as either Endangered, Of Concern or Least Concern. Refer to 'VM Act conservation status' for meaning of Endangered, Of Concern or Least Concern under the VC Act.
Regionally Significant	Refer to taxa not listed as Threatened or Near Threatened species under the EPBC Act and / or NC Act, but have been listed as non-threatened priority taxa for the specified bioregion.
Remnant vegetation	Remnant woody vegetation is defined as vegetation where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy (Neldner *et al.* 2005).Defined under the Vegetation Management Act 1999.
Threatened	A term used for: • flora and fauna species which have been designated as Extinct in the wild, Endangered or Vulnerable under the NC Act; • flora and fauna species which have been designated as Extinct in the wild, Endangered or Vulnerable under the EPBC Act;

	• Ecological Communities designated as Critically Endangered, Endangered or Vulnerable under the EPBC Act; and / or • REs designated as Endangered or Of Concern under the VM Act.
Trenchfall	The process by which fauna become trapped in open pipeline trenches and are unable to escape without intervention.
Vulnerable	Designated as 'Vulnerable' under the EPBC Act and / or NC Act. Refer to definitions of 'EPBC Act conservation status' and 'NC Act conservation status' for meaning of 'Vulnerable' under these Acts.

Abbreviations

Abbreviations	Meaning
BAMM	Biodiversity Assessment and Mapping Methodology
BPA	Biodiversity Planning Assessment
CE	Critically Endangered
cm	Centimetre
CORVEG	Queensland Herbarium's site-based floristic dataset
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DERM	The Department of Environment and Resource Management
DSEWPAC	The Department of Sustainability, Environment, Water, Population, Arts and Communities, Commonwealth
E	Endangered
e.g.	Latin for exempli gratia (for example)
EHA	Queensland Essential Habitat mapping
EIS	Environmental Impact Statement
EP Act	*Environmental Protection Act 1994*
EPA	Environmental Protection Agency, now part of DERM
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Areas
et al.	Latin for `et alii' (masculine plural) or `et aliae' (feminine plural) or `et alia' (neuter plural) (and others)
EVNT	Refers to 'endangered', 'vulnerable' or 'near threatened' species – NC Act
GDA	Geocentric Datum of Australia
GPS	Global positioning system
Ha	Hectare
Hrs	Hours
i.e.	Latin for id est (that is)
kHz	Kilohertz
km	Kilometre
km^2	kilometre square
Lat.	Latitude
LC	Least Concern
Long.	Longitude
LP Act	Queensland *Land Protection (Pest and Stock Route Management) Act 2002*
m	Metre

Abbreviations	Meaning
m^2	Metre square
M	Migratory
MNES	Matters of National Environmental Significance
na	not applicable or not available
NC Act	Queensland *Nature Conservation Act 1992*
NOC	No Concern at Present
NT	Near Threatened
OC	Of Concern
pers. comm.	personal communication
Qld	Queensland
QM	Queensland Museum
RE	Regional Ecosystem
SDPWO Act	The Queensland *State Development and Public Works Organisation Act 1971*
sp.	species (singular)
spp.	species (plural)
subsp.	Subspecies
TOR	Terms of Reference
V	Vulnerable
VM Act	Queensland *Vegetation Management Act 1999*

Executive Summary

This report presents the findings of terrestrial fauna surveys completed for the Arrow Bowen Pipeline (ABP) project in winter and spring 2011. While this terrestrial fauna study examined several potential routes over the course of EIS preparation, this report focuses on one alignment (revision D) that has been developed in collaboration with Arrow to address a range of issues, including potential ecological impacts.

The winter vertebrate fauna survey of the ABP project area was completed between 14 June and 3 July 2011. The weather conditions during the survey period were characterised by clear, cool days with very cool nights.

The spring fauna survey was completed between 5 and 20 September 2011. Weather conditions were characterised by clear, warm days and relatively cool nights.

Due to the relatively cool and dry conditions during the winter and spring fauna survey periods, it is acknowledged that some fauna groups may have been under sampled. Further targeted surveys will be completed in November and December 2011 with results reports in the Supplementary EIS to be prepared for the project in 2012.

A total of 63 field survey sites were surveyed during the winter survey period, comprising one site on the Dysart Lateral, eight sites on the Saraji Lateral, 10 sites on the Elphinstone Lateral and 43 sites on the Mainline. A total of 50 field survey sites were inspected during the spring survey period, comprising three sites on the Saraji Lateral, three sites on the Elphinstone Lateral and 44 sites on the Mainline.

Database searches and literature reviews indicated the potential occurrence of a relatively large number of Endangered, Vulnerable or Near Threatened (EVNT) fauna within the project area. EPBC listed fauna include one Critically Endangered species, two Endangered species and 10 Vulnerable species. Fauna listed under the Queensland NC Act include four Endangered species, 16 Vulnerable species and 16 Near Threatened species.

The winter survey recorded a total of 175 species of terrestrial vertebrate fauna including 24 introduced species and comprising 13 amphibians (all least concern), 19 species of reptile (all least concern), 119 species of bird (one vulnerable, one near threatened) and 24 mammals (one near threatened). An additional four species of amphibian, 13 species of reptile, 25 birds and 19 species of mammal were recorded during the spring survey.

Field surveys in winter confirmed the occurrence of three species of conservation significance within the project area, the Cotton Pygmy Goose (Near-threatened), Squatter Pigeon (Vulnerable) and Little

Pied Bat (Near-threatened). The spring survey recorded these three species at multiple locations, as well as an additional four species of conservation significance, the Grey Snake (Endangered), Powerful Owl (Vulnerable), Grey Goshawk (Near-threatened) and Grey-headed Flying Fox (Vulnerable).

Essential habitat for one fauna species, Little Pied Bat is found within the ROW. The ROW contains 6.25 ha of essential habitat for Little Pied Bat, which is listed as Near-threatened under the NC Act.

Thirteen migratory species were either recorded or are considered likely to occur in the project area, although neither significant areas of habitat nor large populations of migratory species occur within the project site.

The desktop searches identified 24 introduced or pest fauna species within the pipeline buffer, seven of which were recorded during field surveys. The feral Pig and Dingo were the most commonly recorded pest species.

The key vertebrate fauna issues and constraints relating to the development of the ABP project include:

- Disturbance to mature vegetation and hollow-bearing trees and therefore loss of perching, foraging and nesting resources;
- Potential disturbance to fauna movement corridors and dry season fauna refuges (predominantly associated with creeks and dams). Such impacts are primarily temporary in nature;
- A temporary barrier to fauna movement and potential ‘trap’ provided by the open pipeline trench, hereafter referred to as trenchfall;
- Potential limited disturbance to Brigalow communities which provide habitat for the Vulnerable Ornamental Snake;
- Potential impacts on several EVNT fauna species recorded in or close to the proposed alignment during the field surveys, including the Powerful Owl, Grey Goshawk and Grey Snake;
- Disturbance to potential habitat for EVNT fauna species including the Yellow Chat, Powerful Owl, Grey Snake, Ornamental Snake, Brigalow Scaly-foot, Yakka Skink, Common Death Adder, Little Pied Bat and Grey-headed Flying Fox;
- Limited disturbance to riparian vegetation and associated wetland ecosystems providing restricted habitat types for a range of least concern fauna species; and

- Fragmentation of remnant vegetation blocks, particularly in association with hills and ranges north of Moranbah.

A review of relevant desktop data and completion of field surveys indicates that 26 EVNT species and 12 migratory species are considered to have a moderate to high likelihood of occurrence within the proposed pipeline corridor or have already been recorded along the alignment. Of those species, nine EVNT species have been identified as having the potential to be adversely impacted by the proposed works, namely:

- Powerful Owl (recorded from Mont Larcom, AB469);
- Yellow Chat (not recorded during this study, known to present in project area);
- Grey-headed Flying Fox (recorded from Raglan Creek AB446.5);
- Little Pied Bat (recorded from AB50.5, 274.4, 311.5, 462 and SL16.5) ;
- Ornamental Snake (not recorded on project site, but recorded from project area);
- Grey Snake (not recorded on project site, but recorded from project area);
- Brigalow Scaly-foot (not recorded but highly likely to be present in project area);
- Common Death Adder (not recorded but highly likely to be present in project area); and
- Yakka Skink (not recorded but highly likely to be present in project area).

Impacts on these species have been carefully considered against statutory guidelines and it is considered that, with implementation of appropriate strategies, the ABP will be unlikely to result in significant impacts on the viability of affected populations.

Proposed mitigation measures for impacts to vertebrate fauna include:

- Monitoring of open trenches by fauna spotter/catchers during the construction period. Trenchfall represents the major potential threat to a range of EVNT reptile species known or highly likely to be present in the project area, as well as all native fauna which are unable to climb out of the trench;
- Minor re-alignments of the proposed pipeline route to avoid or minimise clearing of areas of high environmental value (e.g. Endangered RE's which contain a concentration of EVNT fauna, habitat for EVNT fauna species generally, riparian areas) and areas of remnant vegetation generally;
- Use of minimum clearing widths in areas of remnant vegetation which supports fauna habitat of the highest quality. These areas have been identified in this report;
- Investigation into use of HDD techniques to avoid impacts on major watercourses (e.g. Fitzroy River). Major watercourses make a significant contribution to landscape connectivity for fauna.

The project team has worked collaboratively to select pipeline route re-alignments which avoid impacts on significant fauna habitat areas, corridors and individual habitat elements, such as hollow bearing trees.

The assessment of potential impacts to terrestrial fauna values found that, in many instances, impacts will be minimal and /or of limited intensity and duration. A suite of mitigation measures for the project has been proposed in keeping with best management practices. With the successful implementation of the recommended mitigation measures, it is considered that the impact of the project on terrestrial native fauna will be of low overall significance.

1 Introduction

1.1 Background

Arrow Bowen Pipeline Pty Ltd (Arrow), a wholly owned subsidiary of Arrow Energy Pty Ltd (Arrow Energy), proposes to construct a 600 km long point-to-point transmission pipeline to convey coal seam gas (CSG) from its fields in the Bowen Basin to a proposed Liquefied Natural Gas (LNG) Plant on Curtis Island off Gladstone for export as part of the further development of its CSG interests.

Sinclair Knight Merz Pty Ltd (SKM) commissioned Ecological Survey & Management (EcoSM) to complete terrestrial vertebrate fauna surveys of the proposed Arrow Bowen Pipeline (ABP) as part of the Environmental Impact Statement (EIS) being prepared for the project. The proposed pipeline includes the mainline and three lateral lines extending from Glendon to Gladstone in central Queensland.

This report provides a detailed assessment of terrestrial fauna and associated ecological issues relevant to the proposed pipeline and describes measures to mitigate potential impacts on fauna values.

While this terrestrial fauna study examined several potential routes over the course of EIS preparation, this report focuses on one alignment (revision D) that has been developed in collaboration with Arrow to address a range of issues, including potential ecological impacts.

2.2 Scope of Works

The scope of this vertebrate fauna assessment is to assess and describe the existing fauna values of the proposed pipeline route, and more specifically to:

- Undertake a comprehensive vertebrate animal survey of the project area at a sampling intensity that supports the scale of vegetation mapping. Surveys of terrestrial wildlife were conducted in a manner that was sensitive to effects of seasonality and the different activity patterns and habitat use by species under different seasonal conditions.
- Describe the terrestrial and riparian animals occurring in the areas affected by the project, noting the broad distribution patterns in relation to vegetation, topography and substrate. The description of the animals present or likely to be present in the area will address:
    - a list of animal species, their diversity and abundance;
    - the existence of any threatened, near threatened or otherwise noteworthy species or communities in the project area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and

current level of protection (such as any requirements of protected area management plans);

- any species that are poorly known but suspected of being threatened or near threatened;
- habitat requirements and their sensitivity to changes (if known);
- movement corridors and barriers to movement;
- the use of the area by migratory (species listed under JAMBA, CAMBA and ROKAMBA) birds, nomadic birds, bats, and arboreal and ground-dwelling animals;
- feral, pest or exotic animals.

- Provide an indicative list of all other known or likely species within a 10 km area around the project site and the local bioregion, highlighting any threatened or near threatened species. Correlate the occurrence of animals of conservation significance to mapped vegetation units or habitats to facilitate the development of measures for their protection. Indicate how well any affected communities are represented and protected elsewhere in the province where the site of the project occurs.

In terms of impact assessment and mitigation, this report seeks to:

- Identify suitable locations for pipeline route refinements to be adopted for the purposes of minimising potential impacts on ecological values.
- Identify potential impacts on fauna habitat features and values that may result from the construction of a pipeline within the revision D alignment; and,
- Identify appropriate measures to help avoid, minimise, mitigate and compensate for (i.e. offset) potential impacts to ecological features and values.

The Terms of Reference (TOR) for the EIS requires a discussion of areas of Critical Habitat within the project area; however, there are no areas of critical habitat currently listed in Queensland.

2.3 Assumptions and Limitations

Ecological surveys often fail to record all species of fauna present on a site for a variety of reasons such as seasonal absence or reduced activity during certain seasons. For example reptiles are less active during winter and can be difficult to detect during these months. The timing of the surveys in late spring and late summer following good rainfall was considered suitable for the detection of all faunal groups. However, the ecology and nature of rare and/or cryptic species means that such species are often not recorded during short surveys.

It should be noted that full access to the project site was not available during the survey due to wet weather and property owner restrictions. This meant that some sites that were identified through the desk top assessment as suitable survey site locations could not be surveyed.

2 Assessment Methodology

2.1 Assessment Team

The assessment team for the fauna surveys consisted of Jason Richard (Principal Ecologist), Steven Marston (Principal Ecologist), David Hannah (Senior Ecologist) Benjamin Nottidge (Senior Ecologist), Craig Marston (Ecologist) and Stewart MacDonald (Ecologist). The fauna surveys were undertaken under Scientific Purposes Permit number WISP07108910.

Specialist analyses were completed by Barbara Triggs (Hair and scat samples) and Greg Ford (Anabat call sequence analysis).

2.2 Project area

The project area considered in this report is a 10 km wide buffer centred on the proposed alignment (i.e. within 5 km either side of the route). The proposed pipeline includes:

- the ABP mainline, which runs approximately 477 km from a point about 18 km north-west of Glendon to a junction with the proposed Arrow Surat Pipeline about 22 km west of Gladstone
- the Elphinstone lateral line (also known as the header line), which runs approximately 52 km from a point about 25 km south-east of Glenden to the mainline about 29 km west of Moranbah
- the Saraji lateral line, which runs approximately 26 km from a point about 11 km west of Peak Downs Mine to the mainline about 36 km west of Peak Downs Mine
- the Dysart lateral line, which runs approximately 26 km from a point about 14 km west of Dysart to the mainline about 37 km west of Dysart.

Field studies concentrated on the Right of Way (R0W) for the proposed alignment, which is assumed to be 30 m in width. For the purpose of database searches, an expanded project area of 20km buffer to the ROW was utilised to capture sufficient fauna data.

2.3 Taxonomic Nomenclature

Taxonomic nomenclature within this report follows the following references:

- Amphibians – Tyler and Knight (2009);
- Reptiles – Wilson (2005a);
- Birds – Pizzey and Knight (2003);
- Mammals (except bats) – Menkhorst and Knight (2001); and
- Bats – Churchill (1998).

Common names are used where a fauna species has an accepted common name with the scientific name provided at the first instance of the name

appearing in the text. Common names are sourced from the references listed above in the first instance or other reputable online sources for widely used common names where the above references do not provide a common name.

2.4 Determination of Significance Level for Fauna

The significance of fauna species is described as per their listing under relevant Commonwealth and Queensland Legislation, as well as Bioregional Planning documents. Those threatened species considered to be of significance throughout this report are:

- Species listed as Critically Endangered, Endangered or Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act (1999)*(EPBC Act);
- Species listed as Endangered, Vulnerable or Near-threatened (EVNT) under the *Qld Nature Conservation Act (1992)* and subordinate regulations;
- Species listed as Migratory or Marine species under the EPBC Act. Typically these species are also protected by international convention; and
- Species considered being of bioregional significance by the Qld Government.

All other endemic fauna species have been designated as being "Least Concern".

2.5 Fauna Desktop Assessment

A desktop review of known and likely fauna values was completed for the preferred pipeline alignment (including alignment options) and associated infrastructure. The desktop review included an interrogation of fauna databases and review of the Biodiversity Planning Assessment (BPA) and corresponding expert panel reports for the Brigalow Belt North (BBN) and Central Queensland Coast (CQC) bioregions.

The fauna desktop assessment included:

- A review of relevant Environmental Impact Statements (EIS) and supporting documents of relevance to the project site and project area. Key documents included:
  - Fauna Technical Paper – Central Queensland Gas Pipeline Project (HLA Envirosciences 2008);
  - Surat-Gladstone Pipeline Project EIS – Appendix 6E, Fauna Ecological Assessment (RPS 2009);
  - Previous studies completed by Ecological Survey & Management in close proximity to the project area.
- A review of Queensland Herbarium RE mapping (version 6.0) for a 10 km buffer centred on the proposed alignment of approximately 580 km (the AB mainline (477.3 km), Elphinstone Lateral (EL) (52

km), Saraji Lateral (SL) (25.8 km), Dysart Lateral (DL) (25.7 km) to identify the diversity of fauna habitat types present. This mapping also provided mapping of Essential Habitats, which are areas in which an EVNT species has been known to occur. An examination of aerial photography was used in conjunction with the existing vegetation mapping. Interrogation of aerial photography allowed habitat features other than remnant vegetation to be detected. For example, cleared lands supporting gilgai, which provide habitat for various fauna despite their lack of vegetation cover.

- Review of Wildnet Data for the Isaac Regional, Rockhampton Regional and Gladstone Regional Council LGA's to capture species which have not been recorded from the project area but are known to occur in the broader region. As Wildnet data are not supplied with geographic coordinates and not vetted they are considered indicative lists only.
- Review of DERM Wildnet Data at six locations, with a 20km buffer (which coincide with a high level of vegetation cover) on the project site. These locations are:
  - -21.232753S, 147.988305E
  - -21.744566S, 148.091955E
  - -21.935632S, 148.309180E
  - -22.508800S, 148.711000E
  - -23.156555S, 150.117000E
  - -23.865296S, 151.041000E

The full Wildnet dataset is provided as **Appendix A**.

- Collation of data from the DSEWAPC Protected Matters Search Tool (August 2011). The data search area was centred on the mainline with a 10km buffer to avoid the generation of superfluous data. The full dataset is provided as Appendix B.
- A search of Queensland Museum Zoology data. These data are based on actual specimen records provided to the Queensland Museum and are therefore verified and associated with specific geographic locations. The data search area was divided into four boxes bound by the following coordinates:
  - Box 1: 21° to 22° S latitude and 147.5°.to 148.5° E longitude
  - Box 2: 22° to 23° S latitude and 148° to 149° E longitude
  - Box 3: 22.5° to 23.5° S latitude and 149° to 150° E longitude
  - Box 4: 23° to 24° S latitude and 150° to 151.5° E longitude.

2.6 Fauna Field Survey

2.6.1 Timing of Field Surveys

The winter vertebrate fauna survey of the ABP project area was completed between 14 June and 3 July 2011. The winter survey focussed on Revision C of the route alignment, however, results of the survey remain largely relevant to this assessment. The weather conditions

during the survey period were characterised by clear, cool days with very cool nights.

The spring fauna survey was completed between 5 and 20 September 2011. Weather conditions were characterised by clear, warm days and relatively cool nights.

The observed meteorological conditions at Moranbah Waste Treatment Plant (the meteorological station nearest the project area) are presented below in **Table 1** for the week of the survey and the preceding week.

Due to the relatively cool and dry conditions during the winter and spring fauna survey periods, it is acknowledged that some fauna groups may have been under sampled. Further targeted surveys will be completed in November and December with results reported in the Supplementary EIS for the project.

Table 1 - Meteorological Conditions at Moranbah during fauna surveys

Date	Temperature		Rainfall
	Min	Max	
	°C	°C	Mm
Winter Fauna Survey			
07/06/2011	15	26.1	0
08/06/2011	17	26.6	0
09/06/2011	12.9	23	0
10/06/2011	10.1	12.2	0
11/06/2011	8	13.5	22.4
12/06/2011	8.8	15.5	1.5
13/06/2011	8.3	21	2
14/06/2011	6.8		0
15/06/2011		20.7	0
16/06/2011	6.5	22.5	0
17/06/2011	7.8	23.2	0
18/06/2011	5.8	22.7	0
19/06/2011	5.3	22	0
20/06/2011	4.9	22.3	0
21/06/2011	5.9	24.2	0

Date	Temperature		Rainfall
	Min	Max	
	°C	°C	Mm
22/06/2011	5.8	24.7	0
23/06/2011	7.9	20.6	0
24/06/2011	5.7	21.8	0
25/06/2011	8.9	23.3	0
26/06/2011	11.3	24.1	0
27/06/2011	11.8	24.3	0
28/06/2011	14.3		1.8
29/06/2011		22.2	
30/06/2011	12.8	21.6	0.4
01/07/2011	8.7	21.9	0
Spring Fauna Survey			
28/08/2011	19.7	28.6	1
29/08/2011	16.2	26.6	38
30/08/2011	16.5	24.7	30.4
31/08/2011	16.5	26.4	1.6
1/09/2011	13.2	25.7	0.1
2/09/2011		25.5	0
3/09/2011	12.6	25.7	0
4/09/2011	12.7	24.8	0
5/09/2011	11.8	24.8	0
6/09/2011	13.1	25.6	0.6
7/09/2011	12.3	26.2	0
8/09/2011	13.2	27.1	0
9/09/2011	13.6		0
10/09/2011			0
11/09/2011		24.8	0

Date	Temperature		Rainfall
	Min	Max	
	°C	°C	Mm
12/09/2011	5.4	24.9	0
13/09/2011	9.7	24.2	0
14/09/2011	10.3	25	0
15/09/2011	10.9	26.7	0
16/09/2011	8.9	27.7	0
17/09/2011	10.2	29.1	0
18/09/2011	7.5	28.4	0
19/09/2011	12.2	28.5	0
20/09/2011	12.3	29.9	0

The seasonal conditions during the survey were not considered ideal for the detection of all groups of fauna. For example, many reptile species remain largely inactive until overnight temperatures exceed approximately 16-18C. Overnight lows were unseasonably cool during the spring fauna period. A further survey will be completed in December 2011 with a focus on nocturnal reptiles to overcome this limitation.

2.6.2 Survey Site Locations

Fauna survey sites were selected so as to provide a representative sample of the habitat diversity across the project area. Trapping sites were selected following a reconnaissance survey. Emphasis was placed on selecting sites that had a high level of microhabitat integrity (presence of understorey, logs, leaf litter and other debris) as these sites were considered most likely to support species of conservation significance.

In many instances, the fauna survey site overlapped with the flora survey sites surveyed by AECOM (2011a), as these represented the largest and most intact areas of vegetation in the project area.

2.6.2.1 Winter Survey

A total of 63 field survey sites were inspected during the winter survey period, comprising one site on the Dysart Lateral, eight sites on the Saraji Lateral, 10 sites on the Elphinstone Lateral and 43 sites on the Mainline. A list of survey sites is provided in **Table 2** below, with reference to Kilometre Points (KP's as appropriate). The location of these survey sites can be seen in **Appendix C**. Photographic plates of survey sites are shown in **Appendix D**. Four photographs were taken at each site in a

northerly, easterly, southerly and westerly direction. The top left photograph for each site is facing north, the top right is facing east, the bottom left is facing south and the bottom right is facing west.

The RE description is based on the data collected from the nearest flora survey assessment sites completed by AECOM (2011a). It is acknowledged that minor re-alignments have occurred between revision C and revision D of the proposed pipeline, however, sites surveyed under revision C remain relevant to the findings of this report.

Table 2 - Fauna Survey Assessment Sites, Winter 2011

Pipeline Section	KP	RE Description	Survey Completed*
Mainline	AB4.8	11.8.5 - *Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks.	BS, AS, I, SL, CP, AN
Mainline	AB12.6	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AN, SL, CP
Mainline	AB23	11.5.3 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS, I
Mainline	AB25.8	11.5.3 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS, I
Mainline	AB38	11.3.2/11.3.25 - 11.3.25 - Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines.	BS
Mainline	AB50.5	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS, I
Mainline	AB58.5	11.5.9/11.7.2 - *Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces	I
Mainline	AB59.4	11.5.3 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	I
Mainline	AB64.2	11.5.9/11.5.3 - *Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces	BS, I
Mainline	AB97	11.5.3/11.7.2 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS

Pipeline Section	KP	RE Description	Survey Completed*
Mainline	AB110	11.4.9 regrowth	I
Mainline	AB112	11.5.3 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS
Mainline	AB139	11.5.3 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS
Mainline	AB145.5	11.5.3 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS
Mainline	AB165.5	11.3.7/11.3.3 - *Corymbia* spp. woodland on alluvial plains and *Eucalyptus coolabah* woodland on alluvial plains.	BS
Mainline	AB217.1	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS, I
Mainline	AB234.1	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	SL, AN, CP, AS, BS
Mainline	AB236.8	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS (1.5hrx3), AS, I, AN
Mainline	AB237	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS
Mainline	AB240.2	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS
Mainline	AB245	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS
Mainline	AB276.8	11.5.3 - *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS
Mainline	AB277.8	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS
Mainline	AB280.5	Regrowth	BS, AS, I
Mainline	AB303.5	11.3.4/11.3.25 - Eucalyptus tereticornis and/or Eucalyptus spp. tall woodland on alluvial plains.	BS, AS

Pipeline Section	KP	RE Description	Survey Completed*
Mainline	AB311.5	11.9.9 - *Eucalyptus crebra* woodland on fine-grained sedimentary rocks.	BS
Mainline	AB319.5	11.3.3 - *Eucalyptus coolabah* woodland on alluvial plains.	SL, AN, CP
Mainline	AB322	11.3.3 - *Eucalyptus coolabah* woodland on alluvial plains.	BS
Mainline	AB332	11.3.1 – *Acacia harpophylla* on alluvial plains	BS, AS
Mainline	AB380	11.11.10 - *Eucalyptus melanophloia* woodland on deformed and metamorphosed sediments and interbedded volcanics	BS
Mainline	AB382	11.11.1 - *Eucalyptus crebra* +/- *Acacia rhodoxylon* woodland on old sedimentary rocks with varying degrees of metamorphism and folding.	BS, I
Mainline	AB386.5	11.3.25/11.3.4 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS, I
Mainline	AB399	11.3.25/11.3.4 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS
Mainline	AB400	11.12.1 - *Eucalyptus crebra* woodland on igneous rocks.	BS, AS, I
Mainline	AB446	11.1.4 - Mangrove forest/woodland on marine clay plains.	BS
Mainline	AB458.6	11.3.26/11.3.4 - *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	BS
Mainline	AB460	11.3.26/11.3.4 - *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	BS, AS, I
Mainline	AB461	11.3.26/11.3.4 - *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	BS, AS
Mainline	AB465	11.3.26/11.3.4 - *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	BS, I
Mainline	AB469	11.5.9/11.5.3 - *Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces	BS, AS, I

Pipeline Section	KP	RE Description	Survey Completed*
Mainline	AB16 (400m east of)	11.8.5 - *Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks.	I
Mainline	AB233 (1km nth of)	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS, I
Mainline	AB234 (370m from)	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS, I
Saraji Lateral	SL0.5	11.5.3 - *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS
Elphinstone Lateral	EL2.7	11.9.9/11.9.7 - *Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks.	SL, AN
Elphinstone Lateral	EL8.3	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS, I
Elphinstone Lateral	EL8.3	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS, SL, AN
Elphinstone Lateral	EL11.8	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS
Elphinstone Lateral	EL19.5	11.9.9 - *Eucalyptus crebra* woodland on fine-grained sedimentary rocks.	BS, AS, AN, SL
Elphinstone Lateral	EL48	11.5.3/11.7.2 - *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS , I, AN
Elphinstone Lateral	EL50	11.5.3/11.7.2 *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS (40mins) , I
Elphinstone Lateral	EL51	11.5.3 - *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS , I
Elphinstone Lateral	EL0-12	11.9.9 - *Eucalyptus crebra* woodland on fine-grained sedimentary rocks.	SL, AN
Elphinstone Lateral	EL19.5 (1.5km west of EL 19.5)	11.5.8 - *Melaleuca spp., Eucalyptus crebra, Corymbia intermedia* woodland on Cainozoic sand plains/remnant surfaces (*Eucalyptus platyphylla* woodland on white-yellow weathered sands).	BS, AN

Pipeline Section	KP	RE Description	Survey Completed*
Saraji Lateral	SL5.8	11.5.3 - *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	BS, AS, I
Saraji Lateral	SL6.5	11.3.2/11.3.25 - *Eucalyptus populnea* woodland	BS
Saraji Lateral	SL7.8	11.5.3 - *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	I
Saraji Lateral	SL11	11.3.27 - Freshwater wetlands.	BS, AS
Saraji Lateral	SL16.5	11.3.2/11.3.7 - *Eucalyptus populnea* woodland	SL, CP, AN
Saraji Lateral	SL19 (in creek)	11.3.2/11.3.7 - *Eucalyptus populnea* woodland	SL (1hrx3), AN, CP
Dysart Lateral	DL18.3	11.3.2 - *Eucalyptus populnea* woodland	SL, AN, CP

*AN = Anabat; BS = Bird Survey; AS = Active Search; SL = Spotlight; CP = Call Playback, I = Incidental observations

2.6.2.2 Spring Survey

A total of 50 field survey sites were inspected during the spring survey period, comprising three sites on the Saraji Lateral, three sites on the Elphinstone Lateral and 44 sites on the Mainline. A list of survey sites is provided in **Table 3** below, with reference to KPs.

Table 3 - Fauna Survey Assessment Sites, Spring 2011

Pipeline Section	KP	RE Description	Survey Completed*
Mainline	AB1.7	11.8.5 - *Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks.	AS
Mainline	AB25.5	11.5.3 - *Eucalyptus polulnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	TS, HF, AN
Mainline	AB28.4	11.9.9 - *Eucalyptus* crebra woodland on fine-grained sedimentary rocks.	HF, CA
Mainline	AB50.5	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	TS, AS, BS
Mainline	AB63.3	11.7.2 - *Acacia* spp. woodland on lateritic duricrust	CA, HF, BS, AS

Pipeline Section	KP	RE Description	Survey Completed*
Mainline	AB71	11.5.9 - *Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces	BS, AS
Mainline	AB73.5	11.7.1x1 – Undescribed	CA, HF, AS
Mainline	AB75.6	11.7.1x1 - Undescribed	AS, HF, CA, AN
Mainline	AB165.2	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	HF
Mainline	AB165.5	11.3.7/11.3.3 - *Corymbia* spp. woodland on alluvial plains and *Eucalyptus coolabah* woodland on alluvial plains.	TS, AN, BS, CP
Mainline	AB165.7 (150m east)	11.3.7/11.3.3 - *Corymbia* spp. woodland on alluvial plains and *Eucalyptus coolabah* woodland on alluvial plains.	BS
Mainline	AB166.4	Non-rem	CA
Mainline	AB232-233	HVR - E	BS
Mainline	AB233	Non-rem	BS, AS
Mainline	AB234	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	TS, AS, BS, HT, AN, SL, CP, HF
Mainline	AB238.2	11.3.3 - *Eucalyptus coolabah* woodland on alluvial plains.	BS
Mainline	AB239.5	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, I
Mainline	AB274.7	Non-rem	AN, BS, AS
Mainline	AB275.6	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	TS, AS, BS, I, HF, CP, SL, HT, AN
Mainline	AB279	Non-rem	AN
Mainline	AB303	HVR-OC	TS, SL, BS, AN, HT
Mainline	AB303.4	Non-rem	HT
Mainline	AB307 (800m NE)	Non-rem	BS, I
Mainline	AB308	11.9.9 - *Eucalyptus crebra* woodland	TS, SL, I, CP, BS,

Pipeline Section	KP	RE Description	Survey Completed*
		on fine-grained sedimentary rocks.	AS, AN, HT
Mainline	AB311.5	Non-rem	SL, AS, BS
Mainline	AB318	HVG-LC	BS
Mainline	AB319.5	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, I
Mainline	AB332	Non-rem	AS, BS
Mainline	AB367	11.11.15 - *Eucalyptus crebra* woodland on deformed and metamorphosed sediments and interbedded volcanic	AS, BS
Mainline	AB380	Non-rem	AS, SL
Mainline	AB382	Non-rem	AS, AN
Mainline	AB387	HVR-LC	TS, AS, SL, CP, BS, HT
Mainline	AB391	Non-rem	AN
Mainline	AB400	11.3.4/11.3.25 - *Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland on alluvial plains.	SL, AS, CA, AN
Mainline	AB410	11.3.4/11.3.25 - *Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland on alluvial plains.	TS, AS, BS, CA, SL, AN
Mainline	AB420	Non-rem	AN
Mainline	AB439	HVR-LC	AN
Mainline	AB446.4	11.1.1 - *Sporobolus virginicus* grassland on marine clay plains	AS, BS
Mainline	AB455-459	11.3.26 - *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	RT
Mainline	AB457	11.3.26 - *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	AS
Mainline	AB458	11.3.26 - *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	SL, AS
Mainline	AB462	HVR-LC	AN
Mainline	AB465	Non-rem	TS, AS, BS, CA, SL, CP, AN

Pipeline Section	KP	RE Description	Survey Completed*
Mainline	AB469	11.11.4 - *Eucalyptus crebra* woodland on old sedimentary rocks	TS, AS, BS, CA, SL, CP, HT
Saraji Lateral	SL19 (Alt)	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, I
Saraji Lateral	SL19	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, I
Saraji Lateral	SL19.1	11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	BS, AS
Elphinstone Lateral	SL19	11.5.8 - *Melaleuca* spp., *Eucalyptus crebra, Corymbia intermedia* woodland on Cainozoic sand plains/remnant surfaces (*Eucalyptus platyphylla* woodland on white-yellow weathered sands).	AN, CA, SL
Elphinstone Lateral	SL19 (1km west)	11.5.8 - *Melaleuca* spp., *Eucalyptus crebra, Corymbia intermedia* woodland on Cainozoic sand plains/remnant surfaces (*Eucalyptus platyphylla* woodland on white-yellow weathered sands).	CA
Elphinstone Lateral	EL50.5	11.5.3/11.7.2 - *Eucalyptus polulnea +/- E. melanophloia +/- Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	SL (3hrsx2)

*AN = Anabat; BS = Bird Survey; AS = Active Search; SL = Spotlight; CP = Call Playback, I = Incidental observations, TS = Trap Site, CA = Camera Trap, HF = Hair Funnel, HT = Harp Trap, RT = Nocturnal Road Transect

2.6.3 Sampling Methodology

2.6.3.1 Habitat Assessment

Fauna habitat assessments were undertaken throughout the pipeline project area including at systematic field survey sites. Systematic fauna sites are those which are sampled with exactly the same trapping intensity, methods and duration throughout the project site. These assessments were used in conjunction with actual observations of fauna to assess the faunal habitat values of the project areas. Habitat assessments involved the recording of important ecological features such as:

- presence of shelter sites for reptiles and small mammals, such as fallen debris, rocks, logs;
- quality and type of ground cover, such as depth of leaf litter, grass and shrub cover, etc;

- presence or absence of habitat trees (i.e. trees that provide significant roosting, nesting or foraging resources);
- size and abundance of hollows;
- tree features, such as bark type which may or may not provide microhabitat for arboreal reptiles and microbats;
- fire history;
- abundance of fruiting and flowering resources;
- water sources;
- vegetation structure (including age/successional phase), cover (such as canopy connectivity), density, etc.; and
- the homogeneity ('similarity') or heterogeneity ('variability') of habitats.

In addition to the general habitat assessment documented above, a semi-quantitative habitat assessment was completed at 21 of the 63 winter survey sites in an effort to rank terrestrial habitat condition. These sites were chosen because they were considered representative of habitat quality in their general vicinity. The habitat assessment methodology is based on the BioCondition Assessment Methodology (Eyre et. al. 2008).

The BioCondition Assessment Methodology was developed by the former Environmental Protection Agency (EPA) to provide a methodology for the rapid assessment of terrestrial ecosystem condition. The methodology is similar to the Habitat Hectare and BioMetric methodologies developed in Victoria and New South Wales respectively. The BioCondition methodology provides a measure of the condition of a 'patch' of vegetation in comparison to the same vegetation in its 'undisturbed' or pre-European state. This involves the assessment of a patch of vegetation against a 'benchmark' which provides the measured attributes of the vegetation type in its undisturbed state. For example, the number of large trees in a patch is measured and compared against the number of benchmark large trees for that vegetation type and scored accordingly. A BioCondition assessment provides a condition score for a patch of vegetation as a score out of 100.

To date, a comprehensive set of benchmarks for regional ecosystems has yet to be developed. In this case the user is required to identify and assess the best available patch of vegetation of the same type in a similar landscape context within the region to use as a benchmark.

Due to the practical limitations of identifying a suitable and accessible reference site to determine a benchmark for the relevant vegetation type, EcoSM developed a simplified BioCondition methodology to enable a rapid assessment of vegetation condition that generally follows the BioCondition methodology without the requirement for a benchmark reference site. The modified methodology is based on judgement of the difference of the vegetation from undisturbed conditions. While this greatly increases the subjectivity of the assessment, it still provides an objective and relative assessment framework and is considered an improvement on purely subjective assessments of habitat and vegetation condition.

However, without a benchmark it is not possible to conduct some parts of the BioCondition assessment. Specifically these are the assessment of native species richness within each life form and the detailed assessment of native grass cover, native herb and forb cover, and native annual species cover. The simplified EcoSM methodology includes an assessment of the level of cover of native species in the understorey against what would be expected in an undisturbed example of the vegetation type. Therefore, the modified assessment provides a score out of 80 that is then multiplied by 1.25 to obtain a score out of 100.

2.6.3.2 Systematic Survey Sites

Fauna trapping sites were either systematic (at which all survey effort was duplicated) to allow comparison between habitats and locations or opportunistic in nature. **Table 4** below provides a summary of survey effort expended at each systematic survey site.

Table 4 – Standard Survey Effort at Systematic Sites

Survey Method	Survey Completed
Elliott trapping	25 small Elliott traps for a minimum of 4 nights
Cage Trapping	3 cage traps for a minimum of 4 nights
Pitfall Trapping	3 buckets for a minimum of 4 nights, used in conjunction with funnel traps
Funnel Trapping	6 funnels on pitfall line for minimum of 4 nights
Harp Trapping	1 harp trap for 2 nights
Spotlighting	1 hour per night over 2 separate nights
Active Searching	1 hour per search over 2 separate days
Diurnal Bird Survey	30min per search over 2 separate days
Nocturnal Bird Survey	Nocturnal playback on 2 separate nights

2.6.3.3 Amphibian Survey Methods

Amphibian sampling involved a combination of diurnal and nocturnal census. Systematic day time searches for tadpoles and adult frogs were conducted with at least a survey effort of one hour at each survey site, according to the amount of habitat requiring survey. Particular attention was given to likely breeding sites such as creeks and waterholes. In addition, damp and watery sites such as dams, wetlands, soaks and mound springs were targeted. Frog species were identified from visual inspection or by calls made during sampling. Driving very slowly along

roads during damp conditions also enabled the capture of frogs as they crossed the road.

2.6.3.4 Reptile Survey Methods

A range of sampling techniques are necessary to survey for reptiles as no single technique will capture all species (Schultz and de Oliverira 1995). Techniques used included pitfall trapping, active searching and spotlighting on foot and from a car travelling at slow speed.

Sampling for reptiles during the winter survey period focussed on active searching under potential shelter sites.

Sampling undertaken during the warmer September survey period, when reptiles were more active, included pitfall trapping with drift fences. Deep pits (>1.1m) capture many species (e.g. geckoes, legless lizards, dragons and snakes) which appear to escape from shallow pits. Pitfall traps were not able to be installed at every site due to difficult substrates.

Timed, diurnal, active searches were undertaken at each site. Thirty minute searches were undertaken before mid-morning at each site before reptiles have reached their optimal body temperature. Basking individuals were identified by sight, however cryptic species required destructive searching of fallen logs, litter, decorticating and fallen bark and rock outcrops.

Nocturnal spotlighting of tree trunks and other habitat was used to detect geckoes and nocturnal snakes. Spotlighting involved on foot and vehicle transects. Transects completed on foot included thirty minutes per site. Spotlighting was also completed along roads and tracks whilst travelling to each site.

2.6.3.5 Diurnal bird survey methods

Birds were observed by both sight and vocalisations. Birds were surveyed early in the morning during peak calling times (within two hours of dawn). Weather conditions over the survey period were generally favourable for birds calls (i.e. still or slightly breezy and clear mornings).

Species were recorded as present within the site or flying overhead.

The time spent searching is an important factor in the number of species that will be detected. Many species forage over a large area each day and therefore two surveys of 30 minutes each were conducted in the morning and afternoon for each site.

2.6.3.6 Nocturnal bird survey methods

Several studies have found owls and other nocturnal birds are most likely to be detected by call playback techniques combined with spotlighting. This technique involved listening for vocalisations, broadcasting of the target species call, using at least a 10 Watt amplifier, and spotlighting. A 10W amplifier may be heard by owls in approximately a one kilometre

radius, although it is difficult to hear Barn Owls (*Tyto alba*) beyond 800 metres.

The methodology involved the observer(s) listening for a period of 10 to 15 minutes, followed by a spotlight search for 10 minutes to detect any animal in the immediate vicinity. Recordings of the calls of each target species were then played intermittently for 5 minutes followed by a 10 minute listening period. After all the calls were played, another 10 minutes of spotlighting and listening were conducted in the vicinity to check for birds attracted by the calls but not vocalising.

Only one census was conducted on the same night unless sites were sufficiently separated (greater than one kilometre apart) as to make the censuses independent. Owls call most frequently in the early evening and before dawn although the surveys were undertaken only at dusk. The weather during the survey period was generally acceptable to detect owl calls, however strong winds during some evenings negated the use of call playback.

2.6.3.7 Non-flying mammal survey methods

Elliott trapping

Elliott traps were numbered, tagged and established in a systematic manner following a specified sampling regime for the survey area. The approach for this survey involved 25 Elliott Type A traps in each trap line placed with a spacing of between 15 and 25 metres. Trap lines were in place for four nights at each site.

Elliott traps were checked every morning to ensure that any animals caught were not left to dehydrate during the course of the day, and then reset in the evening.

Wire cage traps

Wire cage traps were used to target larger mammals such as possums and feral Cats (*Felis catus*). A cage trap was placed for four nights at each site and checked each morning. Cages were also covered to prevent excessive exposure of trapped animals to adverse weather conditions.

Pitfall trapping

Pitfall traps used for this survey were large 20 litre buckets with the top of the bucket at or just below ground level. Within each pit, a rock or small piece of wood, dirt and leaves was placed to provide a refuge for trapped animals. Foam was placed in the pit to provide a refuge if heavy rain was predicted to occur over the survey period.

Each pit was separated by a drift fence located at least five metres either side of the pit (i.e. ten metres minimum per pit). The fences were made from black plastic builder's dampcourse which were erected to

approximately 30 centimetres in height with the lower five centimetres buried into the soil, supported by steel pegs. Pitfall traps were installed at sites where the substrate was suitable for digging of pits. Each trap line comprised of three pits and three pairs of funnel traps (see **Plate 1** below) and remained open for six consecutive nights.

Plate 1 – Reptile Funnel traps installed on pitfall line

Tracks, scats and scratches

Scat, sign and track searches target animal scats and identifiable signs such as footprints, tell-tale scratches on trees (for example the Yellow-bellied Glider, *Petaurus australis*, leaves a distinctive V-shaped feeding scar on food trees), and nests. Survey effort involved at least a 30 minute search performed in appropriate habitat. This technique was combined with other searching techniques (e.g. diurnal reptile searches).

Any scats that were unable to be placed to a species were verified by a person with specialist expertise in the analysis of scats. Predator scats were also be collected and analyses performed on their contents (such as hair from prey) by a specialist.

Spotlighting

Spotlighting survey effort involved a search for one hour, on foot, with a hand-held spotlight of appropriate power for the conditions. Spotlighting was conducted on at each site along a traverse of at least one kilometre, which samples the least disturbed parts within the habitat type. Where

the patch of remnant vegetation was too small to achieve a one kilometre traverse, a proportionate amount of spotlighting was completed.

Spotlighting from a slow moving vehicle is considered to be an effective method of observing nocturnal fauna. Spotlighting with a 100 Watt spotlight from a vehicle was undertaken along designated transects along roads and tracks and opportunistically during travel to, from and between sites.

Infrared Camera

Infrared cameras are useful for targeting large predators such as Dogs (*Canis lupus familiaris*), Dingoes (*C. l. dingo*) and Foxes (*Vulpes vulpes*) that are generally unable to be trapped. The target species are attracted to the camera location by the use of a bait station containing meat or other suitable bait.

Bat survey methods

Ultrasonic bat detectors (Anabat SD1, Titley Electronics Pty. Ltd.) were used in conjunction with harp trapping to census the microchiropteran bat fauna. Bat detectors were randomly deployed overnight at each site for a minimum of two consecutive nights whilst harp traps were erected within potential bat flyways for a minimum of two consecutive nights. Bat detectors were also carried by observers during spotlighting to actively target observed bats.

The presence of megachiropteran bats are substantially easier to ascertain than microchiropteran bats, given their size and audibly detectible vocalisations. However, due to their generally highly mobile and nomadic habits, determining the importance of an area for megachiropteran bats may be more difficult.

Spotlight searches combined with listening for calls and watching for movements in trees were completed for flying-foxes, focussing on fruiting or flowering trees and known roost sites or camps.

2.7 Likelihood Assessment

A key component of this study is an assessment of the likelihood of occurrence of EVNT fauna species within the project site and broader project area.

The assessment of potential occurrence was conducted using distribution information, known habitat preferences and professional opinion. Rankings of species likely to occur within the project site range from highly unlikely and low (ruling out the species presence and any potential impacts/management requirements) to moderate, high or present (indicating that the species had the potential to occur or had been recorded from the project site and required further impact assessment

and management consideration). The criteria used throughout this report are set out in **Table 5** below.

Table 5: Criteria to assess potential for species to occur within the project site

Likelihood to Occur	Definition
Highly unlikely	The species is considered highly unlikely to occur in the project site. Existing database records are based on prediction modeling. Habitat does not exist for the species or the species is considered locally extinct.
Low	The species is considered to have a low likelihood of occurring in the project site. Existing database records are considered historic, invalid or based on predictive habitat modeling. Either habitat does not exist for the species or the species is considered locally extinct. Despite a low likelihood based on the above criteria, the species cannot be totally ruled out of occurring within the project site.
Moderate	Habitat exists for the species; however it is either marginal or not particularly abundant. The species is known from the wider region and could potentially occur.
High	The species is known to occur within the project site or nearby area and core habitat exists, although it was not recorded during current surveys.
Present	The species was recorded from the project site during this survey.

3 Description of Environmental Values of Terrestrial Fauna

3.1 Fauna Habitat Diversity

Habitat type is a significant factor in determining the composition of the fauna species assemblage of a certain area. Two components of any particular habitat are especially important; physical structure and resource availability.

Structure refers to the abundance and complexity of the vegetation, debris and substrate. Habitats with abundant shrubs, thick ground cover and dense sub-canopy and canopy are vertically complex and provide abundant shelter sites, particularly for bird species. Horizontal complexity refers to characteristics such as the presence of ground plant species, open areas, fallen timber and rock crevices that provide sheltering opportunity for terrestrial species. Habitats with higher vertical and horizontal complexity will generally have higher fauna species diversity. Habitats with a diverse plant species assemblage tend to be more structurally complex due to the different growth forms of different species.

In addition, the availability and variety of resources affect the number and type of vertebrate species inhabiting an area. Those habitats with abundant and variable resources may support more species, even if they compete, while the presence of a preferred dietary item will facilitate the presence of a particular species (e.g. fruiting bodies for frugivores). Habitat use by certain species may be seasonal or may reflect current conditions, e.g. recent rainfall or mass flowering events.

The habitats within, and immediately surrounding the project site can be assigned to seven broad categories:

1. Eucalypt Woodland and Open Forest on Alluvial Soils and old sand plains;
2. Woodland and Open Forest on Rocky/Stony Soils;
3. Brigalow Communities;
4. Rivers, creeks and wetlands, both permanent and ephemeral and including billabongs;
5. Grasslands and woodlands on basaltic soils and clays;
6. Estuarine habitats, namely mangroves and clay plains; and
7. Acacia woodlands on rocky substrates.

Key features of these habitat types and specific values to fauna of conservation significance are discussed below.

3.1.1 Woodland and open forest on alluvial soils/sand plains

This habitat is characterised by a diverse and variable canopy tree assemblage, often with a well developed understorey/shrub layer. Examples of the canopy species present include *Eucalyptus tereticornis/camaldulensis*; *E. crebra*; *E. cambageana*; *E. populnea*,

Corymbia tessellaris and *C. dallachyana*. The understorey often featured Acacia species. Any woodland or open forest with a Brigalow (*A. harpophylla*) understorey is discussed separately hereunder.

On the slopes flanking the riparian strip of watercourses such as the Isaac River, the landscape is typically dominated by very large *Eucalyptus tereticornis* many of which act as 'habitat' trees for arboreal mammals, hollow-dependent birds and micro-bats.

The following conservation significant species may occur at times in this habitat along the pipeline route:

- EVNT species - Square-tailed Kite (*Lophoictina isura*); Red Goshawk (*Erythorotriorchus radiatus*); Squatter Pigeon (*Geophaps scripta scripta*); Glossy Black-Cockatoo (*Calyptorhynchus lathami*); Black-chinned Honeyeater (*Melithreptus gularis*), Little Pied Bat (Chalinolobous picatus) and Greater Long-eared Bat (*Nyctophilus corbeni*).
- Migratory species – White-throated Needletail (*Hirundapus caudacutus*), Fork-tailed Swift (*Apus pacificus*) and Rainbow Bee-eater (*Merops ornatus*); and
- Culturally Significant species – Short-beaked Echidna (*Tachyglossus aculeatus*) and Koala (*Phascolarctos cinereus*).

3.1.2 Woodland and open forest on non-alluvial soils

This habitat differs from the same community on alluvial soils by having a less diverse canopy assemblage and generally a structurally sparse understorey. Canopy species present were often dominated by *Eucalyptus crebra* and *E. melanophloia*.

Generally there is almost no understorey and a grassy groundcover. These woodlands are often part of a mosaic of open woodland, of varying dominant tree species and cleared pasture. The landscape is typically set within rolling hills with vegetated ephemeral gullies/creeklines which would have some limited function as corridors.

The following conservation significant species may occur at times in this habitat along the pipeline route:

- EVNT species - Square-tailed Kite; Squatter Pigeon; Black-chinned Honeyeater, Troughton's Sheathtail-bat (*Taphozous troughtoni*), Little Pied Bat and Greater Long-eared Bat;
- Migratory species – White-throated Needletail, Fork-tailed Swift and Rainbow Bee-eater; and
- Culturally Significant species – Short-beaked Echidna and Koala.

3.1.3 Brigalow communities

The ecological community Brigalow (*Acacia harpophylla* dominant or co-dominant) is listed as an Endangered Ecological Community under the

EPBC Act. The community qualified for listing as Endangered due to a severe decline in extent following its clearance in both Queensland and New South Wales for agricultural use, its current small geographic distribution (versus extensive pre-clearing distribution), and its continued clearing for agriculture.

Within the project area, where left undisturbed, the community is dominated by tall Brigalow but may include other species such as Belah (*Casuarina cristata*), some Eucalyptus species and *Brachychiton rupestris*. The understorey layer may vary from open to dense with a diverse assemblage of species possible.

This habitat is particularly important for several federally listed EVNT reptile species which are either restricted to, or most frequently recorded from, this vegetation community. These include Ornamental Snake and Brigalow Scaly-foot, for which there are database records from the area encompassing the pipeline route. These two species will occur in small and/or narrow Brigalow remnants, including roadside vegetation.

The following conservation significant species may occur at times in this habitat along the pipeline route:

- EVNT species – Brigalow Scaly-foot (*Paradelma orientalis*), Yakka Skink (*Egernia rugosa*), Ornamental Snake (*Denisonia maculata*), Dunmall's Snake (*Furina dunmalli*), Squatter Pigeon; Glossy Black-Cockatoo and Little Pied Bat;
- Migratory species – White-throated Needletail, Fork-tailed Swift and Rainbow Bee-eater; and
- Culturally Significant species – Short-beaked Echidna.

3.1.4 Rivers and creeks, (permanent or ephemeral)

The pipeline route crosses several river/creek lines that are perennial, seasonal or intermittent. The canopy in this habitat may be quite diverse, however where previous disturbance has occurred diversity may be low and a weedy understorey is common outside of the immediate riparian zone. Tree species present may include: *Eucalyptus tereticornis*; *Melaleuca leucadendra*; *M. fluviatilis*; *M. saligna*; *Casuarina cunninghamiana*; *Alphitonia excelsa* and *Ficus opposita*. Where vegetation has been cleared, *Melaleuca bracteata* was sometimes common.

Riparian corridors are suitable for a range of conservation significant species, particularly migratory birds, including:

- EVNT species – Square-tailed Kite, Black-chinned Honeyeater;
- Migratory species – Great Egret (*Ardea alba*), White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Rainbow Bee-eater, Rufous Fantail (*Rhipidura rufifrons*), Black-faced Monarch (*Monarcha melanopsis*); and
- Culturally Significant species – Platypus (*Ornithorhynchus anatinus*), Short-beaked Echidna and Koala.

3.1.5 Grasslands

The pipeline route crosses extensive areas of pasture and non-remnant vegetation. Few EVNT species occur in this habitat type; however there are areas of pasture that become inundated sporadically which could provide temporary resources for species that will utilise areas of wet rank grasses such as Australian Painted Snipe (*Rostratula benghalensis*) and Latham's Snipe.

Conservation significant species that may occur in this habitat include:

- EVNT species – Black-necked Stork (*Ephippiorhynchus asiaticus*), Australian Painted Snipe, Squatter Pigeon;
- Migratory species – Great Egret, Cattle Egret, Latham's Snipe, White-throated Needletail, Fork-tailed Swift and Rainbow Bee-eater; and
- Culturally Significant species – Short-beaked Echidna.

Black-necked Stork, Australian Painted Snipe and Latham's Snipe will only occur during periods of inundation. These three migratory species will all occur in, or above, this habitat type at times.

3.1.6 Estuarine Habitats

In the project area, these habitats are dominated by Mangrove low forest on Quaternary estuarine deposits. *Avicennia marina* is the most common species but other trees such as *Aegiceras corniculatum*, Rhizophora spp. and *Ceriops tagal* dominate often in pure stands. There is often a shrub layer consisting of juvenile plants of the above species.

Conservation significant species that may occur in this habitat include:

- EVNT species – Water Mouse (*Xeromys myoides*), Black-necked Stork, Australian Painted Snipe; Estuarine Crocodile (*Crocodylus porosus*).
- Migratory species – Great Egret, Cattle Egret, Latham's Snipe, White-throated Needletail, Fork-tailed Swift and Rainbow Bee-eater.

3.1.7 Acacia Woodlands on Rocky Substrates

In the project area, these woodlands are dominated by Lancewood (*Acacia shirleyi*) and Bendee (*Acacia catenulata*) in scarp retreat zones. Other Acacia spp. that commonly occur and occasionally dominate the tree layer include *A. rhodoxylon, A. burrowii, A. sparsiflora, A. crassa and A. blakei*.

The following conservation significant species may occur at times in this habitat along the pipeline route:

- EVNT species – Brigalow Scaly-foot, Yakka Skink, Dunmall's Snake, and Little Pied Bat;
- Migratory species – White-throated Needletail, Fork-tailed Swift and Rainbow Bee-eater; and

- Culturally Significant species – Short-beaked Echidna.

3.2 Habitat Values by Regional Ecosystem

The proposed alignment is characterised by predominantly cleared land (428.79 km or 73.8% of the alignment), most of which is cropping and grazing land. Remnant vegetation occurs along 124.03 km (21.4%) of the proposed alignment and high value regrowth along 28.06 km (4.8%). Remnant vegetation is comprised of 0.44 km of Endangered REs (0.07% of the alignment), 27.8 km of Of Concern REs (4.79% of the alignment) and 95.7 km of No Concern at Present REs (16.4% of the alignment). The most prominent vegetation types within the project area include:

- 33.93 km of the No Concern at Present poplar box woodland on residual Cainozoic sand plains (RE 11.5.3); and
- 19.33 km of the No Concern at Present ironbark woodland on fine-grained sedimentary rocks (RE 11.9.9) (AECOM 2011a).

A range of fauna habitat values can be associated with specific regional ecosystems including, but not limited to the following:

- High densities of hollow bearing (habitat) trees;
- Prolific nectar and blossom production;
- Complex microhabitats, providing refugia for herpetofauna and small mammals; and
- Wetland habitats which provide unique foraging and breeding resources for birds and amphibians in particular.

Table 6 below provides an overview of the known fauna values associated with each RE present within the ROW. Where specific EVNT fauna values are known they are also listed. In the case of mixed polygons, area of vegetation loss in hectares and estimates of kilometres cleared are assigned to the dominant RE in the polygon.

Table 6: Fauna Habitat Values, listed by Regional Ecosystem

RE Code	Area (ha)	Length (km)	Description	Unique Fauna Values	EVNT Fauna associated with RE
Eucalypt Woodland and Open Forest on Alluvial Soils and old sand plains					
11.3.2	38.63	6.63	*Eucalyptus populnea* woodland on alluvial plains.	Mature stands contain high densities of hollow bearing trees.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
11.3.3	3.02	0.45	*Eucalyptus coolabah* woodland on alluvial plains.	Mature stands contain high densities of hollow bearing trees. Often support ephemeral, vegetated wetlands of high value to waterbirds.	Painted Snipe (Vulnerable), Rough Frog (Near-threatened), Grey Snake (Endangered).
11.3.4	2.72	1.54	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland on alluvial plains.	Mature stands contain high densities of hollow bearing trees. Prolific blossom and nectar on a seasonal basis.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
11.3.7	3.96	1.32	*Corymbia* spp. woodland on alluvial plains.	Mature stands contain high densities of hollow bearing trees.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
11.3.26	2.37	1.59	*Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	Abundance of decorticating bark as a foraging resource for insectivorous birds.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
11.3.36	2.43	0.81	*Eucalyptus crebra* and/or *E. populnea* and/or *E. melanophloia* on alluvial plains. Higher terraces.	Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable)
11.4.2	0.17	0.1	*Eucalyptus* spp. and/or *Corymbia* spp. grassy or shrubby woodland on Cainozoic clay plains.	Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable)

RE Code	Area (ha)	Length (km)	Description	Unique Fauna Values	EVNT Fauna associated with RE
11.5.3	106.56	35.52	*Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	Mature stands contain high densities of hollow bearing trees.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
11.5.8c	10.66	3.9	*Melaleuca* spp., *Eucalyptus crebra, Corymbia intermedia* woodland on Cainozoic sand plains/remnant surfaces (*Eucalyptus platyphylla* woodland on white-yellow weathered sands).	Prolific blossom and nectar on a seasonal basis.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
11.5.9b	30.88	10.69	*Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces (*E. crebra*, E. tenuipes, *Lysicarpus angustifolius* + *Corymbia* spp).	Prolific blossom and nectar on a seasonal basis.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
11.5.12	3.96	1.32	*Corymbia clarksoniana* woodland and other *Corymbia* spp. and *Eucalyptus* spp. on Cainozoic sand plains/remnant surfaces.	Prolific blossom and nectar on a seasonal basis.	Black-chinned honeyeater (Near-threatened), Red Goshawk (Endangered), Grey-headed Flying Fox (Vulnerable).
Grasslands and woodlands on basaltic soils					
11.8.5	31.78	10.59	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks.	Deep basaltic soils as habitat for fossorial reptiles in particular.	Squatter Pigeon (Vulnerable)
11.8.11	4.98	1.66	*Dichanthium sericeum* grassland on Cainozoic igneous rocks.	Deep basaltic soils as habitat for fossorial reptiles in particular.	Squatter Pigeon (Vulnerable), Grey Snake (Endangered).
Rivers, creeks and wetlands					
11.3.25	19.14	6.38	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	Mature stands contain high densities of hollow bearing trees. Prolific blossom and nectar on a seasonal basis.	Tusked Frog (Vulnerable), Rough Frog (Near-threatened), Painted Snipe (Vulnerable), Radjah Shelduck (Near-threatened), Cotton Pygmy Goose (Near-threatened).

RE Code	Area (ha)	Length (km)	Description	Unique Fauna Values	EVNT Fauna associated with RE
11.3.27	1.2	0.75	Freshwater wetlands.	Often support ephemeral, vegetated wetlands of high value to waterbirds.	Tusked Frog (Vulnerable), Rough Frog (Near-threatened), Painted Snipe (Vulnerable), Radjah Shelduck (Near-threatened), Cotton Pygmy Goose (Near-threatened).
Woodland and Open Forest on Rocky / Stony Soils					
11.7.2	12.64	4.22	*Acacia* spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	Complex groundlayer with abundant leaf litter, sticks and debris as reptile habitat.	Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
11.9.2	0.53	0.18	*Eucalyptus melanophloia +/- E. orgadophila* woodland on fine-grained sedimentary rocks.	Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable).
11.9.7a	13.55	21.52	*Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks (generally diverse dense tall shrub layer and ground layer of annual grasses on Jurassic Hooray Sandstone).	Mature stands contain high densities of hollow bearing trees.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
11.9.9	8.94	23.43	*Eucalyptus crebra* woodland on fine-grained sedimentary rocks.	Mature stands contain high densities of hollow bearing trees. Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
11.11.1	0.49	0.56	*Eucalyptus crebra +/- Acacia rhodoxylon* woodland on old sedimentary rocks with varying degrees of metamorphism and folding.	Mature stands contain high densities of hollow bearing trees. Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
11.11.10	0.25	0.51	*Eucalyptus melanophloia* woodland on deformed and metamorphosed sediments and interbedded volcanics.	Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink

RE Code	Area (ha)	Length (km)	Description	Unique Fauna Values	EVNT Fauna associated with RE
					(Vulnerable), Common Death Adder (Near-threatened).
11.11.15	16.56	18.1	*Eucalyptus crebra* woodland on deformed and metamorphosed sediments and interbedded volcanic.	Mature stands contain high densities of hollow bearing trees. Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
11.11.16	1.44	0.48	*Eucalyptus cambageana, Acacia harpophylla* woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Lowlands.	Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
11.12.1	1.26	0.42	*Eucalyptus crebra* woodland on igneous rocks.	Mature stands contain high densities of hollow bearing trees. Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
11.12.2	2.44	0.81	*Eucalyptus melanophloia* woodland on igneous rocks.	Prolific blossom and nectar on a seasonal basis.	Grey-headed Flying Fox (Vulnerable), Brigalow Scaly-foot (Vulnerable), Yakka Skink (Vulnerable), Common Death Adder (Near-threatened).
Brigalow communities					
11.3.1	0.83	0.84	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains.	May contain gilgai, of high value to reptiles and amphibian species on a seasonal basis. Complex groundlayer with abundant leaf litter, sticks and debris as reptile habitat.	Dunmall's Snake (Vulnerable), Brigalow Scaly-foot (Vulnerable), Ornamental Snake (Vulnerable).

RE Code	Area (ha)	Length (km)	Description	Unique Fauna Values	EVNT Fauna associated with RE
11.4.9	0.5	0.5	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains.	May contain gilgai, of high value to reptiles and amphibian species on a seasonal basis. Complex groundlayer with abundant leaf litter, sticks and debris as reptile habitat.	Dunmall's Snake (Vulnerable), Brigalow Scaly-foot (Vulnerable), Ornamental Snake (Vulnerable).
Estuarine communities					
11.1.4	0.56	0.18	Mangrove forest/woodland on marine clay plains.	Provides estuarine wetland habitat which may support species such as Yellow Chat, Estuarine Crocodile and Water Mouse.	Eastern Curlew, Water Mouse, Dawson Yellow Chat, Estuarine Crocodile.
11.1.1	0.49	0.16	*Sporobolus virginicus* grassland on marine clay plains.	Provides estuarine wetland habitat which may support species such as Yellow Chat, Estuarine Crocodile and Water Mouse.	Eastern Curlew, Water Mouse, Dawson Yellow Chat, Estuarine Crocodile.

3.3 Fauna Habitat Condition

The average habitat condition score for sample sites was 43 out of a possible 100 (range of 10.58-75.26), indicating that overall condition is well below expectation for remnant areas of vegetation. Many of the 76 survey sites inspected during the survey were found to be in poor condition with a high density of exotic species and significant disturbance due to cattle grazing, mechanical clearing and other disturbances. These disturbances substantially reduce habitat complexity and in particular:

- Lower percentage of groundcover, particularly native groundcover;
- Lower density of understorey shrubs;
- Decreased availability of woody debris and leaf litter;
- Increased erosion and sedimentation due to cattle intrusion; and
- Reduced floral diversity as a result of smothering by weeds.

Habitat assessment scores were only assigned to a subset of the sites visited to provide a representative sample of condition at the landscape scale. Sites were selected based on their representativeness of local condition.

A summary of habitat types, condition scores and general comments relating to habitat value is provided in **Table 7** below.

Table 7 – Summary of condition assessment results

Pipeline	KP	Condition	Habitat assessment score
Mainline	AB4.8	Good	Not assessed
Mainline	12.6	Good	37.6
Mainline	23	Good, no shrub layer	42.3
Mainline	25.8	Good	63
Mainline	38	Moderate	Not assessed
Mainline	50.5	Good	Not assessed
Mainline	54.6	Poor	35.28
Mainline	58.5	Poor	Not assessed
Mainline	59.4	Moderate	23.52
Mainline	64.2	Good	75.26
Mainline	97	Good, but with buffel groundcover	43.51
Mainline	110	Moderate	Not assessed
Mainline	112	Poor	29.4
Mainline	139	Poor	15.28
Mainline	139	Poor	Not assessed
Mainline	145.5	Poor	14.11
Mainline	145.5	Poor	Not assessed
Mainline	165.5	Good	52.92
Mainline	166.2	Good but buffel groundcover	Not assessed
Mainline	217.1	Poor	Not assessed
Mainline	234.1	Good but degraded understorey	68.2

Pipeline	KP	Condition	Habitat assessment score
Mainline	236.8	Moderate, degraded understorey	Not assessed
Mainline	237	Moderate	Not assessed
Mainline	240.2	Moderate	30.57
Mainline	240.2	Moderate	Not assessed
Mainline	245	Moderate	39.98
Mainline	245	Moderate	Not assessed
Mainline	276.8	Good	Not assessed
Mainline	277.8	Poor, rubber vine	Not assessed
Mainline	280.5	Good	Not assessed
Mainline	303.5	Good	Not assessed
Mainline	311.5	Moderate, degraded understorey	Not assessed
Mainline	312.5	Good	Not assessed
Mainline	319.5	Good	10.58
Mainline	322	Poor groundcover	29.4
Mainline	332	OK, but narrow and weedy understorey	Not assessed
Mainline	380	Good	51.74
Mainline	382	Good, but poor understory	32.92
Mainline	386.5	Moderate	31.75
Mainline	399	Good	36.45
Mainline	400	Poor	28.22
Mainline	446	Good	58.8
Mainline	456.7	Poor	Not assessed
Mainline	458.6	Good	65.85
Mainline	460	Poor	Not assessed
Mainline	461	OK, but poor understorey	Not assessed
Mainline	465	Good, but poor understory	Not assessed
Mainline	469	Good	41.16
Mainline	16 (400m east of)	Good	Not assessed
Mainline	233 (1km nth of)	Good, mostly intact understorey	Not assessed
Mainline	234 (370m from)	Poor	43.51
SL	0.5	Good	55.27
SL	5.8	Good	57.62
SL	6.5	Moderate	58.8
SL	7.8	Good	Not assessed
SL	11	Good	Not assessed
SL	16.5	Poor-moderate, no understorey, buffel	Not assessed
SL	19 (in creek)	Good, but buffel groundcover	Not assessed
SL	19 (on bank)	Good, but buffel groundcover	Not assessed

Pipeline	KP	Condition	Habitat assessment score
DL	DL18.3	Good, but with buffel groundcover	Not assessed
EL	EL2.7	Good	Not assessed
EL	8.3	Good	Not assessed
EL	11.8	Good	Not assessed
EL	19.5	Good-high	74
EL	48	Good, but poor understory	Not assessed
EL	50	Good	61.15
EL	51 (walk in)	Good	Not assessed
EL	0-12	Good	Not assessed
EL	19.5 (1.5km west of)	High	Not assessed

3.4 Environmentally Sensitive Areas

The QLD *Environmental Protection Regulation (2008)* classifies certain areas as "Environmentally Sensitive Areas". Depending on the nature of the activity, ESA's are designated as Category A, B or C ESA's and afforded varying levels of protection. Desktop investigations have identified the following ESAs of ecological significance within the ROW and / or a 10 km buffer:

- Essential Habitat (Category C)
- Protected Area Estates (Category C) – nature refuges and state forests
- Endangered (Category B) and Of Concern REs (Category C)

These are discussed further in following sections.

3.4.1 Essential Habitat

Essential habitat, which is vegetation in which a species that is endangered, vulnerable or near threatened has been known to occur, is mapped by DERM as occurring in a particular location. The Department uses these essential habitat maps to help determine the habitat status of the vegetation under the VM Act to regulate vegetation clearing in such a way as to prevent the loss of biodiversity.

The biological and/or non-biological habitat requirements of a species are covered by specifying essential habitat factors and can include, but are not limited to:

- vegetation—the species or types of vegetation that the species is associated with;
- regional ecosystem—the regional ecosystem(s) with which the species is most commonly associated;

- land zone—the underlying geology associated with a regional ecosystem;
- altitude—the range of altitudes at which the species is found;
- soils—the type of soil on which a species is most commonly found; and
- position in landscape—a precise description of the landscape features the species is commonly associated with (e.g. creek bank, levees, lower slopes, hillsides and ridges).

Essential habitat for one fauna species, Little Pied Bat (*Chalinolobus picatus*) (see Plate 2 below) is found within the ROW. The ROW contains 6.25 ha of essential habitat for Little Pied Bat, which is listed as Near Threatened under the NC Act. The essential habitat area is located at AB75, an area found to support caves and ledges which provide habita for a range of Microchiropteran species.

Plate 2 – Little Pied Bat, showing distinctive pigmentation

According to the DERM Essential Habitat Database, the Little Pied Bat is associated with associated with areas of dry eucalypt woodland and open forest (e.g. *Eucalyptus melanophloia*, *E. populnea*, *E. crebra*, *E. moluccana*, *E. Tereticornis*, *Corymbia citriodora* and *C. tessellaris*) at altitudes from sea level to 850m above sea level.

3.4.2 Protected Area Estates

Areas protected under the NC Act that are adjacent to the ABP are listed in **Table 8.** The ROW does not transect any protected area estate, but lies within 5 km of six state forests and four nature refuges. No national parks or world heritage areas occur with 5 km of the ABP (AECOM 2011a).

The Great Barrier Reef World Heritage Area and Marine Park adjoins the coast of north and central Queensland. Although the ROW does not directly impact the Great Barrier Reef region, it runs through the Calliope, Fitzroy and Burdekin catchments, which flow into the Great Barrier Reef lagoon.

No areas of protected area estate are crossed by the proposed pipeline ROW, so are unlikely to be impacted by construction or operating activities provided that appropriate mitigation measures are implemented.

Table 8 - Protected Area Estate within the Pipeline Buffer

Estate Name	Lot and Plan	KP
Newlands Nature Refuge	4 SP171919	AB 0-8
Kemmis Creek Nature Refuge	12 WHS529	EL 0
Coolibah Nature Refuge	9 CNS42	DL 0 -1
Eugene State Forest	65 FTY1503	AB 297-304
Develin State Forest	66 FTY1343	AB 311-314
Aricia State Forest	11 4FTY861	AB 334-339
Morinish State Forest	878 FTY842	AB 360-361
Mount Larcom State Forest	208 FTY1451	AB 466-467
Bouldercombe State Forest	950 FTY1794	AB 440-405
Pindari Nature Refuge	181 DS631	AB 450-451

3.4.3 Vegetation Communities and Regional Ecosystems

The pipeline passes through the Brigalow Belt Bioregion (Bioregion 11). Queensland Herbarium RE mapping recognises 96 REs and sub-REs within the 5 km buffer area. Field surveys and examination of satellite imagery identified 31 REs within the ROW (AECOM 2011).

Field inspections completed by AECOM (2011) generally agreed with RE mapping, with some minor discrepancies that could be attributed mostly to mapping scale. Field surveys assessed vegetation within a narrow 30 m wide corridor, so were capable of detecting much smaller scale vegetation

patterns than the 1:100,000 RE mapping. Field inspections also recorded clearing that had occurred following compilation of the most recent RE mapping.

3.5 EVNT Fauna

3.5.1 Results of previous studies

Central Queensland Gas Pipeline (HLA Envirosciences 2008)
This proposed pipeline would be 450 km in length and run from Moranbah to Gladstone and follows a similar but more westerly alignment to the proposed ABP. Fauna surveys conducted for the central Qld gas pipeline occurred in the winter months and consequently none of the significant species likely to occur within the impact area were recorded.

Following a desktop assessment reviewing databases however, a total of 41 species protected under the EPBC Act were identified as potentially occurring within the pipeline corridor. Of the species identified, 22 were listed as threatened, 13 as migratory and 18 as marine. Of the 22 threatened species, four had the potential to actually be impacted by construction of the pipeline. This was determined by the known distribution, presence of suitable habitat and ecology of these species which were Dunmall's Snake (*Furina dunmalli*), Yakka Skink (*Egernia rugos*a), Bridled Nailtail Wallaby (*Onchygalea fraenata*) and the Eastern Long-eared Bat (*Nyctophilus timoriensis*).

Surat to Gladstone Pipeline – RPS (2009)
This pipeline is 467 km long and runs from Surat in the southern Brigalow Belt north to Gladstone with the last 64 km and 23 km of the pipeline being contained within the Callide Infrastructure Corridor and Gladstone State Development Area Infrastructure Corridor respectively.

Fauna surveys conducted in January and March 2009 revealed the presence of three species of conservation significance recorded along the pipeline route. These species were the Golden-tailed Gecko (*Strophurus taenicauda*), Squatter Pigeon (*Geophaps scripta*) and the Little Pied Bat (*Chalinolobus picatus*).

Essential habitat mapping in the locality of the pipeline route indicated potential habitat for five species of conservation significance which were the Brigalow Scaly-foot (*Paradelma orientalis*), Golden-tailed Gecko (*Strophurus taenicauda*), Rusty Monitor (*Varanus semiremex*) (now de-listed), Little Pied Bat (*Chalinolobus picatus*) and the Koala (Phascolarctos *cinereus*) (Vulnerable only in SEQ Bioregion).

Through database interrogations and habitat assessments during the survey periods, it was determined 27 EVNT fauna species and 13

migratory fauna species had a more than a moderate chance of occurring in suitable habitat along the pipeline route.

PNG Gas Project – South Pacific Pipeline Company Pty Ltd (Chevron Asiatic Ltd)

This pipeline was proposed to run from Kutubu in Papua New Guinea to Gladstone over a distance of approximately 2500 km but was suspended in 2007. Species of conservation significance identified as potentially occurring within the general locality of the proposed ABP pipeline (i.e. the last 500 km) include the Red Goshawk (*Erythrotriorchis radiatus*), Squatter Pigeon (*Geophaps scripta*), Cotton Pygmy Goose (*Nettapus coromandelianus*), Brigalow Scaly-foot (*Paradelma orientalis*), Dunmall's Snake (*Furina dunmalli*), Yakka Skink (*Egernia rugosa*), Golden-tailed Gecko (*Strophurus taenicauda*), Ornamental Snake (*Denisonia maculata*), Common Death Adder (*Acanthophis antarcticus*) and the Fitzroy Turtle (*Rheodytes leukops*).

Gladstone-Fitzroy Pipeline Project – Gladstone Area Water Board (2008)

The proposed Gladstone-Fitzroy Pipeline project (will transfer approximately 30,000 ML of water per annum from the Fitzroy River to the Gladstone Area Water Board's (GAWB's) existing water infrastructure at Yarwun. Fauna surveys for the Gladstone-Fitzroy Pipeline Project recorded a number of EVNT species in the project area or on adjacent land. They were:

- Critically Endangered: Yellow Chat (*Epthianura crocea macgregori*)
- Vulnerable: Squatter Pigeon (sth. subsp.) (*Geophaps scripta scripta*) and Ornamental Snake (*Denisonia maculata*).
- Regionally Vulnerable: Koala (Southeast Qld) (*Phascolarctos cinereus*).
- Near-threatened: Cotton Pygmy-goose (*Nettapus coromandelianus*), Jabiru (*Ephippiorhynchus asiaticus*), Radjah Shelduck (*Tadorna radjah*) and Black-chinned Honeyeater (*Melithreptus gularis*).

Of the species records obtained for the Gladstone-Fitzroy Pipeline Project, records of the Yellow Chat are of most significance, with two records of the species at Twelve Mile Creek, approximately 1-1.5km north of AB449.

3.5.2 Database Records

Table 9 lists EVNT fauna species recorded within 20km of the proposed pipeline route. Species data was collated from Queensland Museum, Wildnet and EPBC databases. Field survey results showing the location records of EVNT species detected during this study are mapped in **Appendix E**.

EPBC listed fauna include one Critically Endangered species, two Endangered species and 10 Vulnerable species. Fauna listed under the Queensland NC Act include four Endangered species, 16 Vulnerable species and 16 Near Threatened species.

A range of marine species which are listed as potential occurrences in the EPBC Protected Matters Search Tool are highly unlikely to occur within the project site and are even less likely to be impacted by the project. These species have been excluded from further consideration in this assessment, and include the White-bellied Storm-Petrel, Southern Giant Petrel, Humpback Whale, Loggerhead Turtle, Green Turtle, Leathery Turtle, Hawksbill Turtle and Green Sawfish.

Table 9: Threatened Species Recorded in Database Search Area

Class	Scientific Name	Common Name	NCA	EPBCA
Amphibians	*Cyclorana verrucosa*	Rough Collared Frog	NT	
Amphibians	*Adelotus brevis*	Tusked Frog	V	
Birds	*Accipiter novaehollandiae*	Grey Goshawk	NT	
Birds	*Erythrotriorchis radiatus*	Red Goshawk	E	V
Birds	*Lophoictinia isura*	Square-tailed Kite	NT	
Birds	*Nettapus coromandelianus*	Cotton Pygmy-goose	NT	
Birds	*Tadorna radjah*	Radjah Shelduck	NT	
Birds	*Aerodramus terraereginae*	Australian Swiftlet	NT	
Birds	*Esacus magnirostris*	Beach Stone-curlew	V	
Birds	*Calyptorhynchus lathami*	Glossy Black-cockatoo	V	
Birds	*Ephippiorhynchus asiaticus*	Black-necked Stork	NT	
Birds	*Geophaps scripta scripta*	Squatter Pigeon	V	V
Birds	*Falco hypoleucos*	Grey Falcon	NT	
Birds	*Haematopus fuliginosus*	Sooty Oystercatcher	NT	
Birds	*Sternula albifrons*	Little Tern	E	
Birds	*Epthianura crocea macgregori*	Yellow Chat (Dawson)	E	CE
Birds	*Melithreptus gularis*	Black-chinned Honeyeater	NT	
Birds	*Lewinia pectoralis*	Lewin's Rail	NT	
Birds	*Numenius madagascariensis*	Eastern Curlew	NT	
Birds	*Ninox strenua*	Powerful Owl	V	
Birds	*Turnix melanogaster*	Black-breasted Button-quail	V	V
Mammals	*Dasyurus hallucatus*	Northern Quoll	C	E
Mammals	*Taphozous australis*	Coastal Sheathtail Bat	V	
Mammals	*Macroderma gigas*	Ghost Bat	V	
Mammals	*Pteropus poliocephalus*	Grey-Headed Flying-Fox	C	V
Mammals	*Chalinolobus picatus*	Little Pied Bat	NT	
Mammals	*Kerivoula papuensis*	Golden-tipped Bat	NT	
Reptiles	*Rheodytes leukops*	Fitzroy River Turtle	V	V
Reptiles	*Crocodylus porosus*	Estuarine Crocodile	V	
Reptiles	*Acanthophis antarcticus*	Common Death Adder	NT	

Class	Scientific Name	Common Name	NCA	EPBCA
Reptiles	*Denisonia maculata*	Ornamental Snake	V	V
Reptiles	*Furina dunmalli*	Dunmall's Snake	V	V
Reptiles	*Paradelma orientalis*	Brigalow Scaly-foot	V	V
Reptiles	*Egernia rugosa*	Yakka Skink	V	V
Reptiles	*Ophioscincus cooloolensis*		NT	

3.5.3 Field Survey Records

Field surveys undertaken for the ABP project in winter confirmed the occurrence of three species of conservation significance, the Cotton Pygmy Goose, Squatter Pigeon and Little Pied Bat. The spring survey recorded these three species at multiple locations, as well as an additional four species of conservation significance, the Grey Snake, Powerful Owl, Grey Goshawk and Grey-headed Flying Fox. Species records are provided in **Table 10** and **Table 11** below.

Table 10 - Records of significant fauna species, Winter Survey

Species	Location	Co-ordinates	
Cotton Pygmy Goose	Off project site	23.77190	150.92908
Cotton Pygmy Goose	AB16 (400m east)	21.36483	148.02492
Cotton Pygmy Goose	Off project site	23.77190	150.92908
Cotton Pygmy Goose	SL7.8	22.28233	148.36238
Cotton Pygmy Goose	Off project site	23.4167	150.4141
Cotton Pygmy Goose	Off project site	23.4311	150.4077
Squatter Pigeon	Off project site	23.15051	149.85655
Squatter Pigeon	Off project site	23.77461	150.93851
Squatter Pigeon	AB311.5	23.06907	149.80295
Squatter Pigeon	Off project site	23.16116	149.95540
Squatter Pigeon	Off project site	23.15869	150.00740
Squatter Pigeon	Off project site	23.15858	150.01485
Squatter Pigeon	Off project site	23.18787	150.11397
Squatter Pigeon	Off project site	23.16077	149.87312
Squatter Pigeon	Off project site	23.21284	150.1866
Squatter Pigeon	Off project site	22.43788	148.7091
Squatter Pigeon	Off project site	21.95803	148.3087

Species	Location	Co-ordinates	
Little Pied Bat	AB50.5	21.66266	148.07748
Little Pied Bat	AB311.5	23.06731	149.80075
Little Pied Bat	SL16.5	22.28168	148.43785

Table 11 - Records of significant fauna species, Spring survey

Species	Location	Co-ordinates	
Squatter Pigeon	Off project site	21.74067	148.49922
Squatter Pigeon	Off project site	21.74234	148.49327
Squatter Pigeon	Off project site	21.77851	148.11949
Squatter Pigeon	Off project site	21.67103	148.063
Squatter Pigeon	Off project site	21.67031	148.06386
Squatter Pigeon	Off project site	21.38365	148.08237
Squatter Pigeon	Off project site	22.96642	149.50552
Squatter Pigeon	Off project site	23.06648	149.80107
Squatter Pigeon	Off project site	23.42178	150.37577
Squatter Pigeon	Off project site	23.30327	150.24003
Little Pied Bat	AB274.4		
Little Pied Bat	AB462		
Cotton Pygmy Goose	Off project site	21.32668	148.09074
Powerful Owl	AB469		
Grey Snake	Off project site	23.38061	150.39919
Grey Headed Flying Fox	Off project site	23.70703	150.81644
Grey Goshawk	AB275.6		
White-bellied Sea-eagle Nest	Off project site	22.27641	148.47

3.5.4 Likelihood Assessment

Table 12 below presents an assessment of the likelihood of occurrence of EVNT fauna species within the project area, and more specifically, within the project site.

Table 12: Assessment of Likelihood of occurrence, EVNT Fauna species

Class	Scientific Name	Common Name	Records from project area	Likelihood of occurrence within project site
Amphibians	*Adelotus brevis*	Tusked Frog	Two records from Wildnet search area. No Qld museum records in close proximity to project site.	Low. The Tusked Frog is largely confined to wetter forest types which are absent from the project site.
Amphibians	*Cyclorana verrucosa*	Rough Collared Frog	Four records from Wildnet search area. One Qld Museum record 16km north of KP 234 on the mainline.	High. This species occurs in a range of habitats throughout its distribution, including disturbed sites.
Birds	*Accipiter novaehollandiae*	Grey Goshawk	Five records from Wildnet search area. No Qld Museum records in close proximity to project site.	Known. This species was recorded from AB275.6.
Birds	*Erythrotriorchis radiatus*	Red Goshawk	Two records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. This species may overfly the project site on occasion.
Birds	*Aerodramus terraereginae*	Australian Swiftlet	One record from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. This species may overfly the project site on occasion.
Birds	*Calyptorhynchus lathami*	Glossy Black-cockatoo	Two records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. Some areas of potential habitat are present.
Birds	*Ephippiorhynchus asiaticus*	Black-necked Stork	20 records from Wildnet search area, from the project area known to occur in the vicinity of Lake Elphinstone. No Qld Museum records in close proximity to	Low. This species prefers large open and shallow wetlands which are absent from the project site.

Class	Scientific Name	Common Name	Records from project area	Likelihood of occurrence within project site
			project site.	
Birds	*Epthianura crocea macgregori*	Yellow Chat (Dawson)	Nine records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. This species has been recorded from approximately 1.5km north of KP449, at Twelve Mile Creek.
Birds	*Esacus magnirostris*	Beach Stone-curlew	Seven records from Wildnet search area. No Qld Museum records in close proximity to project site.	Low. This species prefers ocean beaches and sandy estuaries, absent from the project site.
Birds	*Falco hypoleucos*	Grey Falcon	One record from Wildnet search area. No Qld Museum records in close proximity to project site.	Low. This species is a very uncommon visitor to the region.
Birds	*Geophaps scripta scripta*	Squatter Pigeon	51 records from Wildnet search area. Multiple records for region from Qld Museum data.	Present. Recorded from multiple locations on the mainline and all laterals.
Birds	*Haematopus fuliginosus*	Sooty Oystercatcher	Three records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. Some areas of potential habitat are present, particularly at Raglan Creek.
Birds	*Lewinia pectoralis*	Lewin's Rail	One record from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. This species prefers densely vegetated freshwater wetlands which occur at several locations on the Isaac River.
Birds	*Lophoictinia isura*	Square-tailed Kite	Two records from Wildnet search area. No Qld Museum records in close proximity to project site.	High. This species occurs in a range of habitats throughout its distribution, including disturbed sites.
Birds	*Melithreptus gularis*	Black-chinned Honeyeater	Six records from Wildnet search area. No Qld Museum records in close proximity to project site.	High. Preferred habitat is present on all major waterways across project site.

Class	Scientific Name	Common Name	Records from project area	Likelihood of occurrence within project site
Birds	*Nettapus coromandelianus*	Cotton Pygmy-goose	17 records from Wildnet search area. Multiple records from winter survey period.	Present. Recorded from farm dams and freshwater wetlands associated with the Isaac River.
Birds	*Ninox strenua*	Powerful Owl	11 records from Wildnet search area. No Qld Museum records in close proximity to project site.	Present, recorded from AB469 near Mount Larcom.
Birds	*Numenius madagascariensis*	Eastern Curlew	34 records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. Some areas of potential habitat are present, particularly at KP
Birds	*Sternula albifrons*	Little Tern	One record from Wildnet search area. No Qld Museum records in close proximity to project site.	Low. This species prefers ocean beaches and sandy estuaries, absent from the project site.
Birds	*Tadorna radjah*	Radjah Shelduck	Nine records from Wildnet serch area. No Qld Museum records in close proximity to project site.	Low. This species prefers large open wetlands which are absent from the project site.
Birds	*Turnix melanogaster*	Black-breasted Button-quail	Two records from Wildnet search area. No Qld Museum records in close proximity to project site.	Low. Preferred vine thicket habitat is absent from project site.
Mammals	*Chalinolobus picatus*	Little Pied Bat	22 records from Wildnet search area. No Qld Museum records in close proximity to project site.	Present.
Mammals	*Dasyurus hallucatus*	Northern Quoll	Two records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. May occur in more extensive forested areas.
Mammals	*Kerivoula papuensis*	Golden-tipped Bat	One record from Wildnet search area. No Qld Museum records in close proximity to project site.	Low. Only small areas of wet forest present at KP 303.5 on Devline Creek.

Class	Scientific Name	Common Name	Records from project area	Likelihood of occurrence within project site
Mammals	*Macroderma gigas*	Ghost Bat	Two records from Wildnet search area. One record approximately 5km north of KP 365 on the mainline.	Moderate. May occur in more extensive forested areas associated with rocky escarpment.
Mammals	*Pteropus poliocephalus*	Grey-Headed Flying-Fox	Eight records from Wildnet search area. No Qld Museum records in close proximity to project site.	High. Extensive areas of preferred habitat present.
Mammals	*Taphozous australis*	Coastal Sheathtail Bat	Three records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. May occur in more extensive forested areas.
Reptiles	*Acanthophis antarcticus*	Common Death Adder	Three records from Wildnet search area. One record 3.5km west of KP 437 at Marmor.	High. Extensive areas of preferred habitat present.
Reptiles	*Crocodylus porosus*	Estuarine Crocodile	Two records from Wildnet search area.	Moderate. This species may occur in estuarine habitats.
Reptiles	*Denisonia maculata*	Ornamental Snake	87 records from Wildnet search area. Closest records are 10km NW of KP0, 16km west of KP 56 and 5km NE of KP365 on the mainline. Also recorded 9km east of KP26 on the Elphinstone Lateral.	High. Small areas of suitable habitat present, but species recorded regularly in project area.
Reptiles	*Egernia rugosa*	Yakka Skink	Two records from Wildnet search area. No Qld Museum records in close proximity to project site.	Moderate. May occur in more extensive forested areas.
Reptiles	*Furina dunmalli*	Dunmall's Snake	One record from Wildnet search area. Nearest record is 20km west of project site within Gladstone .	Low. Very small number of records of this species in project area. Very scarce in northern limits of distribution, which occur in project area.

Class	Scientific Name	Common Name	Records from project area	Likelihood of occurrence within project site
Reptiles	*Hemiaspis damellii*	Grey Snake	No records from Wildnet search area.	Present. Recorded from a site 6km E of AB392.
Reptiles	*Ophioscincus cooloolensis*		One record from Wildnet search area. No Qld museum records in close proximity to project site.	Low. Species is restricted to coastal sand masses.
Reptiles	*Paradelma orientalis*	Brigalow Scaly-foot	Eigh records from Wildnet search area. Recorded 11km SW of KP216 and 10km SW of KP393 on the mainline.	High. Extensive areas of preferred habitat present.
Reptiles	*Rheodytes leukops*	Fitzroy River Turtle	12 records from Wildnet search area. Cluster of records at Glenroy, approximately 4km Southeast of KP 320 on the mainline.	Present. Some areas of preferred habitat present on major watercourses.

3.6 Migratory Fauna

The EPBC search tool report also indicates the potential presence of 13 listed migratory bird species and 1 migratory reptile that have the potential to be within the search area. These species are listed in **Table 13** below.

Table 13: Migratory Species Records - EPBC Act Protected Matters Search Tool

Scientific Name	Common Name	EPBC Status	NC Act Status
Anseranas semipalmata	Magpie Goose	Migratory	Least Concern
Apus pacificus	Fork-tailed Swift	Migratory	Least Concern
Ardea alba	Great Egret	Migratory	Least Concern
Ardea ibis	Cattle Egret	Migratory	Least Concern
Gallinago hardwickii	Latham's Snipe	Migratory	Least Concern
Haliaeetus leucogaster	White-bellied Sea Eagle	Migratory	Least Concern
Hirundapus caudacutus	White-throated Needletail	Migratory	Least Concern
Merops ornatus	Rainbow Bee Eater	Migratory	Least Concern
Monarcha melanopsis	Black-faced Monarch	Migratory	Least Concern
Myiagra cyanoleuca	Satin Flycatcher	Migratory	Least Concern
Nettapus coromandelianus albipennis	Cotton Pygmy Goose	Migratory	Near-threatened
Rhipidura rufifrons	Rufous Fantail	Migratory	Least Concern
Rostratula benghalensis	Painted Snipe	Migratory	Least Concern
Crocodylus porosus	Estuarine Crocodile	Migratory	Vulnerable

The potential occurrence of these species within the project area is discussed in **Table 14** below.

Table 14: Assessment of Likelihood of occurrence, Migratory Fauna Species

Scientific Name	Common Name	Records from project area	Likelihood of occurrence within project site
Anseranas semipalmata	Magpie Goose	16 records from Wildnet search area.	High. Species utilises farm dams, rivers and ponds. Likely to be recorded.
Apus pacificus	Fork-tailed Swift	Two records from Wildnet search area.	Moderate. Occurs at low density in the project area.
Ardea alba	Great Egret	12 records from Wildnet search area.	Present.
Ardea ibis	Cattle Egret	70 records from Wildnet search area.	Present.
Gallinago hardwickii	Latham's Snipe	One record from Wildnet search area.	Low. The preferred wetland habitats of this species are restricted in the project area.
Haliaeetus leucogaster	White-bellied Sea Eagle	25 records from Wildnet search area.	Present.
Hirundapus caudacutus	White-throated Needletail	Five records from Wildnet search area.	High. Species utilises a variety of habitat types seasonally in the project area.
Merops ornatus	Rainbow Bee Eater	128 records from Wildnet search area.	Present.
Monarcha melanopsis	Black-faced Monarch	14 records from Wildnet search area.	High. The species utilises a range of moist forest types and is likely to be recorded.
Myiagra cyanoleuca	Satin Flycatcher	Eight records from Wildnet search area.	High. The species utilises a range of moist forest types and is likely to be recorded.
Nettapus coromandelianus albipennis	Cotton Pygmy Goose	17 records from Wildnet search area.	Present.
Rhipidura rufifrons	Rufous Fantail	29 records from Wildnet search area.	High. The species utilises a range of moist forest types and is likely to be recorded.
Rostratula benghalensis	Painted Snipe	No records from the Wildnet search area or Qld Museum data.	Low. The preferred wetland habitats of this species are restricted in the project area
Crocodylus porosus	Estuarine Crocodile	Two records from Wildnet search area.	Moderate. This species occurs at a low density in the Fitzroy Basin.

3.7 Non-EVNT Fauna Species

3.7.1 Database Searches

Database searches across the broader region encompassed by the combined Gladstone, Isaac and Rockhampton Regional Council areas indicate the presence of 46 species of amphibian, 492 birds, 134 mammals and 197 species of reptile.

Database searches which focussed on the project site and a 20km buffer found historical records of 30 species of amphibian, 297 birds, 87 mammals and 197 species of reptile.

The most common amphibian species recorded in the project area (from Wildnet data) are the Cane Toad (*Rhinella marina*), Clicking Froglet (*Crinia signifera*), Green Tree Frog (*Litoria caerulea*), Ornate Burrowing Frog (*Platyplectrum ornatum*), Eastern Sedgefrog (*Litoria fallax*) and Ruddy Treefrog (*Litoria rubella*). These species are expected to dominate the amphibian fauna of the project site.

Reptile records are dominated by the Ragged Snake-eyed Skink (*Cryptoblepharus pannosus*), *Carlia pectoralis*, Bynoe's Gecko (*Heteronotia binoei*) and Copper-tailed Skink (*Ctenotus taeniolatus*). The Common Tree Snake (Dendrelaphis punctulata), Freshwater Snake (*Tropidonophis mairii*) and Brown Tree Snake (*Boiga irregularis*) are the commonly reported snake species. The Eastern Brown Snake (*Pseudonaja textilis*) and Black Whip Snake (*Demansia vestigata*) are also commonly reported.

Unsurprisingly, bird species of open country and urban areas dominate the database records, including species such as the Laughing Kookaburra (*Dacelo novaeguinae*), Torresian Crow (*Corvus orru*), Australian Magpie (*Cracticus tibicen*), Peaceful Dove (*Geopelia striata*) and Brown Honeyeater (*Lichmera indistincta*).

The Ghost Bat (*Macroderma gigas*) has been the most frequently recorded mammal in the region, and is probably over-represented in the database searches due to repeated visits to a small number of roost sites. The Common Brushtail Possum (*Trichosurus vulpecula*), Black-striped Wallaby (*Macropus dorsalis*), Rufous Bettong (*Aeprymnus rufescens*), Northern Brown Bandicoot (*Isoodon macrourus*) and Greater Glider (*Petauroides volans*) are also commonly recorded.

3.7.2 Field Survey Results

The winter survey recorded a total of 175 species of terrestrial vertebrate fauna including 24 introduced species (**Table 17**) and comprising 13 amphibians (all least concern), 19 species of reptile (all least concern), 119 species of bird (one vulnerable, one near threatened) and 24 mammals (one near threatened).

An additional four species of amphibian, 13 species of reptile, 25 birds and 19 species of mammal we recorded during the spring survey.

Seventeen amphibian species were recorded from the ABP. No near-threatened or threatened species were recorded. A list of amphibian species recorded, their status, are provided below.

Table 15 – Amphibians recorded during winter and spring surveys (17)

Common Name	Scientific Name	NCA	EPBC	Winter	Spring
Beeping Froglet	*Crinia parinsignifera*	LC	-	X	
Broad-palmed Rocketfrog	*Litoria latopalmata*	LC	-	X	X
Bumpy Rocketfrog	*Litoria inermis*	LC	-	X	X
Cane Toad	*Rhinella marinus*	LC	-	X	X
Eastern Sedgefrog	*Litoria fallax*	LC	-	X	X
Graceful Treefrog	*Litoria gracilenta*	LC	-	X	X
Great Brown Broodfrog	*Pseudophryne major*	LC	-	X	
Green Treefrog	*Litoria caerulea*	LC	-	X	X
Naked Treefrog	*Litoria rubella*	LC	-	X	X
Ornate Burrowing Frog	*Opisthodon ornatus*	LC	-		X
Salmon Striped Frog	*Limnodynastes salmini*	LC	-	X	X
Scarlet-sided Pobblebonk	*Limnodynastes terrareginae*	LC	-		X
Spotted Grassfrog	*Limnodynastes tasmaniensis*	LC	-	X	X
Stony Creek Frog	*Litoria wilcoxi*	LC	-		X
Striped Marsh Frog	*Limnodynastes peronii*	LC	-	X	X
Striped Rocketfrog	*Litoria nasuta*	LC	-	X	X
Superb Collared Frog	*Cyclorana brevipes*	LC	-	X	

Nineteen species of reptile were recorded from the ABP during winter. No near-threatened or threatened species were recorded. An additional thirteen species were recorded during spring. One EVNT species, the Endangered Grey Snake (*Hemiaspis damellii*) was recorded during the Spring survey (see **Plate 3** below).

Table 16 – Reptiles recorded during winter and spring surveys (31)

Common Name	Scientific Name	NCA	EPBC	Winter	Spring
-	*Anamalopus brevicollis*	LC	-	X	X
Spotted Python	*Antaresia maculosus*	LC	-		X
Brown Tree Snake	*Boiga irregularis*	LC	-		X

Common Name	Scientific Name	NCA	EPBC	Winter	Spring
-	*Carlia mundivensis*	LC	-	X	
-	*Carlia pectoralis*	LC	-	X	X
Robust Rainbow Skink	*Carlia schmeltzii*	LC	-		X
-	*Carlia vivax*	LC	-	X	X
-	*Cryptoblepharus carnabyi*	LC	-	X	X
-	*Cryptoblepharus pulcher*	LC	-	X	X
Carpentaria Snake	*Cryptophis boschmai*	LC	-	X	X
A Striped Skink	*Ctenotus* sp.	LC	-	X	X
Lesser Black Whip Snake	*Demansia vestigiata*	LC	-	X	X
Green Tree Snake	*Dendrelaphis punctulata*	LC	-		X
Eastern stone gecko	*Diplodactylus vittatus*	LC	-		X
Tommy Roundhead	*Diporiphora australis*	LC	-	X	X
Red-naped Snake	*Furina diadema*	LC	-		X
-	*Gehyra catenata*	LC	-		X
-	*Gehyra dubia*	LC	-	X	X
-	*Glaphyromorphus punctulatus*	LC	-	X	X
Grey Snake	*Hemiaspis damelii*	LC	-		X
Bynoe's Gecko	*Heteronotia binoei*	LC	-	X	X
-	*Lerista fragilis*	LC	-	X	X
Burton's Snake Lizard	*Lialis burtonis*	LC	-		X
-	*Lygisaurus foliorum*	LC	-	X	X
Boulenger's Skink	*Morethia boulengeri*	LC	-	X	X
-	*Morethia taeniopleura*	LC	-		X
Ocellated Velvet Gecko	*Oedura monilis*	LC	-	X	X
Zigzag Velvet Gecko	*Oedura rhombifer*	LC	-		X
Eastern Brown Snake	*Pseudonaja textilis*	LC	-	X	X
Eastern spiny-tailed gecko	*Strophurus williamsi*	LC	-		X
Keelback	*Tropidonophis mairii*	LC	-	X	X

Plate 3 – Grey Snake, an Endangered Species

One hundred and nineteen species of birds were recorded during the winter survey, with an additional 25 species recorded during spring. The following species of significance were recorded during either winter or spring field surveys:

- The Squatter Pigeon (*Geophaps scripta*), listed as Vulnerable under the EPBC Act and NC Act, was recorded commonly across the project area.
- The Vulnerable Powerful Owl (*Ninox strenua*) was recorded from a single location near Mount Larcom.
- The Near-threatened (NC Act) and migratory (EPBC Act) Australian Cotton Pygmy Goose was recorded from several locations.

The following species listed as migratory species protected under the EPBC Act were recorded within the project area: Rainbow Bee-eater, Intermediate Egret, Cattle Egret, White-bellied Sea Eagle and the Black-faced Monarch.

Table 17 – Birds recorded during winter and spring surveys (144)

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Apostlebird	*Struthidea cinerea*	LC	-	X	X
Australasian Grebe	*Tachybaptus novaehollandiae*	LC	-	X	X
Australian Bustard	*Ardeotis australis*	LC	-	X	X

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Australian Hobby	*Falco longipennis*	LC	-	X	X
Australian Magpie	*Gymnorhina tibicen*	LC	-	X	X
Australian Pelican	*Pelecanus conspicillatus*	LC	-	X	X
Australian Raven	*Corvus coronoides*	LC	-	X	X
Azure Kingfisher	*Alcedo azurea*	LC	-		X
Barking Owl	*Ninox connivens*	LC	-		X
Barn Owl	*Tyto alba*	LC	-	X	X
Bar-shouldered Dove	*Geopelia humeralis*	LC	-	X	X
Black Bittern	*Ixobrychus flavicollis*	LC	-	X	X
Black Duck	*Anas superciliosa*	LC	-	X	X
Black Faced Woodswallow	*Artamus cinereus*	LC	-	X	X
Black Swan	*Cygnus atratus*	LC	-	X	X
Black-faced Cuckoo Shrike	*Coracina novaehollandiae*	LC	-	X	X
Black-fronted Dotterel	*Elseyornis melanops*	LC	-	X	X
Black-necked Stork	*Ephippiorhynchus asiaticus*	LC	-		X
Blue-faced Honeyeater	*Entomyzon cyanotis*	LC	-	X	X
Blue-winged Kookaburra	*Dacelo leachii*	LC	-	X	X
Brahminy Kite	*Haliastur indus*	LC	-	X	X
Brolga	*Grus rubicunda*	LC	-	X	X
Brown Falcon	*Falco berigora*	LC	-	X	X
Brown Goshawk	*Accipiter fasciatus*	LC	-	X	X
Brown Honeyeater	*Lichmera indistincta*	LC	-	X	X
Brown Quail	*Coturnix ypsilophora*	LC	-	X	X
Brush Cuckoo	*Cacomantis variolosus*	LC	-	X	X
Buff Rumped Thornbill	*Acanthiza reguloides*	LC	-		X
Bush Stone Curlew	*Burhinus grallarius*	LC	-		X
Cattle Egret	*Ardea ibis*	LC	M	X	X
Channel-billed Cuckoo	*Scythrops novaehollandiae*	LC	-	X	X
Cicadabird	*Coracina tenuirostris*	LC	-		X

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Clamorous Reed Warbler	*Acrocephalus stentoreus*	LC	-	X	X
Cockatiel	*Nymphicus hollandicus*	LC	-		X
Collared Sparrowhawk	*Accipiter cirrhocephalus*	LC	-	X	X
Common Bronzewing	*Phaps chalcoptera*	LC	-	X	X
Cotton Pygmy Goose	*Nettapus coromandelianus*	N-t	-	X	X
Darter	*Anhinga melanogaster*	LC	-	X	X
Double Barred Finch	*Taeniopygia bichenovii*	LC	-	X	X
Dusky Moorhen	*Gallinula tenebrosa*	LC	-	X	X
Eastern Yellow Robin	*Eopsaltria australis*	LC	-	X	X
Emu	*Dromaius novaehollandiae*	LC	-	X	X
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	LC	-	X	X
Figbird	*Sphecotheres viridis*	LC	-		X
Forest Kingfisher	*Todiramphus macleayii*	LC	-		X
Fuscous Honeyeater	*Lichenostomus fuscus*	LC	-	X	X
Galah	*Cacatua roseicapilla*	LC	-	X	X
Golden Headed Cisticola	*Cisticola exilis*	LC	-	X	X
Grey Butcherbird	*Cracticus torquatus*	LC	-	X	X
Grey Crowned Babbler	*Pomatostomus temporalis*	LC	-	X	X
Grey Fantail	*Rhipidura fuliginosa*	LC	-	X	X
Grey Shrike-thrush	*Colluricincla harmonica*	LC	-	X	X
Grey Teal	*Anas gracilis*	LC	-	X	X
Hardhead	*Aythya australis*	LC	-	X	X
Hoary-headed Grebe	*Poliocephalus poliocephalus*	LC	-	X	X
Horsefield's Cuckoo	*Chrysococcyx basalis*	LC	-	X	X
Intermediate Egret	*Egretta intermedia*	LC	M	X	X
Jacana	*Irediparra gallinacea*	LC	-		X
Jacky Winter	*Microeca fascinans*	LC	-		X
Large-tailed Nightjar	*Caprimulgus macrurus*	LC	-		X
Latham's Snipe	*Gallinago hardwickii*	LC	M		X

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Laughing Kookaburra	*Dacelo novaeguineae*	LC	-	X	X
Leaden Flycatcher	*Myiagra rubecula*	LC	-	X	X
Lewin's Honeyeater	*Meliphaga lewinii*	LC	-	X	X
Little Black Cormarant	*Phalacrocorax sulcirostris*	LC	-	X	X
Little Bronze Cuckoo	*Chrysococcyx minutillus*	LC	-	X	X
Little Cuckoo-shrike	*Coracina papuensis*	LC	-	X	X
Little Eagle	*Hieraaetus morphnoides*	LC	-	X	
Little Friarbird	*Philemon citreogularis*	LC	-	X	X
Little Lorikeet	*Glossopsitta pusilla*	LC	-	X	X
Little Pied Cormarant	*Phalacrocorax melanoleucos*	LC	-	X	X
Little Shrike-thrush	*Colluricincla megarhyncha*	LC	-		X
Magpie Lark	*Grallina cyanoleuca*	LC	-	X	X
Mangrove Honeyeater	*Lichenostomus fasciogularis*	LC	-	X	X
Masked Lapwing	*Vanellus miles*	LC	-	X	X
Masked Owl	*Tyto novaehollandiae*	LC	-		X
Masked Woodswallow	*Artamus cinereus*	LC	-	X	X
Mistletoebird	*Dicaeum hirundinaceum*	LC	-	X	X
Nankeen Kestrel	*Falco cenchroides*	LC	-	X	X
Nankeen Night Heron	*Nycticorax caledonicus*	LC	-		X
Noisy Friarbird	*Philemon corniculatus*	LC	-	X	X
Noisy Miner	*Manorina melanocephala*	LC	-	X	X
Olive-backed Oriole	*Oriolus sagittatus*	LC	-	X	X
Owlet Nightjar	*Aegotheles cristatus*	LC	-	X	X
Pacific Heron	*Ardea pacifica*	LC	-		X
Pacific Baza	*Aviceda subcristata*	LC	-	X	X
Pale-headed Rosella	*Platycercus adscitus*	LC	-	X	X
Peaceful Dove	*Geopelia striata*	LC	-	X	X
Pheasant Coucal	*Centropus phasianinus*	LC	-	X	X
Pied Butcherbird	*Cracticus nigrogularis*	LC	-	X	X

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Pied Cormarant	*Phalacrocorax varius*	LC	-	X	X
Pied Currawong	*Strepera graculina*	LC	-	X	X
Plumed Whistling Duck	*Dendrocygna eytoni*	LC	-	X	X
Plum-headed Finch	*Neochmia modesta*	LC	-	X	X
Powerful Owl	*Ninox strenua*	V	-		X
Rainbow Bee-eater	*Merops ornatus*	LC	M	X	X
Rainbow Lorikeet	*Trichoglossus haematodus*	LC	-	X	X
Red-backed Fairy-wren	*Malurus melanocephalus*	LC	-	X	X
Red-tailed Black Cockatoo	*Calyptorhynchus banksii*	LC	-	X	X
Red-winged Parrot	*Aprosmictus erythropterus*	LC	-	X	X
Restless Flycatcher	*Myiagra inquieta*	LC	-	X	X
Richard's Pipit	*Anthus novaeseelandiae*	LC	-	X	X
Royal Spoonbill	*Platalea regia*	LC	-	X	X
Rufous Songlark	*Cincloramphus mathewsi*	LC	-	X	X
Rufous Whistler	*Pachycephala rufiventris*	LC	-	X	X
Sacred Kingfisher	*Todiramphus sanctus*	LC	-		X
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*	LC	-	X	X
Scarlet Honeyeater	*Myzomela sanguinolenta*	LC	-	X	X
Singing Honeyeater	*Lichenostomus virescens*	LC	-	X	X
Southern Boobook	*Ninox novaeseelandiae*	LC	-	X	X
Spangled Drongo	*Dicrurus bracteatus*	LC	-		X
Speckled Warbler	*Chthonicola sagittata*	LC	-		X
Spectacled Monarch	*Monarcha trivirgatus*	LC	M		X
Spotted Bowerbird	*Chlamydera maculata*	LC	-	X	X
Spotted Harrier	*Circus assimilis*	LC	-	X	X
Spotted Pardalote	*Pardalotus punctatus*	LC	-	X	X
Squatter Pigeon	*Geophaps scripta*	V	V	X	X
Straw-necked Ibis	*Threskiornis spinicollis*	LC	-	X	X
Striated Pardalote	*Pardalotus striatus*	LC	-	X	X

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Sulphur Crested Cockatoo	*Cacatua galerita*	LC	-	X	X
Tawny Frogmouth	*Podargus strigoides*	LC	-	X	X
Tawny Grassbird	*Megalurus timoriensis*	LC	-	X	X
Torresian Crow	*Corvus orru*	LC	-	X	X
Varied Sitella	*Daphoenositta chrysoptera*	LC	-	X	X
Varied Triller	*Lalage leucomela*	LC	-	X	X
Wedged-tailed Eagle	*Aquila audax*	LC	-	X	X
Weebill	*Smicrornis brevirostris*	LC	-	X	X
Welcome Swallow	*Hirundo neoxena*	LC	-	X	X
Whistling Kite	*Haliastur sphenurus*	LC	-	X	X
White Ibis	*Threskiornis molucca*	LC	-	X	X
White-bellied Cuckoo Shrike	*Coracina papuensis*	LC	-	X	X
White-bellied Sea-eagle	*Haliaeetus leucogaster*	LC	M	X	X
White-browed Scrubwren	*Sericornis frontalis*	LC	-		X
White-faced Heron	*Egretta novaehollandiae*	LC	-	X	X
White-throated Gerygone	*Gerygone olivacea*	LC	-	X	X
White-throated Honeyeater	*Melithreptus albogularis*	LC	-	X	X
White-throated Nightjar	*Eurostopodus mystacalis*	LC	-	X	X
White-winged Chough	*Corcorax melanorhamphos*	LC	-	X	X
White-winged Triller	*Lalage sueurii*	LC	-		X
Willy Wagtail	*Rhipidura leucophrys*	LC	-	X	X
Wood Duck	*Chenonetta jubata*	LC	-	X	X
Yellow Rumped Thornbill	*Acanthiza chrysorrhoa*	LC	-	X	
Yellow-billed Spoonbill	*Platalea flavipes*	LC	-	X	X
Yellow-throated Miner	*Manorina flavigula*	LC	-	X	X

Twenty-four species of mammal (including four introduced species) were recorded from the ABP winter survey, with an additional 19 species recorded in Spring. Significant species recorded were as follows:

- the near-threatened Little Pied Bat, which was recorded from three locations (**Appendix E**).
- The Vulnerable Grey-headed Flying Fox, which was recorded from Raglan Creek, where a mixed flying fox camp is located downstream of the pipeline alignment.

A copy of the Anabat results analysis is provided as **Appendix F**.

Table 18 – Mammals recorded during winter survey (43)

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Agile Wallaby	*Macropus agilis*	LC	-		X
Becarri's Mastiff Bat	*Mormopterus beccarii*	LC	-	X	
Black Flying Fox	*Pteropus alecto*	LC	-		X
Black Rat	*Rattus rattus*	LC	-	X	X
Black Striped Wallaby	*Macropus dorsalis*	LC	-		X
Bush Rat	*Rattus fuscipes*	LC	-		X
Cat	*Felis catus*	LC	-		X
Common Brushtail Possum	*Trichosurus vulpecula*	LC	-	X	X
Common Dunnart	*Sminthopsis marina*	LC	-		X
Common Planigale	*Planigale maculata*	LC	-		X
Dog	*Canis lupus familiaris*	LC	-	X	X
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	LC	-		X
Eastern Grey Kangaroo	*Macropus giganteus*	LC	-	X	X
Eastern Long-eared Bat	*Nyctophilus bifax*	LC	-	X	
Echidna	*Tachyglossus aculeatus*	LC	-		X
Gould's Wattled Bat	*Chalinolobus gouldii*	LC	-	X	
Greater Glider	*Petauroides volans*	LC	-	X	X
Grey-headed Flying Fox	*Pteropus poliocephalus*	LC	V		X

Common Name	Scientific Name	NCA	Status EPBC	Winter	Spring
Hare	*Lepus europaeus*	LC	-	X	X
Inland Broad-nosed Bat	*Scotorepens balstoni*	LC	-	X	
Koala	*Phascolarctos cinereus*	LC	-	X	X
Large Bent-wing Bat	*Miniopterus orianae oceanensis*	LC	-	X	
Large-footed Myotis	*Myotis macropus*	LC	-	X	
Little Bent-wing Bat	*Miniopterus australis*	LC	-	X	
Little Pied Bat	*Chalinolobus picatus*	N-t	-	X	
Little Red Flying Fox	*Pteropus scapulatus*	LC	-		X
Long Nosed Bandicoot	*Perameles nasuta*	LC	-		X
Long-eared Bat	*Nyctophilus* sp.	LC	-	X	
Northern Brown Bandicoot	*Isoodon macrourus*	LC	-	X	X
Northern Freetail Bat	*Chaerephon jobensis*	LC	-	X	
Pale Field Rat	*Rattus tunneyi*	LC	-		X
Pig	*Sus scrofa*	LC	-	X	X
Platypus	*Ornithorhynchus anatinus*	LC	-		X
Red-necked Wallaby	*Macropus rufogriseus*	LC	-	X	X
Rufous Bettong	*Aepyprymnus rufescens*	LC	-	X	X
Squirrel Glider	*Petaurus norfolcensis*	LC	-		X
Sugar Glider	*Petaurus breviceps*	LC	-	X	X
Swamp Wallaby	*Wallabia bicolor*	LC	-	X	X
Unadorned rock-wallaby	*Petrogale inornata*	LC	-		X
Water Rat	*Hydromys chrysogaster*	LC	-	X	X
Whiptail Wallably	*Macropus parryi*	LC	-		X
White-striped Mastiff Bat	*Austronomus australis*	LC	-	X	
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	LC	-	X	

3.8 Introduced Fauna

The *Land Protection (Pest and Stock Route) Management Act* 2002 (LP Act) lists declared species for Queensland. Under the Act, pest species for both plants and animals are classified into three categories:

- Class 1 species are not generally established in Queensland and have potential to cause adverse economic, environmental or social impact. The landowner is obliged to take reasonable steps to keep their land free of Class 1 pest species, unless the owner holds a declared pest permit allowing the pests to be kept on the land.
- Class 2 species are established in Queensland and can cause significant adverse economical, environmental or social impact. The landowner is obliged to take reasonable steps to keep their land free of Class 2 pest species, unless the owner holds a declared pest permit allowing the pests to be kept on the land.
- Class 3 species are established in Queensland and have or could have adverse economical, environmental or social impact. Legislative obligations relating to control of these species are generally limited to specific conservation areas.

The desktop searches identified 24 introduced fauna species within the pipeline buffer, seven of which were recorded during field surveys. **Table 19** below provides a list of introduced fauna species known from the broader region and those recorded from the project area.

Table 19: Introduced Fauna recorded from the project area

Class	Scientific Name	Common Name	Status (LP Act)	Observed In project area
Amphibians	*Rhinella marina*	Cane Toad	n/a	Yes
Birds	*Anas platyrhynchos*	Northern Mallard	n/a	No
Birds	*Columba livia*	Rock Dove	n/a	No
Birds	*Streptopelia chinensis*	Spotted Dove	n/a	No
Birds	*Lonchura punctulata*	Nutmeg Mannikin	n/a	No
Birds	*Passer domesticus*	House Sparrow	n/a	Yes
Birds	*Gallus gallus*	Red Junglefowl	n/a	No
Birds	*Pavo cristatus*	Indian Peafowl	n/a	No
Birds	*Sturnus tristis*	Common Myna	n/a	No
Birds	*Sturnus vulgaris*	Common Starling	n/a	No
Mammals	*Bos indicus*	Zebu	n/a	No
Mammals	*Bos taurus*	European Cattle	n/a	Yes
Mammals	*Capra hircus*	Goat	n/a	No
Mammals	*Canis familiaris*	Dog	Class 2	Yes
Mammals	*Canis lupus dingo*	Dingo	Class 2	Yes
Mammals	*Equus caballus*	Horse	n/a	No

Class	Scientific Name	Common Name	Status (LP Act)	Observed In project area
Mammals	*Felis catus*	Cat	Class 2	Yes
Mammals	*Lepus capensis*	Brown Hare	n/a	No
Mammals	*Oryctolagus cuniculus*	Rabbit	n/a	No
Mammals	*Mus musculus*	House Mouse	n/a	No
Mammals	*Rattus rattus*	Black Rat	n/a	No
Mammals	*Sus scrofa*	Pig	Class 2	Yes
Reptiles	*Hemidactylus frenatus*	House Gecko	n/a	No
Birds	*Turdus merula*	Common Blackbird	n/a	No

Plate 4 – Dingo, recorded commonly on the project site

3.9 Corridor Values

3.9.1 Mapped Corridor Values

DERM has conducted comprehensive biodiversity planning assessments (BPAs) for the Brigalow Belt Bioregion (EPA, 2008). A key output of the BPA is identification and mapping of terrestrial biodiversity corridors and riparian wildlife corridors throughout Queensland.

In the Brigalow Belt Bioregion, the general basis for corridor selection in the BPA was through reserves, mountain ranges and large remnant tracts that provide for major east-west, north-south or altitudinal movement of wildlife across the bioregion. In fragmented subregions (<30% remnant vegetation) remnant riparian vegetation was given a higher significance for landscape connectivity. As such, riparian corridors have been identified at a higher frequency than in less fragmented regions.

The ABP transects four terrestrial biodiversity corridors and a large number of riparian corridors identified in the BPA. However, a large proportion of the area identified within BPA corridors is non-remnant vegetation with low ecological value in its present condition.

3.9.2 Observed Corridor Values

Linear corridors of vegetation are associated with all major waterways (greater than stream order 2) within the project area. In many instances however, these corridors are highly compromised due to chronic grazing pressure, continues thinning of vegetation and a general lack of habitat complexity. The riparian zone of the Isaac and Fitzroy Rivers, although degraded in many locations, provides an important dispersal pathway through the project area, particularly for birds and bats.

Major terrestrial corridors in the project area are associated with the Denham Range (east-west) Kerlong Range (north-south) and Broadsound Range (north-south).These ranges are well vegetated due to their inaccessibility and lack of agricultural activity, and they are characterised by extensive tracts of remnant vegetation. They are however, dissected in many locations by roads and other linear infrastructure.

3.10 Critical Habitat

Critical habitat is defined under the Qld NCA as “habitat that is essential for the conservation of a viable population of protected wildlife or community of native wildlife, whether or not special management considerations and protection are required.” There are various means by which Critical Habitat may be declared, generally at the direction of the Minister.

There are currently no declared 'critical habitats' or 'areas of major interest' listed under the Nature Conservation Act 1992.

4 Potential Impacts

4.1 Key Fauna Issues and Constraints

The key vertebrate fauna issues and constraints relating to the development of the ABP project include:

- Disturbance to mature vegetation and hollow-bearing trees and therefore loss of perching, foraging and nesting resources;
- Potential disturbance to fauna movement corridors and dry season fauna refuges (predominantly associated with creeks and dams). Such impacts are primarily temporary in nature;
- A temporary barrier to fauna movement and potential 'trap' provided by the open pipeline trench, hereafter referred to as trenchfall;
- Potential limited disturbance to Brigalow communities which provide habitat for the Vulnerable Ornamental Snake;
- Potential impacts on several EVNT fauna species recorded in or close to the proposed alignment during the field surveys, including the Powerful Owl, Grey Goshawk and Grey Snake;
- Disturbance to potential habitat for EVNT fauna species including the Yellow Chat, Powerful Owl, Grey Snake, Ornamental Snake, Brigalow Scaly-foot, Yakka Skink, Common Death Adder, Little Pied Bat and Grey-headed Flying Fox;
- Limited disturbance to riparian vegetation and associated wetland ecosystems providing restricted habitat types for a range of least concern fauna species; and
- Fragmentation of remnant vegetation blocks, particularly in association with hills and ranges north of Moranbah.

4.2 Potential Impacts on fauna habitat

The proposed pipeline alignment transects approximately 124.03 km of remnant vegetation, or 21.35% of the proposed 580.8 km pipeline alignment (with laterals). Assuming that the entire 30 m wide ROW contained remnant vegetation and was required for construction, the total disturbance area would be approximately 371.2 ha of remnant vegetation (456.29 ha including high value regrowth) (AECOM 2011a).

Table 20 below provides a summary of the area of each Regional Ecosystem type to be cleared and the potential impact to fauna habitat values.

Table 20: Impacts on Fauna Habitat

RE Code	Description	Area Cleared	Potential Impact to Fauna Habitat Values
11.1.1	*Sporobolus virginicus* grassland on marine clay plains.	0.49	Provides estuarine wetland habitat which may support species such as Yellow Chat, Estuarine Crocodile and Water Mouse.
11.1.4	Mangrove forest/woodland on marine clay plains.	0.56	Provides estuarine wetland habitat which may support species such as Yellow Chat, Estuarine Crocodile and Water Mouse.
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains.	0.83	Provides habitat for a suite of threatened reptiles including Brigalow Scaly-foot, Dunmall's Snake, Grey Snake and Ornamental Snake.
11.3.2	*Eucalyptus populnea* woodland on alluvial plains.	30.63	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains.	3.02	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland on alluvial plains.	2.72	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.3.7	*Corymbia* spp. woodland on alluvial plains.	3.96	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	19.14	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.3.26	*Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains.	2.37	Potential removal of tree species with abundant decorticating bark which is preferred foraging substrate for a variety if woodlands birds and reptiles.
11.3.27	Freshwater wetlands.	1.2	Potential disturbance to unique habitat for wetland birds such as Cotton Pygmy Goose.

RE Code	Description	Area Cleared	Potential Impact to Fauna Habitat Values
11.3.36	*Eucalyptus crebra* and/or *E. populnea* and/or *E. melanophloia* on alluvial plains. Higher terraces.	2.43	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.4.2	*Eucalyptus* spp. and/or *Corymbia* spp. grassy or shrubby woodland on Cainozoic clay plains.	0.17	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains.	0.53	Provides habitat for a suite of threatened reptiles including Brigalow Scaly-foot, Dunmall's Snake, Grey Snake and Ornamental Snake.
11.5.3	*Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	106.56	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.5.8c	*Melaleuca* spp., *Eucalyptus crebra, Corymbia intermedia* woodland on Cainozoic sand plains/remnant surfaces (*Eucalyptus platyphylla* woodland on white-yellow weathered sands	10.66	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.5.9b	*Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces (*E. crebra*, E. tenuipes, *Lysicarpus angustifolius* + *Corymbia* spp).	30.88	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.5.12	*Corymbia clarksoniana* woodland and other *Corymbia* spp. and *Eucalyptus* spp. on Cainozoic sand plains/remnant surfaces.	3.96	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Associated with a high number fauna species.
11.7.1	*Acacia harpophylla and/or Casuarina cristata and Eucalyptus thozetiana or E. microcarpa woodland on lower scarp slopes on Cainozoic lateritic*	0.51	Potential disturbance to high quality habitat for Common Death Adder and Yakka Skink, as well as common habitat specialists such as the Inornate Rock Wallaby.

RE Code	Description	Area Cleared	Potential Impact to Fauna Habitat Values
	duricrust.		
11.7.2	*Acacia* spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	12.64	Potential disturbance to high quality habitat for Common Death Adder and Yakka Skink, as well as common habitat specialists such as the Inornate Rock Wallaby.
11.8.5	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks.	31.78	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders. Also high quality habitat for fossorial skinks such as members of the Genus Lerista and Anamolopus.
11.8.11	*Dichanthium sericeum* grassland on Cainozoic igneous rocks.	4.98	Habitat for EVNT fauna species including Grey Snake.
11.9.2	*Eucalyptus melanophloia +/- E. orgadophila* woodland on fine-grained sedimentary rocks.	0.53	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.9.7a	*Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks (generally diverse dense tall shrub layer and ground layer of annual grasses on Jurassic Hooray Sandstone).	2.64	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.9.9	*Eucalyptus crebra* woodland on fine-grained sedimentary rocks.	8.94	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.11.1	*Eucalyptus crebra +/- Acacia rhodoxylon* woodland on old sedimentary rocks with varying degrees of metamorphism and folding.	0.49	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.11.4	*Eucalyptus crebra* woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Coastal ranges.	4.28	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.11.15	*Eucalyptus crebra* woodland on deformed and metamorphosed sediments and	16.56	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting

RE Code	Description	Area Cleared	Potential Impact to Fauna Habitat Values
	interbedded volcanic.		birds, microbats and marsupial gliders.
11.11.16	*Eucalyptus cambageana, Acacia harpophylla* woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Lowlands.	1.44	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.12.1	*Eucalyptus crebra* woodland on igneous rocks.	1.26	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.
11.12.2	*Eucalyptus melanophloia* woodland on igneous rocks.	2.44	Potential removal of some limited numbers of mature trees which provide hollows for fauna especially nesting birds, microbats and marsupial gliders.

4.3 Impacts on Connectivity

The pipeline construction has the potential to create a short-term barrier to fauna movement by restricting access for some species across an unfavourable habitat (i.e. cleared land within the ROW).

In addition, the clearance of vegetation within intact habitat patches can produce edge effects such as increased predation. The creation of a cleared easement through intact habitat patches changes the structure and dynamics of the patches and local fauna populations. The cleared easement essentially creates additional edges to habitat patches and the suite of changes which occur in the vicinity of the edge are termed 'edge effects'.

Edge effects are greatest within patches containing structurally complex vegetation such as vine thickets, Brigalow communities and riparian zones. Edge effects may produce changes to plant species composition (including resources for fauna), prevent the movement of some species across the cleared easement and provide access for pest species that would otherwise not occur within the habitat type.

The majority of the alignment is in pasture / grassland, which is the habitat least affected by connectivity or fragmentation impacts.

Operational impacts on terrestrial fauna are considered to be minimal due to the rehabilitation and revegetation (where appropriate) of the majority of the pipeline easement width. Within structurally complex vegetation such as riparian areas, the cleared pipeline easement may present a barrier to some fauna species, although the majority of species present are adapted to dispersal across open woodland habitats and are therefore likely to be tolerant of small canopy gaps. The easement is a permeable

barrier, unlike a physical structure or large water body. Although the operational easement will be kept free of deep-rooted trees for pipeline maintenance, ground covers will provide shelter for small fauna species crossing the gap.

4.4 Potential Impacts associated with Trenchfall

To allow the laying of the pipeline, an open trench will be required. While the trenching will be progressive, and therefore the full length of the pipeline will not be open at any given time, the length of open trench at any given time will vary.

This in turn provides a temporary barrier to fauna movement and the potential for ground-dwelling fauna to fall into the trench and become trapped. Once trapped in the trench, wildlife could be subject to overheating, dehydration and / or predation. In addition, the trench will vary in depth between 1.0 and 2.0 m and therefore may be of a sufficient depth to result in fauna mortalities from falling from height. Fauna entrapment within the pipeline trench has been recognised as a key environmental issue by the Australian Pipeline Industry Association Code of Environmental Practice. Published information from other Australian pipeline projects has demonstrated that pipeline trenches can entrap high numbers of a wide diversity of terrestrial animals, particularly reptiles, frogs and small mammals (Woinarski *et al*. 2000, Doody *et al*. 2003, Wilson and Swan 2004).

Plate 5 –Ornamental Snake, an EVNT species susceptible to trenchfall

4.5 Potential Impacts on EVNT and Migratory Fauna Species

A review of relevant desktop data and completion of field surveys indicates that 26 EVNT species and 12 migratory species are considered to have a moderate to high likelihood of occurrence within the proposed pipeline corridor or have already been recorded. These species are assessed individually below with reference to potential for adverse impact. Some EVNT species are also Migratory species, in which case they are only assessed once below.

Of those species, the following 9 EVNT or Migratory species have been identified as having the potential to be adversely impacted by the proposed works (see **Table 21** and **Table 22** below):

- Powerful Owl;
- Yellow Chat;
- Grey-headed Flying Fox;
- Little Pied Bat;
- Ornamental Snake;
- Grey Snake;
- Brigalow Scaly-foot;
- Common Death Adder; and
- Yakka Skink.

Species-specific mitigation measures are required to avoid or minimise potential impacts on these species.

Table 21: Potential Impact on EVNT fauna species

Scientific Name	Common Name	Behaviour/Potential Impact	Potential to be Impacted By Project
Cyclorana verrucosa	Rough Collared Frog	The Rough Collared Frog occurs in a range of wetland habitats, riparian woodlands and farm dams. Potential impacts on waterways and wetlands have been reduced as far as possible through route re-alignment. Impacts are likely to be restricted in extent and temporary in nature. Adverse and enduring impacts on this species are not expected.	No
Accipiter novaehollandiae	Grey Goshawk	This is a highly mobile species which forages over an extensive area. Clearing of the ROW is not likely to substantially reduce available resources for this species in the project area.	No
Erythrotriorchis radiatus	Red Goshawk	This is a highly mobile species which forages over an extensive area. Clearing of the ROW is not likely to substantially reduce available resources for this species in the project area.	No
Lophoictinia isura	Square-tailed Kite	The birds are generally nomadic and may be solitary or in well dispersed pairs. As such, isolated occurrences of the species may be recorded from within the proposed pipeline corridor but the minimal clearing associated with the pipeline is unlikely to have a significant impact on this species.	No
Nettapus coromandelianus	Cotton Pygmy Goose	The Cotton Pygmy Goose is associated with	No

Scientific Name	Common Name	Behaviour/Potential Impact	Potential to be Impacted By Project
albipennis		habitat types which have either been avoided by careful design and re-alignment of the proposed pipeline, or will be subject to directional drilling and not directly disturbed. Potential impacts are not considered likely to be significant.	
Aerodramus terraereginae	Australian Swiftlet	This is a highly mobile species which forages over an extensive area. Clearing of the ROW is not likely to substantially reduce available resources for this species in the project area.	No
Calyptorhynchus lathami	Glossy Black-cockatoo	The Glossy-black cockatoo is strongly associated with spatially restricted stands of Allocasuarina and Casuarina species, which are essential for foraging. No evidence of usage was found at any location within the ROW during the present study. Impacts on this species are unlikely.	No
Geophaps scripta scripta	Squatter Pigeon	Preferred habitat for the species occurs in patches throughout the pipeline corridor. The Squatter Pigeon can breed throughout most of the year and therefore no restrictions on construction timing are required. The mobility of this species and the relatively short-term construction impacts for the pipeline suggest that this species would not be significantly impacted.	No
Haematopus fuliginosus	Sooty Oystercatcher	The Sooty Oystercatcher is restricted to estuarine mudflats and rocky shores. Such features will not be impacted by the ABP.	No
Melithreptus gularis	Black-chinned Honeyeater	This species is thinly distributed in eucalypt forests where it feeds predominantly on manna and insects. It is more commonly observed within riparian vegetation. Individuals of the species have large home ranges and therefore appear locally nomadic as they move through forests following feeding resources. The honeyeater has been recorded near the proposed pipeline corridor. Clearing required to safely construct the pipeline would not significantly impact this species.	No
Numenius madagascariensis	Eastern Curlew	This species has been recorded in the Gladstone area. Highly unlikely to be affected by proposed works.	No
Ninox strenua	Powerful Owl	The Powerful Owl was recorded from the project site near Mount Larcom. Loss of large habitat trees (used for nesting and refugia for prey species) may impact this species.	Yes
(Epthianura crocea macgregori)	Yellow Chat	Not recorded from the project Site, but known from survey records approximately 1.5km north of ABP449 and potentially present within the pipeline buffer area.	Yes
Taphozous australis	Coastal Sheathtail Bat	This is a highly mobile species which forages over an extensive area. Clearing or the ROW is not likely to substantially reduce available resources for this species in the project area.	No
Macroderma gigas	Ghost Bat	The largest Australian microbat, this species is patchily distributed in small colonies, and requires undisturbed roost caves or mineshafts. Ghost bats have been recorded in the Mt Larcom area, in proximity to the proposed pipeline corridor. Although the project is unlikely to affect roosting sites, it does have the potential to	No

Scientific Name	Common Name	Behaviour/Potential Impact	Potential to be Impacted By Project
		reduce food resources such as geckoes, frogs, small birds and mammals. Therefore, mitigation measures for this species need to be addressed	
Pteropus poliocephalus	Grey-headed Flying-fox	This is a highly mobile species which forages over an extensive area. Clearing or the ROW is not likely to substantially reduce available resources for this species in the project area.	Yes
Chalinolobus picatus	Little Pied Bat	This is a highly mobile species which forages over an extensive area. Clearing or the ROW is not likely to substantially reduce available resources for this species in the project area.	Yes
Crocodylus porosus	Estuarine Crocodile	Crocodiles inhabit coastal rivers and swamps extending well inland via major rivers and billabongs. They are known or likely to utilise the Fitzroy River and Raglan Creek. The short-term nature of the construction works at these river crossings would not significantly impact this species.	No
Acanthophis antarcticus	Common Death Adder	The few undisturbed habitats crossed by the pipeline corridor may constitute suitable habitat for the Common Death Adder; however, there are no records of this species in close proximity to the alignment.	Yes
Denisonia maculata	Ornamental Snake	This snake is usually found in rocky, alluvial or black soil and occupies open forests, woodland and riparian habitats, particularly near water. It is restricted to the Fitzroy River catchment. A total of 98 individuals were removed from the trench during construction of the North Queensland Gas Pipeline, from 'hotspots' where cracking-clay soils were flood-prone (Wilson and Swan 2004). Therefore, this snake may be impacted by entrapment of individuals in the trench and mitigation measures for this species need to be addressed	Yes
Furina dunmalli	Dunmall's Snake	Populations of Furina dunmalli in the Brigalow Belt would be of high regional significance, because in this area they consist of restricted disjunct outlier populations, highly separated from the main range of the species. The project has the potential to impact this snake and therefore mitigation measures for this species need to be addressed.	No
Hemiaspis damellii	Grey Snake	This snake is usually found in rocky, alluvial or black soil and occupies open forests, woodland and riparian habitats, particularly near water. This snake may be impacted by entrapment of individuals in the trench and mitigation measures for this species need to be addressed.	Yes
Paradelma orientalis	Brigalow Scaly-foot	This species inhabits eucalypt woodland and Brigalow scrub and is usually found under logs, rocks and debris. The habitat for the Brigalow Scaly-foot occurs along the pipeline, notably in the forested rocky slopes with abundant ground litter. This legless lizard is known to inhabit areas within the proposed pipeline corridor and the project has the potential to impact this species. Therefore, mitigation measures for this species need to be addressed.	Yes
Egernia rugosa	Yakka Skink	They occur in a wide variety of habitats including	Yes

Scientific Name	Common Name	Behaviour/Potential Impact	Potential to be Impacted By Project
		in Poplar Box, alluvial soils, low ridges, cypress on sands, belah, mulga and Eucalyptus intertexta, log piles and where there are rabbit warrens. They are considered to be a habitat generalist. There are increasing sightings of this species in very degraded sites (EPA, 2002). There are numerous locations along the pipeline corridor that provide habitat for this species, primarily locations with abundant ground debris. As this species is not highly mobile, the project has the potential to impact this lizard and therefore mitigation measures for this species need to be addressed.	

Table 22: Migratory fauna species potentially impacted by the proposed ABP

Scientific Name	Common Name	Behaviour/Potential Impact	Potential to be Impacted By Project
Anseranas semipalmata	Magpie Goose	Birds of this species are completely aquatic, seldom leaving the water except to rest on logs. They spend the majority of their time floating among water lilies in deep water in pairs or small family groups and come near to the shore only to feed in the early morning and evening. They have also been recorded numerous times in the areas surrounding the ABP wherever dams and fresh waterbodies occur. This species can move considerable distances and therefore is unlikely to be impacted by the short-term construction works in this area as there will be no impact to the waterbodies in the area.	No
Apus pacificus	Fork-tailed Swift	This is a highly mobile species which forages over an extensive area. Clearing or the ROW is not likely to substantially reduce available resources for this species in the project area.	No
Ardea alba	Great Egret	Often found with grazing animals in pastures and in shallows of freshwater wetlands. As the proposed works do not affect the habitat of this species there will be no impact on this species.	No
Ardea ibis	Cattle Egret	Often found with grazing animals in pastures and in shallows of freshwater wetlands. As the proposed works do not affect the habitat of this species there will be no impact on this species.	No
Crocodylus porosus	Estuarine Crocodile	Discussed above.	No
Gallinago hardwickii	Latham's Snipe	Often found in pastures and in shallows of freshwater wetlands. As the proposed works do not affect the habitat of this species there will be no impact on this species.	No

Scientific Name	Common Name	Behaviour/Potential Impact	Potential to be Impacted By Project
Haliaeetus leucogaster	White-bellied Sea Eagle	The White-bellied Sea-eagle is often seen soaring in the skies near oceans, bays and waterways or flying over the surface of waters. These sedentary birds form permanent breeding pairs and have a few favoured perch trees where they rest and roost. The main diet is fish though they also hunt tortoises, sea-snakes, waterfowl, bird nestlings and on occasions, rabbits. The nests of the birds are approximately 4 m deep and often about 30 m or more above the ground. This species was observed during field surveys.	No
Hirundapus caudacutus	White-throated Needletail	This is a highly mobile species which forages over an extensive area. Clearing or the ROW is not likely to substantially reduce available resources for this species in the project area.	No
Merops ornatus	Rainbow Bee Eater	This species is a habitat generalist and highly mobile. Impacts are likely to be minimal and temporary.	No
Monarcha melanopsis	Black-faced Monarch	This species is a habitat generalist and highly mobile. Impacts are likely to be minimal and temporary.	No
Myiagra cyanoleuca	Satin Flycatcher	This species is a habitat generalist and highly mobile. Impacts are likely to be minimal and temporary.	No
Nettapus coromandelianus albipennis	Cotton Pygmy Goose	Discussed above.	No
Rhipidura rufifrons	Rufous Fantail	This species is a habitat generalist and highly mobile. Impacts are likely to be minimal and temporary.	No

3.6 Potential Impacts Associated with exotic fauna

Vertebrate pests are present throughout the project site. The construction of the ABP is unlikely to significantly increase the distribution or abundance of vertebrate pests as these species will lose habitat. However, Dingoes / Wild Dogs and introduced murids (rats and mice) may be attracted to work sites if food or scraps are available.

Plate 6 – Feral Pigs, common on the project site

5 Impact Mitigation Measures

The proposed pipeline alignment has been developed with an aim to minimise the potential impacts on significant fauna species and biodiversity values, in general. In particular, areas of essential habitat have been avoided as far as possible along the proposed route. In the few areas where the pipeline does cross essential habitats, the crossing has been located along existing cleared easements or in other disturbed habitats, as far as practical. The location of the proposed route in these disturbed areas is intended to reduce and avoid impact on areas of essential habitat.

Creek crossings have been revised to ensure that crossings are located to minimise the number of crossings and to reduce the area of vegetation clearing required. However, despite reducing the area of vegetation clearing required along the proposed pipeline alignment, some remnant native vegetation which represents potential fauna habitat will be required to be removed as part of the proposal.

A number of mitigation measures have been developed to minimise the impacts on fauna species associated with ABP and these are discussed below.

5.1 Vegetation Removal

The following vegetation management measures are proposed to reduce impacts of fauna:

- Minimise the clearing of mature and hollow-bearing trees along the alignment, by ensuring that only the 30m ROW is cleared and by retaining mature and hollow-bearing trees that occur on the edge of the ROW where practical through modification of the ROW;
- Within sensitive habitats (such as riparian areas) and where possible in relation to minimum operational requirements, trimming of branches should be considered along the edge of the ROW in preference to the removal of entire trees;
- A pre-clearing inspection should be undertaken by an appropriately qualified ecologist to clearly identify and mark hollow-bearing trees or other ecologically sensitive areas with an accurate Differential GPS and marked in the field with spray paint and flagging tape. These trees will be cleared with a spotter catcher present;
- Immediately prior to the clearing of vegetation within the ROW (within 24hrs), a thourough search of all suitable microhabitats within the clearing area should be completed by competent ecologists to locate threatened and near-threatened species. The competent person/ecologist will be familiar with the microhabitat preferences of the Yakka Skink and Brigalow Scaly-foot in particular;
- Pre-clearing surveys should be conducted to determine the presence/absence of nest sites of diurnal raptors. If a nest is located, it

should be inspected to determine whether it is active or inactive. If an active nest is found it will be relocated if possible;
- All fauna captured during pre-clearing surveys should be re-located;
- A preconstruction survey should be conducted by a suitably qualified and experienced botanist to define the boundary of clearing and to identify any vegetation that is to be retained. This will further assist in ensuring that only the minimum amount of fauna habitat will be removed during clear and grade activities;
- A suitably qualified and experienced fauna spotter / handler will be present during vegetation clearing to minimise the potential for harm to fauna species and to recover any injured fauna;
- Felled timber should be put into windrows along the edge of the ROW to provide habitat for fauna species, where feasible on consideration of the landholder, the amount of felled timber available, operational and access requirements and the sensitivity of adjacent vegetation.

5.2 Reduction of Fragmentation Impacts

Detailed design should aim to minimise edge effects by slight alterations to the pipeline alignment that may be able to avoid passing directly through intact habitat patches but only touch one edge of the patch.

In addition, progressive rehabilitation will ensure that the pipeline easement remains permeable for dispersing fauna thereby maintaining movement corridors.

5.2 Riparian Crossings

Riparian vegetation generally provides a higher diversity of plant species when compared to open forest and therefore feeding resources for fauna. In addition, these areas often support mature vegetation and therefore tree hollows. Clearing of riparian vegetation will be kept to that required to safely construct the pipeline.

AECOM (2011b) has prepared an assessment of waterway crossings for the ABP which considers the most appropriate crossing locations and techniques. In many instances, these crossings were discussed in the field with the fauna survey team.

The following management strategies have been undertaken to minimise impacts on riparian habitats:

- Where practical, waterway crossings which minimise the requirement for clearing and disturbance to riparian areas along the proposed alignment have already been selected; and
- The route selection has avoided artificial farm dams and adjacent vegetation as far as practicable along the proposed pipeline route.

Table 23 below lists major waterway crossings for the ABP, associated fauna values at each crossing and suggested mitigation strategies. It

should be noted that some areas require further investigation and that refinements to the final route alignment will occur up to contruction of the pipeline.

Table 23: Proposed Mitigation - major waterways impacted by the proposed ABP

Waterway Crossing	KP's	Fauna Values	Suggested Mitigation	Construction Method
Mainline				
Suttor Creek	AB12.3	Large hollow bearing trees.	Avoid large trees bearing hollows and stags where possible.	To be determined following further investigation as part of the Supplementary EIS.
Eaglefield Creek	AB28.3	No specific fauna values.	Move line approximately 400 m west to a more suitable crossing point	Open Cut
Isaac River	AB50.2	Large hollow bearing trees.	Move approximately 50 m east to avoid large remnant trees.	Open Cut
Twelve Mile Gully	AB59.1	No specific fauna values.	None proposed	Open Cut
Hat Creek	AB68.2	No specific fauna values.	Move to old road crossing, 50 m west of alignment. 20 m gap in vegetation.	Open Cut
North Creek	AB105.2	No specific fauna values.	Move line 25 m east into existing gap.	Open Cut
North Creek	AB109.3	No specific fauna values.	None proposed	Open Cut
North Creek Tributary	AB110	No specific fauna values.	Avoid large trees where possible and utilise existing clearing / thin vegetation.	Open Cut
Isaac River Tributary	AB160.1	No specific fauna values.	Move line approximately 200 m west to avoid remnant vegetation.	Open Cut
Isaac River	AB164.7	Large hollow bearing trees.	Four alternate crossing points have been identified.	Open Cut

Waterway Crossing	KP's	Fauna Values	Suggested Mitigation	Construction Method
Blackburn Creek	AB171.7	No specific fauna values.	None proposed	Open Cut
Sandy Gully	AB197.8	No specific fauna values.	None proposed	Open Cut
Isaac River	AB234	Large hollow bearing trees.	Move 50 m south-east to avoid gully and large trees.	Open Cut or HDD subject to geotechnical and hydraulic constraints
Clarke Creek	AB238.5	No specific fauna values.	None proposed	Open Cut
Bora Creek	AB245.1	No specific fauna values.	None proposed	Open Cut
Clive Creek	AB249	No specific fauna values.	None proposed	Open Cut
Mackenzie River Trib	AB261.5	Vine thicket providing unique fauna resources.	Move line approximately 150m north-east to a thinner band of vegetation.	Open Cut
Pluto Creek	AB275.6	No specific fauna values.	None proposed	Open Cut
Apis Creek	AB284.2	No specific fauna values.	None proposed	Open Cut
Endrick Creek	AB285.4	Natural waterhole, habitat for aquatic/amphibious fauna and wetland birds.	Move 90 m north to avoid natural waterhole.	Open Cut
Develin Creek	AB303.1	Vine thicket providing unique fauna resources.	Avoid vine thicket to south and pool to north.	Open Cut
Fitzroy River	AB319.5	Large hollow bearing trees, aquatic habitat for turtles, platypus, amphibians.	None proposed	HDD
Ten Mile Creek	AB332.2	Large hollow bearing trees.	Move 200 m south-east to existing clearing to avoid HVR.	Open Cut
Two Mile Creek	AB349.3	No specific fauna values.	None proposed	Open Cut
Louisa Creek	AB358.3	Large hollow bearing trees.	Suitable crossing point 20 m to east which avoids large	Open Cut

Waterway Crossing	KP's	Fauna Values	Suggested Mitigation	Construction Method
			E. tereticornis with hollows.	
Limestone Creek	AB371.3	Large hollow bearing trees.	Three alternate crossings identified.	Open Cut
Deep Creek	AB373.4	Large hollow bearing trees.	Move 50 m east into existing clearing.	Open Cut
Black Gin Creek	AB377.6	Natural waterhole, habitat for aquatic/amphibious fauna and wetland birds.	Move 150 m east (downstream) to avoid natural waterhole.	Open Cut
Lion Creek	AB382.7	No specific fauna values.	Move 80 m north-east into existing 12 clearing.	Open Cut
Scrubby Creek	AB391.3	No specific fauna values.	None proposed	Open Cut
Four Mile Creek	AB402.7	No specific fauna values.	None proposed	Open Cut
Gavial Creek	AB406.3	No specific fauna values.	None proposed	Open Cut
Midgee Creek	AB410.4	No specific fauna values.	Potential crossing point 800 m south-west adjacent to existing cleared gas pipeline alignment.	Open Cut
Bob's Creek	AB413.6	Large hollow bearing trees.	Avoid large remnant trees where possible.	Open Cut
Oakey Creek	AB419.7	No specific fauna values.	None proposed	Open Cut
Inkerham Creek	AB430.1	Estuarine habitat.	Tidal, mangroves. Possibly avoid marine vegetation by moving alignment 2.5 km.	Open Cut
Twelve Mile Creek	AB438.8	No specific fauna values.	None proposed	Open Cut
Horrigan Creek	AB445.5	No specific fauna values.	Suitable crossing point, although ensure line crosses at right angle. Evidence of erosion and flooding.	Open Cut
Raglan Creek	AB446.6	Estuarine habitat.	Two alternate crossings proposed.	Open cut or HDD 9subject to geotechnical

Waterway Crossing	KP's	Fauna Values	Suggested Mitigation	Construction Method
				constraints.
Larcom Creek	AB476.2	No specific fauna values.	Two alternate crossings proposed.	Open Cut
Elphinstone Lateral				
Walker Creek	EL8.3	Large hollow bearing trees.	Stay south of large *E. tereticornis* habitat trees, as well as gully of tributary stream to the north-east	Open Cut
Walker Creek	EL11.8	No specific fauna values.	None proposed	Open Cut
Carborough Creek	EL28.3	No specific fauna values.	Extensive gully erosion around creek.	Open Cut
Spring Creek	EL34.7	Large hollow bearing trees.	Use existing clearing and avoid large trees.	Open Cut
Thirty Mile Creek	EL37.1	Large hollow bearing trees.	Move 70 m west to avoid remnant vegetation.	Open Cut
Saraji Lateral				
Ripstone Creek	SL6.5	Large hollow bearing trees.	Avoid Large trees with hollows.	Open Cut
Unnamed Wetland	SL7.8	Cotton Pygmy Goose (EVNT). Natural waterhole, habitat for aquatic/amphibious fauna and wetland birds.	Move 350 m north to avoid natural waterhole and remnant vegetation.	Open Cut
Unnamed Wetland	SL11.1	Natural waterhole, habitat for aquatic/amphibious fauna and wetland birds.	Move 800 m north to avoid swamp and wetland vegetation.	Open Cut
Isaac River	SL19	White-bellied Sea Eagle Nest.	Move crossing approximately 5.5 km north-west to allow Saraji lateral to be shifted north and avoid impacts on remnant vegetation and wetlands from SL 0 to SL 19. Avoid large trees and stags, including very large *E.*	Open Cut

Waterway Crossing	KP's	Fauna Values	Suggested Mitigation	Construction Method
			tereticornis on southwest bank.	

5.3 Trenchfall

The following strategies are recommended to reduce the impact of trenchfall on terrestrial fauna:

- Where practical, the length of time that the trench is open should be minimised to limit the potential for the pipeline to impact on local populations of fauna in areas adjacent to sensitive habitat areas;
- The installation of ramps should be located at least every 1000m to assist fauna to leave the trench.
- Shelter material that also functions as wet weather refuges should be installed in the trench to minimise the risk of heat stress and drowning of fauna species potential captured. A common method is placing sawdust-filled hessian sacks soaked in water in pairs at intervals along the trench, particularly in areas adjacent to sensitive fauna habitat areas;
- A qualified and experienced fauna spotted / handler should be employed to check the trench for captured fauna along the entire route. Searches should be conducted at least daily, preferably in the morning to remove animals prior to the heat of the day. Personnel should be qualified to assess and euthenase, if necessary, any injured livestock or large native or feral vertebrates.

5.4 Pest Management

Maintenance of good hygiene practices during construction, particularly with regard to waste disposal, will assist in minimising the spread and proliferation of pest fauna species. Appropriate management measures will be documented in Construction and Operational phase Environmental Management Plans.

5.5 Summary of Key Fauna Constraints and Mitigation

Table 24 below provides a summary of the key fauna habitat areas (other than waterways) identified during the current study, and lists proposed changes/mitigation strategies for those areas.

Table 24: Proposed Mitigation, Key Fauna Habitat Areas

Nearest KP	Location	Issue	Change / Mitigation
AB44.4-44.5	Tributary to Isaac River	Brigalow Habitat for Ornamental Snake	Deviation 200m east to avoid habitat.

Nearest KP	Location	Issue	Change / Mitigation
AB50.5	Isaac River	Vulnerable Squatter Pigeon recorded	No change. Survey for nests as construction takes place in nesting season.
AB64	Arrow Tenement	Vulnerable Squatter Pigeon recorded	No change. Survey for nests as construction takes place in nesting season.
AB73.5	West of Burton Mine Haul Road	Escarpment provides cave roosts for a variety of microchiropteran bats, potential Northern Quoll and Death Adder habitat.	Current alignment satisfactory with appropriate construction management. Deviation would require survey for bat caves.
AB74-75	Escarpment north of proposed pipeline	Escarpment provides cave roosts for a variety of microchiropteran bats, potential Northern Quoll and Death Adder habitat.	Current alignment satisfactory with appropriate construction management. Deviation would require survey for bat caves.
AB93.2-93.8	Annandale	Brigalow habitat for Ornamental Snake	Deviation 150m E to avoid habitat.
AB166-168	Isaac River	Good quality habitat for Ornamental Snake	Possible alternative crossings identified by AECOM would be preferable to reduce impact on Ornamental Snake.
AB212-218	Isaac River floodplain	Habitat for Ornamental Snake with Brigalow regrowth	Deviate to the south, trench monitoring during construction.
AB234	Isaac River	Good quality habitat for Ornamental Snake	HDD, nearby trench monitoring during construction.
AB238	Below Ungle Waterhole	Potential Ornamental Snake habitat	HDD, nearby trench monitoring construction.
AB274.7	Mount Gardiner	Vulnerable Squatter Pigeon recorded	No change. Survey for nests is construction takes place in nesting season.
AB275.6	Mount Gardiner	Rare Grey Goshawk Recorded	No change.
AB311.5		Vulnerable Squatter Pigeon recorded	No change. Survey for nests is construction takes place in nesting season.
AB367	Northwest Limestone Creek	Vulnerable Squatter Pigeon recorded	No change. Survey for nests is construction takes place in nesting season.
AB392	North of Gracemere	Endangered Grey Snake Recorded	No change. Species recorded in cleared area with no particular habitat association.
AB430	Inkerman Creek	Potential *Xeromys* and Yellow Chat habitat	No disruption during breeding season if recorded within construction area.

Nearest KP	Location	Issue	Change / Mitigation
AB446.5	Raglan Creek	Flying Fox Camp, includes approximately 5% EPBC listed Grey-headed FF. Potential *Xeromys* habitat	Pipeline alignment cannot shift downstream without impacting camp. and re-alignment under consideration.
AB469	Mount Larcom	Powerful Owl pair recorded	No alignment change. Ensure nest trees are not cleared during breeding season.
SL19	Isaac River	Nest of EPBC Listed (Migratory) White-bellied Sea Eagle	Alternative crossing to north identified and more suitable.
EL19 (west of)	Kerlong Range	Potential scat of Northern Quoll recorded in this area, suitable habitat for Northern Quolls	Prefer shift of alignment to east if possible.

5.6 Mitigation Measures for EVNT Fauna

Table 25 below provides a summary of issues, relevant KP's and proposed mitigation measures for EVNT species considered likely to be impacted by the ABP.

Table 25: Proposed Mitigation, EVNT Fauna species impacted by ABP

Species	Issue	Relevant KP	Proposed Mitigation Measure
Powerful Owl	Loss of potential nest sites, and denning resources for prey species such as the Greater Glider.	AB469	The disturbance footprint is to be the minimum width required to safely construct the pipeline. Modify ROW as appropriate to protect large trees and significant habitat features.
Yellow Chat	Potential disturbance to wetland habitats.	AB489	Minimise impacts to wetland areas through avoidance/HDD, dry season construction scheduling, and post-construction habitat rehabilitation.
Grey-headed Flying Fox	Loss of foraging habitat and disturbance to known roost site.	AB446-447	Works will be conducted >500m from roost site. HDD will ensure minimal impacts to vegetation and foraging habitat. The disturbance footprint is to be the minimum width required to safely construct the pipeline.
Little Pied Bat	Loss of potential den/roost sites in hollow bearing trees.	AB50.5, 311.5, SL16.5	The disturbance footprint is to be the minimum width required to safely construct the pipeline. Modify ROW as appropriate to protect large trees and significant habitat features.

Species	Issue	Relevant KP	Proposed Mitigation Measure
Common Death Adder	Loss of preferred habitat. Potential trenchfall	AB56-73	The ROW is to be the minimum safe width to construct the pipeline at these KPs. Fauna spotter/catcher will survey the open trench to remove any trapped fauna species. Ramps will be located at intervals of approximately 1000m along the pipeline to assist in the escape of trapped fauna.
Ornamental Snake	Loss of preferred habitat. Potential trenchfall	AB166-168, AB212-218, AB238	The ROW is to be the minimum safe width to construct the pipeline at these KPs. Fauna spotter/catcher will survey the open trench to remove any trapped fauna species. Ramps will be located at intervals of approximately 1000m along the pipeline to assist in the escape of trapped fauna.
Grey Snake	Loss of preferred habitat. Potential trenchfall	AB392 (general locality)	The ROW is to be the minimum safe width to construct the pipeline at these KPs. Fauna spotter/catcher will survey the open trench to remove any trapped fauna species. Ramps will be located at intervals of approximately 1000m along the pipeline to assist in the escape of trapped fauna.
Brigalow Scaly-foot	Loss of preferred habitat. Potential trenchfall	AB56-73	The ROW is to be the minimum safe width to construct the pipeline at these KPs. Fauna spotter/catcher will survey the open trench to remove any trapped fauna species. Ramps will be located at intervals of approximately 1000m along the pipeline to assist in the escape of trapped fauna.
Yakka Skink	Loss of preferred habitat. Potential trenchfall	AB56-73	The ROW is to be the minimum safe width to construct the pipeline at these KPs. Fauna spotter/catcher will survey the open trench to remove any trapped fauna species. Ramps will be located at intervals of approximately 1000m along the pipeline to assist in the escape of trapped fauna.

5 Conclusion

The terrestrial fauna and habitat values of the Arrow Bowen Pipeline project area have been assessed through a comprehensive review of existing information and two seasonal fauna surveys.

This report has identified the following primary impacts associated with construction and operation of the proposed Arrow Bowen gas pipeline:

- Clearing of a maximum of 371.2 ha of remnant vegetation which comprises habitat for native fauna; and
- Potential impacts on habitat for nine EVNT fauna species either recorded in surveys of the project area or considered to have a high likelihood of occurrence.

Proposed mitigation measures for impacts to vertebrate fauna include:

- Monitoring of open trenches during the construction period. Trenchfall represents the major potential threat to a range of EVNT reptile species known or highly likely to be present in the project area as well as a threat to a diverse array of Least Concern fauna species;
- Minor re-alignments of the proposed pipeline route to avoid or minimise clearing of areas of high environmental value (e.g. Endangered RE's which contain a concentration of EVNT fauna, habitat for EVNT fauna species generally, riparian areas) and areas of remnant vegetation generally;
- Use of minimum clearing widths in areas of remnant vegetation which supports fauna habitat of the highest quality;
- Investigation into use of HDD techniques to avoid impacts on major watercourses (e.g. Fitzroy River). Major watercourses make a significant contribution to landscape connectivity for fauna.

A review of relevant desktop data and completion of field surveys indicates that 26 EVNT species and 12 migratory species are considered to have a moderate to high likelihood of occurrence within the proposed pipeline corridor or have already been recorded along the alignment. Of those species, nine EVNT species have been identified as having the potential to be adversely impacted by the proposed works, namely:

- Powerful Owl (recorded from Mont Larcom, AB469);
- Yellow Chat (not recorded during this study, known to present in project area);
- Grey-headed Flying Fox (recorded from Raglan Creek AB446.5);
- Little Pied Bat (recorded from AB50.5, 274.4, 311.5, 462 and SL16.5) ;
- Ornamental Snake (not recorded on project site, but recorded from project area);
- Grey Snake (not recorded on project site, but recorded from project area);
- Brigalow Scaly-foot (not recorded but highly likely to be present in project area);

- Common Death Adder (not recorded but highly likely to be present in project area); and
- Yakka Skink (not recorded but highly likely to be present in project area).

Impacts on these species have been carefully considered against statutory guidelines and it is considered that, with implementation of appropriate strategies, the ABP will be unlikely to result in significant impacts on the viability of affected populations.

Further investigations will be undertaken to develop route revisions in areas where EVNT species have been recorded or considered likely to occur, including:

- Further surveys for the Ornamental Snake and or Brigalow Scaly-foot at AB44.4, AB93.2, AB212 and AB234. Low overnight temperatures precluded adequate surveys for these species in Winter and Spring;
- Further investigation will examine realigning the route approximately 400m north of AB73.6 as this area contains small caves which are used by a variety of Microchiropteran bats;
- Specific investigation of marine vegetation as habitat for the Endangered Yellow Chat. Marine vegetation was recorded at several locations within the proposed alignment from KP 430.1 to 430.2 and KP 446.4 to 446.8.

This study also identified the key areas which support higher fauna habitat values.

The project team has worked collaboratively to select pipeline route re-alignments which avoid impacts on significant fauna habitat areas, corridors and individual habitat elements, such as hollow bearing trees.

The assessment of potential impacts to these values found that, in many instances, impacts will be minimal and /or of limited intensity and duration. A suite of mitigation measures for the project has been proposed in keeping with best management practices. With the successful implementation of the recommended mitigation measures, it is considered that the impact of the project on terrestrial native fauna will be of low overall significance.

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Appendices

Appendix A Wildlife Online Database Search

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
amphibians	Limnodynastidae	Adelotus brevis	tusked frog		V		2	0	
amphibians	Myobatrachidae	Crinia deserticola	chirping froglet		C		1	0	
amphibians	Hylidae	Cyclorana alboguttata	greenstripe frog		C		6	0	
amphibians	Hylidae	Cyclorana brevipes	superb collared frog		C		1	0	
amphibians	Hylidae	Cyclorana cultripes	grassland collared frog		C		2	0	
amphibians	Hylidae	Cyclorana novaehollandiae	eastern snapping frog		C		14	0	
amphibians	Hylidae	Cyclorana platycephala	water holding frog		C		1	0	
amphibians	Hylidae	Cyclorana verrucosa	rough collared frog		NT		2	0	
amphibians	Limnodynastidae	Limnodynastes fletcheri	barking frog		C		1	0	
amphibians	Limnodynastidae	Limnodynastes peronii	striped marshfrog		C		1	0	
amphibians	Limnodynastidae	Limnodynastes salmini	salmon striped frog		C		1	0	
amphibians	Limnodynastidae	Limnodynastes tasmaniensis	spotted grassfrog		C		11	0	
amphibians	Limnodynastidae	Limnodynastes terraereginae	scarlet sided pobblebonk		C		1	0	
amphibians	Hylidae	Litoria caerulea	common green treefrog		C		49	0	
amphibians	Hylidae	Litoria dentata	bleating treefrog		C		7	0	
amphibians	Hylidae	Litoria fallax	eastern sedgefrog		C		21	0	
amphibians	Hylidae	Litoria gracilenta	graceful treefrog		C		6	0	
amphibians	Hylidae	Litoria inermis	bumpy rocketfrog		C		5	0	
amphibians	Hylidae	Litoria latopalmata	broad palmed rocketfrog		C		2	0	
amphibians	Hylidae	Litoria nasuta	striped rocketfrog		C		8	0	
amphibians	Hylidae	Litoria rothii	northern laughing treefrog		C		1	0	
amphibians	Hylidae	Litoria rubella	ruddy treefrog		C		15	0	
amphibians	Hylidae	Litoria wilcoxii	eastern stony creek frog		C		8	1	
amphibians	Limnodynastidae	Platyplectrum ornatum	ornate burrowing frog		C		5	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
amphibians	Myobatrachidae	Pseudophryne major	great brown broodfrog		C		1	1	
amphibians	Myobatrachidae	Pseudophryne raveni	copper backed broodfrog		C		3	1	
amphibians	Bufonidae	Rhinella marina	cane toad	Y			25	0	
amphibians	Myobatrachidae	Uperoleia fusca	dusky gungan		C		2	0	
amphibians	Myobatrachidae	Uperoleia rugosa	chubby gungan		C		1	0	
amphibians	Myobatrachidae	Uperoleia trachyderma	orange shouldered gungan		C		1	0	
birds	Meliphagidae	Acanthagenys rufogularis	spiny-cheeked honeyeater		C		2	0	
birds	Acanthizidae	Acanthiza apicalis	inland thornbill		C		1	0	
birds	Acanthizidae	Acanthiza chrysorrhoa	yellow-rumped thornbill		C		1	0	
birds	Acanthizidae	Acanthiza nana	yellow thornbill		C		1	0	
birds	Acanthizidae	Acanthiza pusilla	brown thornbill		C		1	0	
birds	Acanthizidae	Acanthiza reguloides	buff-rumped thornbill		C		1	0	
birds	Meliphagidae	Acanthorhynchus tenuirostris	eastern spinebill		C		1	0	
birds	Accipitridae	Accipiter cirrocephalus	collared sparrowhawk		C		2	0	
birds	Accipitridae	Accipiter fasciatus	brown goshawk		C		2	0	
birds	Accipitridae	Accipiter novaehollandiae	grey goshawk		NT		5	0	
birds	Acrocephalidae	Acrocephalus australis	Australian reed-warbler		C		12	0	
birds	Scolopacidae	Actitis hypoleucos	common sandpiper		C		5	0	
birds	Aegothelidae	Aegotheles cristatus	Australian owlet-nightjar		C		2	0	
birds	Apodidae	Aerodramus terraereginae	Australian swiftlet		NT		1	0	
birds	Megapodiidae	Alectura lathami	Australian brush-turkey		C		1	0	
birds	Psittacidae	Alisterus scapularis	Australian king-parrot		C		3	0	
birds	Anatidae	Anas castanea	chestnut teal		C		8	0	
birds	Anatidae	Anas gracilis	grey teal		C		2	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
birds	Anatidae	Anas rhynchotis	Australasian shoveler		C		1	0	
birds	Anatidae	Anas superciliosa	Pacific black duck		C		44	0	
birds	Anhingidae	Anhinga novaehollandiae	Australasian darter		C		87	0	
birds	Laridae	Anous minutus	black noddy		C		1	0	
birds	Anseranatidae	Anseranas semipalmata	magpie goose		C		1	0	
birds	Motacillidae	Anthus novaeseelandiae	Australasian pipit		C		4	0	
birds	Psittacidae	Aprosmictus erythropterus	red-winged parrot		C		12	0	
birds	Apodidae	Apus pacificus	fork-tailed swift		C		1	0	
birds	Accipitridae	Aquila audax	wedge-tailed eagle		C		11	0	
birds	Ardeidae	Ardea ibis	cattle egret		C		1	0	
birds	Ardeidae	Ardea intermedia	intermediate egret		C		2	0	
birds	Ardeidae	Ardea modesta	eastern great egret		C		30	0	
birds	Ardeidae	Ardea pacifica	white-necked heron		C		2	0	
birds	Otididae	Ardeotis australis	Australian bustard		C		2	0	
birds	Scolopacidae	Arenaria interpres	ruddy turnstone		C		1	0	
birds	Artamidae	Artamus cinereus	black-faced woodswallow		C		2	0	
birds	Artamidae	Artamus cyanopterus	dusky woodswallow		C		1	0	
birds	Artamidae	Artamus leucorynchus	white-breasted woodswallow		C		11	0	
birds	Artamidae	Artamus minor	little woodswallow		C		1	0	
birds	Artamidae	Artamus superciliosus	white-browed woodswallow		C		1	0	
birds	Accipitridae	Aviceda subcristata	Pacific baza		C		1	0	
birds	Anatidae	Aythya australis	hardhead		C		51	0	
birds	Burhinidae	Burhinus grallarius	bush stone-curlew		C		1	0	
birds	Ardeidae	Butorides striata	striated heron		C		14	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
birds	Cacatuidae	Cacatua galerita	sulphur-crested cockatoo		C		39	0	
birds	Cuculidae	Cacomantis flabelliformis	fan-tailed cuckoo		C		2	0	
birds	Cuculidae	Cacomantis pallidus	pallid cuckoo		C		6	0	
birds	Cuculidae	Cacomantis variolosus	brush cuckoo		C		1	0	
birds	Scolopacidae	Calidris acuminata	sharp-tailed sandpiper		C		6	0	
birds	Scolopacidae	Calidris alba	sanderling		C		1	0	
birds	Scolopacidae	Calidris canutus	red knot		C		1	0	
birds	Scolopacidae	Calidris ferruginea	curlew sandpiper		C		5	0	
birds	Scolopacidae	Calidris ruficollis	red-necked stint		C		6	0	
birds	Cacatuidae	Calyptorhynchus banksii	red-tailed black-cockatoo		C		6	0	
birds	Cacatuidae	Calyptorhynchus funereus	yellow-tailed black-cockatoo		C		1	0	
birds	Cacatuidae	Calyptorhynchus lathami	glossy black-cockatoo		V		2	0	
birds	Caprimulgidae	Caprimulgus macrurus	large-tailed nightjar		C		13	0	
birds	Monarchidae	Carterornis leucotis	white-eared monarch		C		1	0	
birds	Cuculidae	Centropus phasianinus	pheasant coucal		C		2	0	
birds	Alcedinidae	Ceyx azureus	azure kingfisher		C		2	0	
birds	Cuculidae	Chalcites basalis	Horsfield's bronze-cuckoo		C		5	0	
birds	Cuculidae	Chalcites lucidus	shining bronze-cuckoo		C		1	0	
birds	Cuculidae	Chalcites minutillus minutillus	little bronze-cuckoo		C		1	0	
birds	Cuculidae	Chalcites osculans	black-eared cuckoo		C		1	0	
birds	Columbidae	Chalcophaps indica	emerald dove		C		1	0	
birds	Charadriidae	Charadrius mongolus	lesser sand plover		C		4	0	
birds	Charadriidae	Charadrius ruficapillus	red-capped plover		C		1	0	
birds	Anatidae	Chenonetta jubata	Australian wood duck		C		1	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
birds	Laridae	Chlidonias hybrida	whiskered tern		C		1	0	
birds	Laridae	Chroicocephalus novaehollandiae	silver gull		C		1	0	
birds	Acanthizidae	Chthonicola sagittata	speckled warbler		C		2	0	
birds	Megaluridae	Cincloramphus cruralis	brown songlark		C		1	0	
birds	Megaluridae	Cincloramphus mathewsi	rufous songlark		C		1	0	
birds	Accipitridae	Circus assimilis	spotted harrier		C		3	0	
birds	Cisticolidae	Cisticola exilis	golden-headed cisticola		C		5	0	
birds	Climacteridae	Climacteris picumnus	brown treecreeper		C		3	0	
birds	Pachycephalidae	Colluricincla harmonica	grey shrike-thrush		C		1	0	
birds	Pachycephalidae	Colluricincla megarhyncha	little shrike-thrush		C		2	0	
birds	Columbidae	Columba livia	rock dove	Y			8	0	
birds	Campephagidae	Coracina maxima	ground cuckoo-shrike		C		2	0	
birds	Campephagidae	Coracina novaehollandiae	black-faced cuckoo-shrike		C		79	0	
birds	Campephagidae	Coracina papuensis	white-bellied cuckoo-shrike		C		5	0	
birds	Campephagidae	Coracina tenuirostris	cicadabird		C		1	0	
birds	Corcoracidae	Corcorax melanorhamphos	white-winged chough		C		1	0	
birds	Climacteridae	Cormobates leucophaea metastasis	white-throated treecreeper (southern)		C		1	0	
birds	Corvidae	Corvus bennetti	little crow		C		1	0	
birds	Corvidae	Corvus coronoides	Australian raven		C		3	0	
birds	Corvidae	Corvus orru	Torresian crow		C		176	0	
birds	Phasianidae	Coturnix pectoralis	stubble quail		C		2	0	
birds	Phasianidae	Coturnix ypsilophora	brown quail		C		2	0	
birds	Artamidae	Cracticus nigrogularis	pied butcherbird		C		119	0	
birds	Artamidae	Cracticus tibicen	Australian magpie		C		91	0	

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birds	Artamidae	Cracticus torquatus	grey butcherbird		C		2	0	
birds	Cuculidae	Cuculus optatus	oriental cuckoo		C		1	0	
birds	Anatidae	Cygnus atratus	black swan		C		3	0	
birds	Halcyonidae	Dacelo leachii	blue-winged kookaburra		C		14	0	
birds	Halcyonidae	Dacelo novaeguineae	laughing kookaburra		C		12	0	
birds	Neosittidae	Daphoenositta chrysoptera	varied sittella		C		5	0	
birds	Anatidae	Dendrocygna arcuata	wandering whistling-duck		C		1	0	
birds	Anatidae	Dendrocygna eytoni	plumed whistling-duck		C		3	0	
birds	Nectariniidae	Dicaeum hirundinaceum	mistletoebird		C		1	0	
birds	Dicruridae	Dicrurus bracteatus	spangled drongo		C		4	0	
birds	Casuariidae	Dromaius novaehollandiae	emu		C		6	0	
birds	Ardeidae	Egretta garzetta	little egret		C		1	0	
birds	Ardeidae	Egretta novaehollandiae	white-faced heron		C		13	0	
birds	Ardeidae	Egretta sacra	eastern reef egret		C		13	4	
birds	Accipitridae	Elanus axillaris	black-shouldered kite		C		5	0	
birds	Charadriidae	Elseyornis melanops	black-fronted dotterel		C		4	0	
birds	Meliphagidae	Entomyzon cyanotis	blue-faced honeyeater		C		83	0	
birds	Cacatuidae	Eolophus roseicapillus	galah		C		26	0	
birds	Petroicidae	Eopsaltria australis	eastern yellow robin		C		6	0	
birds	Ciconiidae	Ephippiorhynchus asiaticus	black-necked stork		NT		2	0	
birds	Meliphagidae	Epthianura crocea	yellow chat		V		2	0	
birds	Meliphagidae	Epthianura crocea macgregori	yellow chat (Dawson)		E	CE	9	0	
birds	Meliphagidae	Epthianura tricolor	crimson chat		C		1	0	
birds	Charadriidae	Erythrogonys cinctus	red-kneed dotterel		C		1	0	

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birds	Accipitridae	Erythrotriorchis radiatus	red goshawk		E	V	2	0	
birds	Burhinidae	Esacus magnirostris	beach stone-curlew		V		7	0	
birds	Cuculidae	Eudynamys orientalis	eastern koel		C		5	0	
birds	Eurostopodidae	Eurostopodus argus	spotted nightjar		C		1	0	
birds	Eurostopodidae	Eurostopodus mystacalis	white-throated nightjar		C		1	0	
birds	Coraciidae	Eurystomus orientalis	dollarbird		C		4	0	
birds	Falconidae	Falco berigora	brown falcon		C		5	0	
birds	Falconidae	Falco cenchroides	nankeen kestrel		C		26	0	
birds	Falconidae	Falco hypoleucos	grey falcon		NT		1	0	
birds	Falconidae	Falco longipennis	Australian hobby		C		1	0	
birds	Falconidae	Falco peregrinus	peregrine falcon		C		2	0	
birds	Falconidae	Falco subniger	black falcon		C		1	0	
birds	Rallidae	Fulica atra	Eurasian coot		C		1	0	
birds	Scolopacidae	Gallinago hardwickii	Latham's snipe		C		1	0	
birds	Rallidae	Gallinula tenebrosa	dusky moorhen		C		2	0	
birds	Rallidae	Gallirallus philippensis	buff-banded rail		C		1	0	
birds	Laridae	Gelochelidon nilotica	gull-billed tern		C		12	0	
birds	Columbidae	Geopelia cuneata	diamond dove		C		1	0	
birds	Columbidae	Geopelia humeralis	bar-shouldered dove		C		2	0	
birds	Columbidae	Geopelia striata	peaceful dove		C		13	0	
birds	Columbidae	Geophaps scripta	squatter pigeon		C		16	0	
birds	Columbidae	Geophaps scripta scripta	squatter pigeon (southern subspecies)		V	V	1	0	
birds	Acanthizidae	Gerygone albogularis	white-throated gerygone		C		3	0	
birds	Acanthizidae	Gerygone fusca	western gerygone		C		1	0	

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birds	Acanthizidae	Gerygone levigaster	mangrove gerygone		C		7	0	
birds	Acanthizidae	Gerygone palpebrosa	fairy gerygone		C		2	0	
birds	Psittacidae	Glossopsitta concinna	musk lorikeet		C		1	0	
birds	Psittacidae	Glossopsitta pusilla	little lorikeet		C		21	0	
birds	Monarchidae	Grallina cyanoleuca	magpie-lark		C		79	0	
birds	Gruidae	Grus rubicunda	brolga		C		1	0	
birds	Haematopodidae	Haematopus fuliginosus	sooty oystercatcher		NT		3	1	
birds	Haematopodidae	Haematopus longirostris	Australian pied oystercatcher		C		12	0	
birds	Accipitridae	Haliaeetus leucogaster	white-bellied sea-eagle		C		4	0	
birds	Accipitridae	Haliastur indus	brahminy kite		C		1	0	
birds	Accipitridae	Haliastur sphenurus	whistling kite		C		58	0	
birds	Accipitridae	Hieraaetus morphnoides	little eagle		C		1	0	
birds	Recurvirostridae	Himantopus himantopus	black-winged stilt		C		5	0	
birds	Apodidae	Hirundapus caudacutus	white-throated needletail		C		1	0	
birds	Hirundinidae	Hirundo neoxena	welcome swallow		C		26	0	
birds	Laridae	Hydroprogne caspia	Caspian tern		C		3	0	
birds	Jacanidae	Irediparra gallinacea	comb-crested jacana		C		4	0	
birds	Ardeidae	Ixobrychus dubius	Australian little bittern		C		1	0	
birds	Ardeidae	Ixobrychus flavicollis	black bittern		C		1	0	
birds	Campephagidae	Lalage leucomela	varied triller		C		1	0	
birds	Campephagidae	Lalage sueurii	white-winged triller		C		1	0	
birds	Columbidae	Leucosarcia picata	wonga pigeon		C		2	0	
birds	Rallidae	Lewinia pectoralis	Lewin's rail		NT		1	0	
birds	Meliphagidae	Lichenostomus chrysops	yellow-faced honeyeater		C		3	0	

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birds	Meliphagidae	Lichenostomus fasciogularis	mangrove honeyeater		C		19	0	
birds	Meliphagidae	Lichenostomus flavus	yellow honeyeater		C		1	0	
birds	Meliphagidae	Lichenostomus leucotis	white-eared honeyeater		C		2	0	
birds	Meliphagidae	Lichenostomus melanops	yellow-tufted honeyeater		C		2	0	
birds	Meliphagidae	Lichenostomus virescens	singing honeyeater		C		30	0	
birds	Meliphagidae	Lichmera indistincta	brown honeyeater		C		4	0	
birds	Scolopacidae	Limicola falcinellus	broad-billed sandpiper		C		1	0	
birds	Scolopacidae	Limosa lapponica	bar-tailed godwit		C		14	0	
birds	Scolopacidae	Limosa limosa	black-tailed godwit		C		1	0	
birds	Estrildidae	Lonchura castaneothorax	chestnut-breasted mannikin		C		6	0	
birds	Estrildidae	Lonchura punctulata	nutmeg mannikin	Y			2	0	
birds	Accipitridae	Lophoictinia isura	square-tailed kite		NT		2	0	
birds	Columbidae	Lopholaimus antarcticus	topknot pigeon		C		2	0	
birds	Columbidae	Macropygia amboinensis	brown cuckoo-dove		C		1	0	
birds	Maluridae	Malurus lamberti	variegated fairy-wren		C		6	0	
birds	Maluridae	Malurus melanocephalus	red-backed fairy-wren		C		40	0	
birds	Meliphagidae	Manorina flavigula	yellow-throated miner		C		139	0	
birds	Meliphagidae	Manorina melanocephala	noisy miner		C		5	0	
birds	Megaluridae	Megalurus timoriensis	tawny grassbird		C		1	0	
birds	Megapodiidae	Megapodius reinwardt	orange-footed scrubfowl		C		1	0	
birds	Meliphagidae	Meliphaga lewinii	Lewin's honeyeater		C		1	0	
birds	Meliphagidae	Melithreptus albogularis	white-throated honeyeater		C		6	0	
birds	Meliphagidae	Melithreptus gularis	black-chinned honeyeater		NT		1	0	
birds	Meliphagidae	Melithreptus lunatus	white-naped honeyeater		C		5	0	

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birds	Psittacidae	Melopsittacus undulatus	budgerigar		C		1	0	
birds	Meropidae	Merops ornatus	rainbow bee-eater		C		40	0	
birds	Phalacrocoracidae	Microcarbo melanoleucos	little pied cormorant		C		18	0	
birds	Petroicidae	Microeca fascinans	jacky winter		C		2	0	
birds	Petroicidae	Microeca flavigaster	lemon-bellied flycatcher		C		1	0	
birds	Accipitridae	Milvus migrans	black kite		C		3	0	
birds	Alaudidae	Mirafra javanica	Horsfield's bushlark		C		1	0	
birds	Monarchidae	Monarcha melanopsis	black-faced monarch		C		1	0	
birds	Monarchidae	Myiagra alecto	shining flycatcher		C		3	0	
birds	Monarchidae	Myiagra cyanoleuca	satin flycatcher		C		8	0	
birds	Monarchidae	Myiagra inquieta	restless flycatcher		C		3	0	
birds	Monarchidae	Myiagra rubecula	leaden flycatcher		C		3	0	
birds	Meliphagidae	Myzomela obscura	dusky honeyeater		C		1	0	
birds	Meliphagidae	Myzomela sanguinolenta	scarlet honeyeater		C		16	0	
birds	Nectariniidae	Nectarinia jugularis	olive-backed sunbird		C		1	0	
birds	Estrildidae	Neochmia modesta	plum-headed finch		C		1	0	
birds	Estrildidae	Neochmia temporalis	red-browed finch		C		2	0	
birds	Anatidae	Nettapus coromandelianus	cotton pygmy-goose		NT		5	0	
birds	Anatidae	Nettapus pulchellus	green pygmy-goose		C		1	0	
birds	Strigidae	Ninox boobook	southern boobook		C		1	0	
birds	Strigidae	Ninox connivens	barking owl		C		8	0	
birds	Strigidae	Ninox strenua	powerful owl		V		4	0	
birds	Scolopacidae	Numenius madagascariensis	eastern curlew		NT		34	0	
birds	Scolopacidae	Numenius phaeopus	whimbrel		C		18	0	

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birds	Ardeidae	Nycticorax caledonicus	Nankeen night-heron		C		1	0	
birds	Cacatuidae	Nymphicus hollandicus	cockatiel		C		4	0	
birds	Columbidae	Ocyphaps lophotes	crested pigeon		C		46	0	
birds	Oriolidae	Oriolus sagittatus	olive-backed oriole		C		6	0	
birds	Pachycephalidae	Pachycephala pectoralis	golden whistler		C		2	0	
birds	Pachycephalidae	Pachycephala rufiventris	rufous whistler		C		3	0	
birds	Accipitridae	Pandion cristatus	eastern osprey		C		1	0	
birds	Pardalotidae	Pardalotus punctatus	spotted pardalote		C		1	0	
birds	Pardalotidae	Pardalotus striatus	striated pardalote		C		132	0	
birds	Passeridae	Passer domesticus	house sparrow	Y			14	0	
birds	Pelecanidae	Pelecanus conspicillatus	Australian pelican		C		8	0	
birds	Hirundinidae	Petrochelidon ariel	fairy martin		C		43	0	
birds	Hirundinidae	Petrochelidon nigricans	tree martin		C		8	0	
birds	Petroicidae	Petroica rosea	rose robin		C		2	0	
birds	Phalacrocoracidae	Phalacrocorax carbo	great cormorant		C		2	0	
birds	Phalacrocoracidae	Phalacrocorax sulcirostris	little black cormorant		C		37	0	
birds	Phalacrocoracidae	Phalacrocorax varius	pied cormorant		C		1	0	
birds	Columbidae	Phaps chalcoptera	common bronzewing		C		2	0	
birds	Columbidae	Phaps elegans	brush bronzewing		C		1	0	
birds	Meliphagidae	Philemon buceroides	helmeted friarbird		C		9	0	
birds	Meliphagidae	Philemon citreogularis	little friarbird		C		19	0	
birds	Meliphagidae	Philemon corniculatus	noisy friarbird		C		11	0	
birds	Meliphagidae	Phylidonyris niger	white-cheeked honeyeater		C		1	0	
birds	Pittidae	Pitta versicolor	noisy pitta		C		3	0	

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birds	Threskiornithidae	Platalea flavipes	yellow-billed spoonbill		C		2	0	
birds	Threskiornithidae	Platalea regia	royal spoonbill		C		4	0	
birds	Psittacidae	Platycercus adscitus	pale-headed rosella		C		64	0	
birds	Psittacidae	Platycercus adscitus palliceps	pale-headed rosella (southern form)		C		4	0	
birds	Meliphagidae	Plectorhyncha lanceolata	striped honeyeater		C		1	0	
birds	Threskiornithidae	Plegadis falcinellus	glossy ibis		C		1	0	
birds	Charadriidae	Pluvialis fulva	Pacific golden plover		C		4	0	
birds	Charadriidae	Pluvialis squatarola	grey plover		C		2	0	
birds	Podargidae	Podargus strigoides	tawny frogmouth		C		3	0	
birds	Podicipedidae	Podiceps cristatus	great crested grebe		C		33	0	
birds	Podicipedidae	Poliocephalus poliocephalus	hoary-headed grebe		C		2	0	
birds	Pomatostomidae	Pomatostomus temporalis	grey-crowned babbler		C		1	0	
birds	Rallidae	Porphyrio porphyrio	purple swamphen		C		1	0	
birds	Psophodidae	Psophodes olivaceus	eastern whipbird		C		2	0	
birds	Columbidae	Ptilinopus regina	rose-crowned fruit-dove		C		7	0	
birds	Ptilonorhynchidae	Ptilonorhynchus maculatus	spotted bowerbird		C		1	0	
birds	Ptilonorhynchidae	Ptilonorhynchus nuchalis	great bowerbird		C		3	0	
birds	Paradisaeidae	Ptiloris paradiseus	paradise riflebird		C		1	0	
birds	Recurvirostridae	Recurvirostra novaehollandiae	red-necked avocet		C		4	0	
birds	Rhipiduridae	Rhipidura albiscapa	grey fantail		C		2	0	
birds	Rhipiduridae	Rhipidura leucophrys	willie wagtail		C		82	0	
birds	Rhipiduridae	Rhipidura rufifrons	rufous fantail		C		29	0	
birds	Cuculidae	Scythrops novaehollandiae	channel-billed cuckoo		C		5	0	
birds	Acanthizidae	Sericornis frontalis	white-browed scrubwren		C		14	0	

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birds	Acanthizidae	Smicrornis brevirostris	weebill		C		7	0	
birds	Oriolidae	Sphecotheres vieilloti	Australasian figbird		C		2	0	
birds	Laridae	Sternula albifrons	little tern		E		1	0	
birds	Artamidae	Strepera graculina	pied currawong		C		7	0	
birds	Columbidae	Streptopelia chinensis	spotted dove	Y			5	0	
birds	Corcoracidae	Struthidea cinerea	apostlebird		C		1	0	
birds	Meliphagidae	Sugomel niger	black honeyeater		C		1	0	
birds	Sulidae	Sula leucogaster	brown booby		C		2	0	
birds	Monarchidae	Symposiarchus trivirgatus	spectacled monarch		C		17	0	
birds	Podicipedidae	Tachybaptus novaehollandiae	Australasian grebe		C		2	0	
birds	Anatidae	Tadorna radjah	radjah shelduck		NT		1	1	
birds	Estrildidae	Taeniopygia bichenovii	double-barred finch		C		6	0	
birds	Estrildidae	Taeniopygia guttata	zebra finch		C		1	0	
birds	Laridae	Thalasseus bengalensis	lesser crested tern		C		1	0	
birds	Laridae	Thalasseus bergii	crested tern		C		13	0	
birds	Threskiornithidae	Threskiornis molucca	Australian white ibis		C		5	0	
birds	Threskiornithidae	Threskiornis spinicollis	straw-necked ibis		C		3	0	
birds	Halcyonidae	Todiramphus chloris	collared kingfisher		C		18	0	
birds	Halcyonidae	Todiramphus macleayii	forest kingfisher		C		19	0	
birds	Halcyonidae	Todiramphus pyrrhopygius	red-backed kingfisher		C		1	0	
birds	Halcyonidae	Todiramphus sanctus	sacred kingfisher		C		2	0	
birds	Rallidae	Tribonyx ventralis	black-tailed native-hen		C		1	0	
birds	Psittacidae	Trichoglossus chlorolepidotus	scaly-breasted lorikeet		C		1	0	
birds	Psittacidae	Trichoglossus haematodus moluccanus	rainbow lorikeet		C		12	0	

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birds	Scolopacidae	Tringa brevipes	grey-tailed tattler		C		5	0	
birds	Scolopacidae	Tringa nebularia	common greenshank		C		7	0	
birds	Scolopacidae	Tringa stagnatilis	marsh sandpiper		C		1	0	
birds	Turnicidae	Turnix maculosus	red-backed button-quail		C		3	0	
birds	Turnicidae	Turnix melanogaster	black-breasted button-quail		V	V	2	0	
birds	Turnicidae	Turnix varius	painted button-quail		C		1	0	
birds	Turnicidae	Turnix velox	little button-quail		C		1	0	
birds	Tytonidae	Tyto javanica	eastern barn owl		C		2	0	
birds	Tytonidae	Tyto novaehollandiae	masked owl		C		2	0	
birds	Charadriidae	Vanellus miles	masked lapwing		C		1	0	
birds	Charadriidae	Vanellus miles miles	masked lapwing (northern subspecies)		C		2	0	
birds	Charadriidae	Vanellus miles novaehollandiae	masked lapwing (southern subspecies)		C		7	0	
birds	Charadriidae	Vanellus tricolor	banded lapwing		C		1	0	
birds	Scolopacidae	Xenus cinereus	terek sandpiper		C		4	0	
birds	Timaliidae	Zosterops lateralis	silvereye		C		1	0	
mammals	Potoroidae	Aepyprymnus rufescens	rufous bettong		C		3	0	
mammals	Dasyuridae	Antechinus flavipes	yellow-footed antechinus		C		1	0	
mammals	Bovidae	Bos taurus	European cattle	Y			1	0	
mammals	Canidae	Canis familiaris	dog	Y			1	0	
mammals	Canidae	Canis lupus dingo	dingo				1	0	
mammals	Molossidae	Chaerephon jobensis	northern freetail bat		C		5	0	
mammals	Vespertilionidae	Chalinolobus gouldii	Gould's wattled bat		C		8	0	
mammals	Vespertilionidae	Chalinolobus morio	chocolate wattled bat		C		4	0	
mammals	Vespertilionidae	Chalinolobus nigrogriseus	hoary wattled bat		C		3	0	

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mammals	Vespertilionidae	Chalinolobus picatus	little pied bat		NT		8	0	
mammals	Dasyuridae	Dasyurus hallucatus	northern quoll		C	E	2	0	
mammals	Dugongidae	Dugong dugon	dugong		V		2	0	
mammals	Equidae	Equus caballus	horse	Y			3	0	
mammals	Felidae	Felis catus	cat	Y			1	0	
mammals	Muridae	Hydromys chrysogaster	water rat		C		1	0	
mammals	Peramelidae	Isoodon macrourus	northern brown bandicoot		C		17	0	
mammals	Vespertilionidae	Kerivoula papuensis	golden-tipped bat		NT		1	1	
mammals	Macropodidae	Lagorchestes conspicillatus	spectacled hare-wallaby		C		1	0	
mammals	Leporidae	Lepus capensis	brown hare	Y			12	0	
mammals	Megadermatidae	Macroderma gigas	ghost bat		V		2	0	
mammals	Macropodidae	Macropus agilis	agile wallaby		C		1	0	
mammals	Macropodidae	Macropus dorsalis	black-striped wallaby		C		2	0	
mammals	Macropodidae	Macropus giganteus	eastern grey kangaroo		C		6	0	
mammals	Macropodidae	Macropus parryi	whiptail wallaby		C		2	0	
mammals	Macropodidae	Macropus robustus	common wallaroo		C		2	0	
mammals	Macropodidae	Macropus rufogriseus	red-necked wallaby		C		1	0	
mammals	Muridae	Melomys burtoni	grassland melomys		C		3	0	
mammals	Muridae	Melomys cervinipes	fawn-footed melomys		C		4	0	
mammals	Vespertilionidae	Miniopterus australis	little bent-wing bat		C		8	0	
mammals	Vespertilionidae	Miniopterus schreibersii oceanensis	eastern bent-wing bat		C		1	0	
mammals	Molossidae	Mormopterus beccarii	Beccari's freetail bat		C		2	0	
mammals	Molossidae	Mormopterus loriae ridei	little north-eastern freetail bat		C		1	0	
mammals	Molossidae	Mormopterus norfolkensis	east coast freetail bat		C		2	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
mammals	Molossidae	Mormopterus planiceps	southern freetail bat		C		2	0	
mammals	Muridae	Mus musculus	house mouse	Y			4	0	
mammals	Vespertilionidae	Nyctophilus bifax	northern long-eared bat		C		2	0	
mammals	Vespertilionidae	Nyctophilus geoffroyi	lesser long-eared bat		C		1	0	
mammals	Vespertilionidae	Nyctophilus gouldi	Gould's long-eared bat		C		3	0	
mammals	Ornithorhynchidae	Ornithorhynchus anatinus	platypus		C		1	0	
mammals	Leporidae	Oryctolagus cuniculus	rabbit	Y			3	0	
mammals	Peramelidae	Perameles nasuta	long-nosed bandicoot		C		1	0	
mammals	Pseudocheiridae	Petauroides volans	greater glider		C		2	0	
mammals	Petauridae	Petaurus australis australis	yellow-bellied glider (southern subspecies)		C		1	0	
mammals	Petauridae	Petaurus breviceps	sugar glider		C		1	0	
mammals	Petauridae	Petaurus norfolcensis	squirrel glider		C		2	0	
mammals	Macropodidae	Petrogale herberti	Herbert's rock-wallaby		C		13	3	
mammals	Macropodidae	Petrogale inornata	unadorned rock-wallaby		C		1	0	
mammals	Phascolarctidae	Phascolarctos cinereus	koala		C		1	0	
mammals	Dasyuridae	Planigale ingrami	long-tailed planigale		C		6	0	
mammals	Dasyuridae	Planigale maculata	common planigale		C		2	0	
mammals	Pseudocheiridae	Pseudocheirus peregrinus	common ringtail possum		C		1	0	
mammals	Muridae	Pseudomys delicatulus	delicate mouse		C		5	0	
mammals	Muridae	Pseudomys gracilicaudatus	eastern chestnut mouse		C		1	0	
mammals	Pteropodidae	Pteropus alecto	black flying-fox		C		2	0	
mammals	Pteropodidae	Pteropus poliocephalus	grey-headed flying-fox		C	V	8	0	
mammals	Pteropodidae	Pteropus scapulatus	little red flying-fox		C		1	0	
mammals	Muridae	Rattus fuscipes	bush rat		C		1	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
mammals	Muridae	Rattus rattus	black rat	Y			3	0	
mammals	Muridae	Rattus tunneyi	pale field-rat		C		2	0	
mammals	Rhinolophidae	Rhinolophus megaphyllus	eastern horseshoe-bat		C		4	0	
mammals	Emballonuridae	Saccolaimus flaviventris	yellow-bellied sheathtail bat		C		2	0	
mammals	Vespertilionidae	Scoteanax rueppellii	greater broad-nosed bat		C		6	0	
mammals	Vespertilionidae	Scotorepens balstoni	inland broad-nosed bat		C		1	0	
mammals	Vespertilionidae	Scotorepens greyii	little broad-nosed bat		C		10	0	
mammals	Vespertilionidae	Scotorepens orion	south-eastern broad-nosed bat		C		10	0	
mammals	Vespertilionidae	Scotorepens sanborni	northern broad-nosed bat		C		1	0	
mammals	Vespertilionidae	Scotorepens sp.					1	0	
mammals	Dasyuridae	Sminthopsis crassicaudata	fat-tailed dunnart		C		1	0	
mammals	Dasyuridae	Sminthopsis macroura	stripe-faced dunnart		C		7	0	
mammals	Dasyuridae	Sminthopsis murina	common dunnart		C		3	0	
mammals	Suidae	Sus scrofa	pig	Y			1	0	
mammals	Tachyglossidae	Tachyglossus aculeatus	short-beaked echidna		C		6	0	
mammals	Molossidae	Tadarida australis	white-striped freetail bat		C		1	0	
mammals	Emballonuridae	Taphozous australis	coastal sheathtail bat		V		3	0	
mammals	Emballonuridae	Taphozous georgianus	common sheathtail bat		C		1	0	
mammals	Emballonuridae	Taphozous sp.					3	0	
mammals	Emballonuridae	Taphozous troughtoni	Troughton's sheathtail bat		C		1	0	
mammals	Macropodidae	Thylogale stigmatica	red-legged pademelon		C		1	0	
mammals	Macropodidae	Thylogale thetis	red-necked pademelon		C		1	0	
mammals	Phalangeridae	Trichosurus vulpecula	common brushtail possum		C		2	0	
mammals	Delphinidae	Tursiops aduncus	Indo-Pacific bottlenose dolphin		C		2	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
mammals	Vespertilionidae	Vespadelus baverstocki	inland forest bat		C		1	0	
mammals	Vespertilionidae	Vespadelus pumilus	eastern forest bat		C		4	0	
mammals	Vespertilionidae	Vespadelus troughtoni	eastern cave bat		C		3	0	
mammals	Vespertilionidae	Vespadelus vulturnus	little forest bat		C		1	0	
mammals	Canidae	Vulpes vulpes	red fox	Y			1	0	
mammals	Macropodidae	Wallabia bicolor	swamp wallaby		C		1	0	
reptiles	Elapidae	Acanthophis antarcticus	common death adder		NT		3	0	
reptiles	Agamidae	Amphibolurus burnsi			C		4	0	
reptiles	Agamidae	Amphibolurus nobbi			C		7	0	
reptiles	Agamidae	Amphibolurus nobbi nobbi	nobbi		C		2	0	
reptiles	Scincidae	Anomalopus brevicollis			C		1	0	
reptiles	Scincidae	Anomalopus verreauxii			C		12	1	
reptiles	Boidae	Antaresia maculosa	spotted python		C		8	0	
reptiles	Boidae	Aspidites melanocephalus	black-headed python		C		7	0	
reptiles	Scincidae	Bellatorias frerei	major skink		C		1	0	
reptiles	Colubridae	Boiga irregularis	brown tree snake		C		1	0	
reptiles	Elapidae	Cacophis harriettae	white-crowned snake		C		1	0	
reptiles	Scincidae	Calyptotis lepidorostrum			C		4	0	
reptiles	Cheloniidae	Caretta caretta	loggerhead turtle		E	E	1	0	
reptiles	Scincidae	Carlia munda			C		4	0	
reptiles	Scincidae	Carlia pectoralis			C		7	0	
reptiles	Scincidae	Carlia schmeltzii			C		2	0	
reptiles	Scincidae	Carlia sp.					2	2	
reptiles	Scincidae	Carlia vivax			C		2	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
reptiles	Chelidae	Chelodina longicollis	eastern snake-necked turtle		C		2	0	
reptiles	Cheloniidae	Chelonia mydas	green turtle		V	V	3	0	
reptiles	Agamidae	Chlamydosaurus kingii	frilled lizard		C		1	0	
reptiles	Crocodylidae	Crocodylus porosus	estuarine crocodile		V		2	0	
reptiles	Scincidae	Cryptoblepharus pannosus	ragged snake-eyed skink		C		1	0	
reptiles	Scincidae	Cryptoblepharus plagiocephalus sensu lato			C		1	1	
reptiles	Scincidae	Cryptoblepharus virgatus	striped snake-eyed skink		C		1	0	
reptiles	Scincidae	Cryptoblepharus virgatus sensu lato			C		6	0	
reptiles	Scincidae	Ctenotus allotropis			C		5	0	
reptiles	Scincidae	Ctenotus leonhardii			C		1	0	
reptiles	Scincidae	Ctenotus robustus			C		6	0	
reptiles	Scincidae	Ctenotus strauchii			C		4	0	
reptiles	Scincidae	Ctenotus taeniolatus	copper-tailed skink		C		9	0	
reptiles	Scincidae	Cyclodomorphus gerrardii	pink-tongued lizard		C		1	0	
reptiles	Elapidae	Demansia psammophis	yellow-faced whip snake		C		17	0	
reptiles	Elapidae	Demansia torquata	collared whip snake		C		2	0	
reptiles	Elapidae	Demansia vestigiata	black whip snake		C		4	0	
reptiles	Colubridae	Dendrelaphis punctulata	common tree snake		C		2	0	
reptiles	Elapidae	Denisonia maculata	ornamental snake		V	V	18	0	
reptiles	Gekkonidae	Diplodactylus conspicillatus	fat-tailed diplodactylus		C		16	0	
reptiles	Gekkonidae	Diplodactylus vittatus	wood gecko		C		4	0	
reptiles	Agamidae	Diporiphora australis			C		24	0	
reptiles	Agamidae	Diporiphora bilineata	two-lined dragon		C		1	0	
reptiles	Scincidae	Egernia rugosa	yakka skink		V	V	2	2	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
reptiles	Scincidae	Egernia striolata	tree skink		C		1	1	
reptiles	Chelidae	Elseya albagula	southern snapping turtle		C		5	0	
reptiles	Chelidae	Emydura macquarii krefftii	Krefft's river turtle		C		5	0	
reptiles	Scincidae	Eremiascincus fasciolatus	narrow-banded sand swimmer		C		1	0	
reptiles	Scincidae	Eulamprus brachysoma			C		9	0	
reptiles	Scincidae	Eulamprus martini			C		1	0	
reptiles	Scincidae	Eulamprus quoyii	eastern water skink		C		9	5	
reptiles	Scincidae	Eulamprus sokosoma			C		1	0	
reptiles	Scincidae	Eulamprus tenuis			C		1	1	
reptiles	Elapidae	Furina diadema	red-naped snake		C		2	0	
reptiles	Elapidae	Furina dunmalli	Dunmall's snake		V	V	1	1	
reptiles	Elapidae	Furina ornata	orange-naped snake		C		1	0	
reptiles	Gekkonidae	Gehyra catenata			C		4	0	
reptiles	Gekkonidae	Gehyra dubia			C		24	0	
reptiles	Gekkonidae	Gehyra variegata	tree dtella		C		1	0	
reptiles	Scincidae	Glaphyromorphus punctulatus			C		1	0	
reptiles	Elapidae	Hemiaspis signata	black-bellied swamp snake		C		1	0	
reptiles	Gekkonidae	Hemidactylus frenatus	house gecko	Y			1	0	
reptiles	Gekkonidae	Heteronotia binoei	Bynoe's gecko		C		23	0	
reptiles	Elapidae	Hoplocephalus bitorquatus	pale-headed snake		C		1	0	
reptiles	Elapidae	Hydrophis elegans			C		1	0	
reptiles	Scincidae	Lampropholis adonis			C		3	0	
reptiles	Scincidae	Lampropholis delicata			C		10	0	
reptiles	Scincidae	Lerista fragilis			C		1	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
reptiles	Scincidae	Lerista punctatovittata			C		1	0	
reptiles	Pygopodidae	Lialis burtonis	Burton's legless lizard		C		13	0	
reptiles	Gekkonidae	Lucasium steindachneri	Steindachner's gecko		C		35	0	
reptiles	Scincidae	Lygisaurus foliorum			C		4	0	
reptiles	Scincidae	Menetia greyii			C		4	0	
reptiles	Scincidae	Menetia timlowi			C		1	0	
reptiles	Boidae	Morelia spilota	carpet python		C		5	0	
reptiles	Scincidae	Morethia boulengeri			C		11	0	
reptiles	Scincidae	Morethia taeniopleura	fire-tailed skink		C		6	0	
reptiles	Gekkonidae	Nephrurus asper	spiny knob-tailed gecko		C		5	0	
reptiles	Gekkonidae	Oedura castelnaui	northern velvet gecko		C		1	0	
reptiles	Gekkonidae	Oedura marmorata	marbled velvet gecko		C		1	0	
reptiles	Gekkonidae	Oedura monilis			C		4	0	
reptiles	Gekkonidae	Oedura rhombifer	zig-zag gecko		C		2	1	
reptiles	Gekkonidae	Oedura robusta	robust velvet gecko		C		1	1	
reptiles	Gekkonidae	Oedura tryoni	southern spotted velvet gecko		C		4	0	
reptiles	Scincidae	Ophioscincus cooloolensis			NT		2	0	
reptiles	Elapidae	Oxyuranus scutellatus	coastal taipan		C		3	0	
reptiles	Pygopodidae	Paradelma orientalis	brigalow scaly-foot		V	V	1	0	
reptiles	Agamidae	Pogona barbata	bearded dragon		C		41	0	
reptiles	Elapidae	Pseudechis australis	king brown snake		C		1	0	
reptiles	Elapidae	Pseudechis porphyriacus	red-bellied black snake		C		2	0	
reptiles	Elapidae	Pseudonaja textilis	eastern brown snake		C		7	0	
reptiles	Pygopodidae	Pygopus nigriceps	hooded scaly-foot		C		1	0	

Class	Family	Scientific Name	Common Name	I	Q	A	Sighting Records	Specimen Records	
reptiles	Pygopodidae	Pygopus schraderi			C		5	0	
reptiles	Typhlopidae	Ramphotyphlops affinis			C		1	0	
reptiles	Typhlopidae	Ramphotyphlops grypus			C		1	0	
reptiles	Typhlopidae	Ramphotyphlops ligatus			C		2	0	
reptiles	Typhlopidae	Ramphotyphlops unguirostris			C		1	0	
reptiles	Typhlopidae	Ramphotyphlops wiedii			C		7	0	
reptiles	Chelidae	Rheodytes leukops	Fitzroy River turtle		V	V	12	4	
reptiles	Elapidae	Rhinoplocephalus boschmai	Carpentaria whip snake		C		9	0	
reptiles	Elapidae	Rhinoplocephalus nigrescens	eastern small-eyed snake		C		2	0	
reptiles	Elapidae	Rhinoplocephalus nigrostriatus	black-striped snake		C		2	0	
reptiles	Elapidae	Simoselaps australis	coral snake		C		1	0	
reptiles	Gekkonidae	Strophurus williamsi	soft-spined gecko		C		22	0	
reptiles	Elapidae	Suta suta	myall snake		C		33	0	
reptiles	Scincidae	Tiliqua scincoides	eastern blue-tongued lizard		C		1	0	
reptiles	Colubridae	Tropidonophis mairii	freshwater snake		C		8	0	
reptiles	Varanidae	Varanus gouldii	sand monitor		C		2	0	
reptiles	Varanidae	Varanus semiremex	rusty monitor		C		1	0	
reptiles	Varanidae	Varanus tristis	black-tailed monitor		C		3	0	
reptiles	Varanidae	Varanus varius	lace monitor		C		5	0	
reptiles	Elapidae	Vermicella annulata	bandy-bandy		C		2	0	

Appendix B EPBC Protected Matters Search Results

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report: Coordinates

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

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

Information 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

Report created: 19/08/11 10:03:51

Coordinates

Buffer: 10.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communitites:	5
Threatened Species:	54
Migratory Species:	31

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.

Commonwealth Lands:	3
Commonwealth Heritage Places:	1
Listed Marine Species:	70
Whales and Other Cetaceans:	11

Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

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

Place on the RNE:	41
State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	15
Nationally Important Wetlands:	2

Details

Matters of National Environmental Significance

World Heritage Properties **[Resource Information]**

Name	Status
Great Barrier Reef QLD	Declared property

National Heritage Places **[Resource Information]**

Name	Status
Natural	
Great Barrier Reef QLD	Listed place

Threatened Ecological Communities **[Resource Information]**

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

Name	Status	Type of Presence
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community likely to occur within area
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Threatened Species **[Resource Information]**

Name	Status	Type of Presence
BIRDS		
Botaurus poiciloptilus		

Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Epthianura crocea macgregori		
Yellow Chat (Dawson) [67090]	Critically Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria		
White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta		
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Neochmia ruficauda ruficauda		
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Poephila cincta cincta		
Black-throated Finch (southern) [64447]	Endangered	Species or species habitat likely to occur within area
Pterodroma neglecta neglecta		
Kermadec Petrel (western) [64450]	Vulnerable	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster		
Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
MAMMALS		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus		
Northern Quoll [331]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Nyctophilus timoriensis (South-eastern form)		
Greater Long-eared Bat, South-eastern Long-eared Bat [66888]	Vulnerable	Species or species habitat may occur within area
Pteropus conspicillatus		
Spectacled Flying-fox [185]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Species or species habitat may occur within area
Xeromys myoides		

Water Mouse, False Water Rat [66]	Vulnerable	Species or species habitat likely to occur within area
OTHER		
Cycas megacarpa [55794]	Endangered	Species or species habitat known to occur within area
Cycas ophiolitica [55797]	Endangered	Species or species habitat known to occur within area
PLANTS		
Atalaya collina [55417]	Endangered	Species or species habitat likely to occur within area
Bosistoa selwynii Heart-leaved Bosistoa [13702]	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa Three-leaved Bosistoa [16091]	Vulnerable	Species or species habitat likely to occur within area
Bulbophyllum globuliforme Miniature Moss-orchid [6649]	Vulnerable	Species or species habitat likely to occur within area
Capparis thozetiana [6021]	Vulnerable	Species or species habitat likely to occur within area
Corymbia xanthope [64021]	Vulnerable	Species or species habitat likely to occur within area
Cossinia australiana Cossinia [3066]	Endangered	Species or species habitat likely to occur within area
Cupaniopsis shirleyana Wedge-leaf Tuckeroo [3205]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium queenslandicum King Blue-grass [5481]	Vulnerable	Species or species habitat likely to occur within area
Digitaria porrecta Finger Panic Grass [12768]	Endangered	Species or species habitat likely to occur within area
Eucalyptus raveretiana Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area
Hakea trineura Three-veined Hakea [15931]	Vulnerable	Species or species habitat likely to occur within area
Leucopogon cuspidatus [9739]	Vulnerable	Species or species habitat likely to occur within area
Marsdenia brevifolia [64585]	Vulnerable	Species or species habitat likely to occur within area
Neoroepera buxifolia		

[13375]	Vulnerable	Species or species habitat likely to occur within area
Parsonsia larcomensis [64587]	Vulnerable	Species or species habitat likely to occur within area
Pimelea leptospermoides [20849]	Vulnerable	Species or species habitat likely to occur within area
Pultenaea setulosa [2705]	Vulnerable	Species or species habitat likely to occur within area
Quassia bidwillii Quassia [10094]	Vulnerable	Species or species habitat likely to occur within area
Taeniophyllum muelleri Minute Orchid, Ribbon-root Orchid [10771]	Vulnerable	Species or species habitat may occur within area
REPTILES		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Delma torquata Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat known to occur within area
Lerista allanae Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area
Paradelma orientalis Brigalow Scaly-foot [59134]	Vulnerable	Species or species habitat known to occur within area
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle [1761]	Vulnerable	Species or species habitat may occur within area
SHARKS		
Pristis zijsron Green Sawfish, Dindagubba,	Vulnerable	Species or species habitat may occur within area

Narrowsnout Sawfish [68442]		
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Species		**[Resource Information]**
Name	Status	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Breeding likely to occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Lamna nasus		
Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area
Orcaella brevirostris		
Irrawaddy Dolphin [45]		Species or species habitat may occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area

Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Breeding may occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Breeding likely to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Breeding may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Breeding likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Nettapus coromandelianus albipennis		
Australian Cotton Pygmy-goose [25979]		Species or species habitat may occur within area
Rostratula benghalensis s. lat.		
Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Defence - LOGISTIC SUPPORT DEPOT - ROCKHAMPTON
Defence - ROCKHAMPTON TRAINING DEPOT
Defence - ROCKHAMPTON AIRFIELD

Commonwealth Heritage Places [Resource Information]

Name	Status
Historic	
ABC Radio Studios QLD	Listed place

Listed Marine Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		

Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Breeding likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Breeding may occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Breeding likely to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Nettapus coromandelianus albipennis		
Australian Cotton Pygmy-goose [25979]		Species or species habitat may occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Breeding may occur within area
Rostratula benghalensis s. lat.		
Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Fish		
Acentronura tentaculata		
Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni		
Tryon's Pipefish [66193]		Species or species habitat may occur within area
Choeroichthys brachysoma		
Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Corythoichthys amplexus		
Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus		
Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus		

Reef-top Pipefish [66201] Corythoichthys intestinalis	Species or species habitat may occur within area
Australian Messmate Pipefish, Banded Pipefish [66202] Corythoichthys ocellatus	Species or species habitat may occur within area
Orange-spotted Pipefish, Ocellated Pipefish [66203] Corythoichthys paxtoni	Species or species habitat may occur within area
Paxton's Pipefish [66204] Corythoichthys schultzi	Species or species habitat may occur within area
Schultz's Pipefish [66205] Doryrhamphus excisus	Species or species habitat may occur within area
Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211] Festucalex cinctus	Species or species habitat may occur within area
Girdled Pipefish [66214] Filicampus tigris	Species or species habitat may occur within area
Tiger Pipefish [66217] Halicampus dunckeri	Species or species habitat may occur within area
Red-hair Pipefish, Duncker's Pipefish [66220] Halicampus grayi	Species or species habitat may occur within area
Mud Pipefish, Gray's Pipefish [66221] Halicampus nitidus	Species or species habitat may occur within area
Glittering Pipefish [66224] Halicampus spinirostris	Species or species habitat may occur within area
Spiny-snout Pipefish [66225] Hippichthys cyanospilos	Species or species habitat may occur within area
Blue-speckled Pipefish, Blue-spotted Pipefish [66228] Hippichthys heptagonus	Species or species habitat may occur within area
Madura Pipefish, Reticulated Freshwater Pipefish [66229] Hippichthys penicillus	Species or species habitat may occur within area
Beady Pipefish, Steep-nosed Pipefish [66231] Hippocampus bargibanti	Species or species habitat may occur within area
Pygmy Seahorse [66721] Hippocampus kuda	Species or species habitat may occur within area
Spotted Seahorse, Yellow Seahorse [66237] Hippocampus planifrons	Species or species habitat may occur within area
Flat-face Seahorse [66238] Hippocampus zebra	Species or species habitat may occur within area
Zebra Seahorse [66241] Lissocampus runa	Species or species habitat may occur within area
Javelin Pipefish [66251] Micrognathus andersonii	Species or species habitat may occur within area
Anderson's Pipefish, Shortnose Pipefish [66253] Micrognathus brevirostris	Species or species habitat may occur within area

thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Nannocampus pictus		
Painted Pipefish, Reef Pipefish [66263]		Species or species habitat may occur within area
Solegnathus hardwickii		
Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solenostomus cyanopterus		
Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius		
Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus		
Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Syngnathoides biaculeatus		
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus		
Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii		
Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii		
Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii		
Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis		
Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii		
Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Disteira kingii		
Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major		
Olive-headed Seasnake [1124]		Species or species habitat may occur within area

Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Laticauda colubrina a sea krait [1092]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and Other Cetaceans **[Resource Information]**

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE **[Resource Information]**

Note that not all Indigenous sites may be listed.

Name	Status
Natural	
Capricornia Serpentinite Landscape QLD	Indicative Place
Mount Larcom Range QLD	Indicative Place
Balaclava Island and The Narrows QLD	Registered
Great Barrier Reef Region QLD	Registered
Old Lakes Creek Quarry QLD	Registered
Historic	
Clancholla QLD	Indicative Place
Rockhampton Railway - City Section QLD	Indicative Place
Rudd Residence QLD	Indicative Place
ABC Radio Studios QLD	Registered
Alexandra Bridge QLD	Registered
Anula QLD	Registered
Archer Park Railway Station (former) QLD	Registered
Brahman House QLD	Registered
Bulletin Building QLD	Registered
Gracemere Homestead QLD	Registered
Harbour Board Building (former) QLD	Registered
House QLD	Registered
Mater Misericordiae Hospital QLD	Registered
Normanby Hotel (former) QLD	Registered
Old School of Arts QLD	Registered
Our Lady of Good Counsel Convent (former), Hall and Tower QLD	Registered
Quay Street Streetscape QLD	Registered
Railway Roundhouse QLD	Registered
Rockhampton Botanic Gardens QLD	Registered
Rockhampton Court House Precinct QLD	Registered
Rockhampton Customs House (former) QLD	Registered
Rockhampton Post Office QLD	Registered
Rockhampton Technical College QLD	Registered
Rockhampton Town Hall QLD	Registered
Rockhampton War Memorial and Surrounds QLD	Registered
Schotia Place QLD	Registered
Shandon QLD	Registered
St Christophers Chapel QLD	Registered
St Josephs Catholic Cathedral QLD	Registered
St Pauls Anglican Cathedral QLD	Registered
St Pauls Anglican Cathedral Offices QLD	Registered
St Peters Catholic Church QLD	Registered
T and G Building QLD	Registered
The Supreme Court QLD	Registered
Tobruk House QLD	Registered
Wisemans Cottage QLD	Registered
State and Territory Reserves	**[Resource Information]**
Pindari, QLD	
Junee, QLD	
Coolibah, QLD	
Fitzroy River, QLD	

Newlands, QLD

Invasive Species **[Resource Information]**

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

Name	Status	Type of Presence
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed,		Species or species habitat likely to occur within area

Carrot Grass, False Ragweed [19566]	
Prosopis spp.	
Mesquite, Algaroba [68407]	Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtjji	
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]	Species or species habitat likely to occur within area
Salvinia molesta	
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]	Species or species habitat likely to occur within area

Nationally Important Wetlands **[Resource Information]**

Fitzroy River Floodplain, QLD
Fitzroy River Delta, QLD

Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

The following groups have been mapped, but may not cover the complete distribution of the species:
- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

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

Coordinates

-21.23275 147.9883,-21.74457 148.09196,-21.93568 148.30918,-22.5088 148.3091,-23.15655 150.117,-23.8653 151.041

Acknowledgements

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

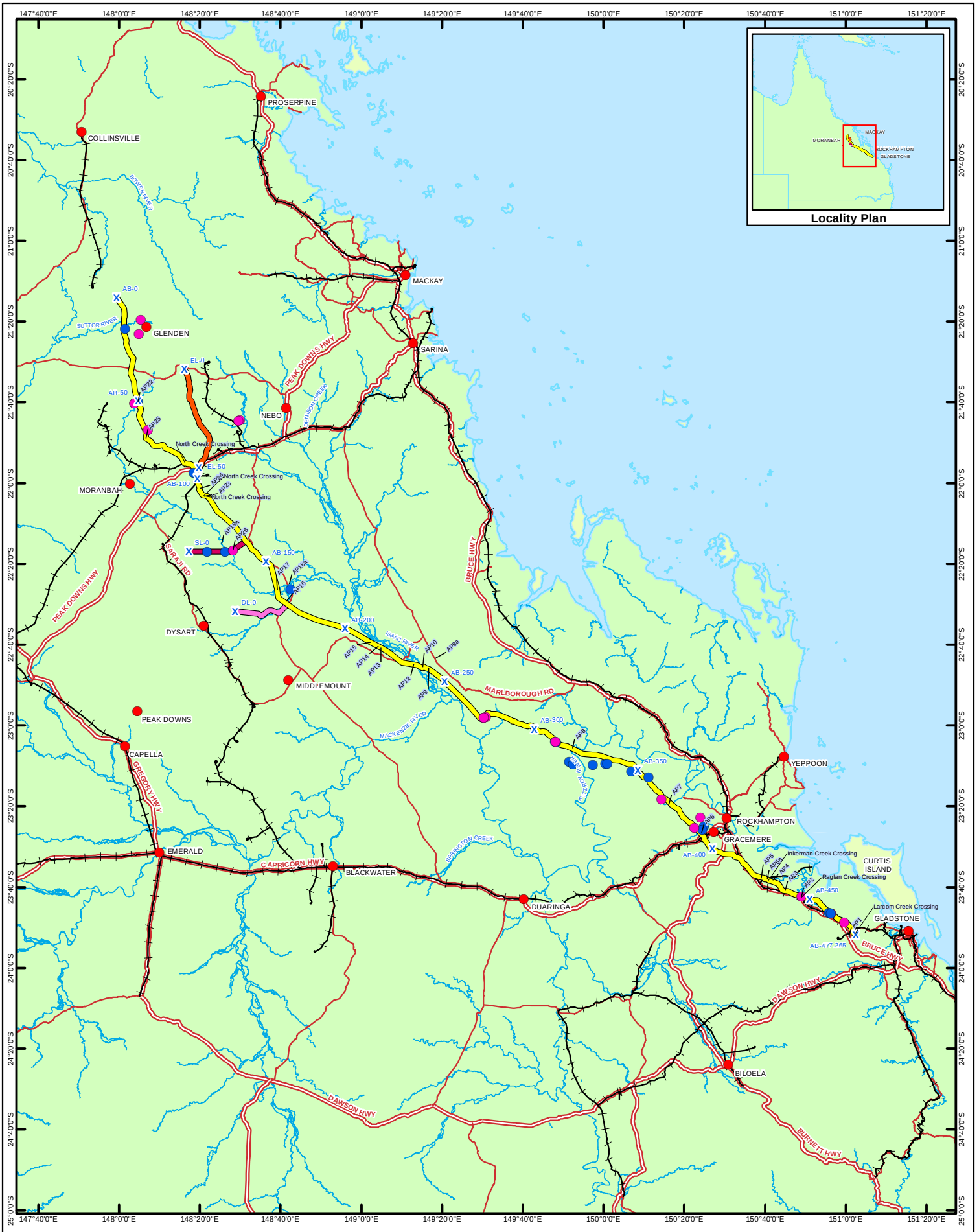
-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT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

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

Please feel free to provide feedback via the Contact Us page.

Appendix C Survey Site Locations

ARROW BOWEN PIPELINE PRELIMINARY ROUTE (REV D)



Appendix C - Survey Site Locations

Legend

Fauna Survey Sites
- Spring Fauna Survey Sites
- Winter Fauna Survey Sites
- Kilometre Posts
- Localities

- Highways
- Major Roads
- Railways
- Major Watercourses

- ABP Mainline Rev D
- Dysart Lateral Rev D
- Elphinstone Lateral Rev D
- Saraji Lateral Rev D

Data Sources:
StreetPro: Localities, Roads, Railways
DERM: Major Watercourses
Data Supplied by Arrow Energy:
ABP Mainline RevD,
ABP Lateral RevD
Kilometre Posts
Data Digitised by SKM: Aquatic Sites
Data Supplied by AECOM: AECOM Watercourse Survey Points

N

arrow energy go further

0 25 50
Kilometres

Scale: 1:2,250,000 @ A4
Coordinate System: GCS GDA 1994

Document: I:\ENVR\Projects\EN02962\Spatial\ArcGIS\V3\Appendix_C_ECOSM_Survey_Site_Location_A4.mxd Date: 24/10/2011

NOT FOR CONSTRUCTION

Appendix D Survey Site Location Photographic Plates

AB 1.7

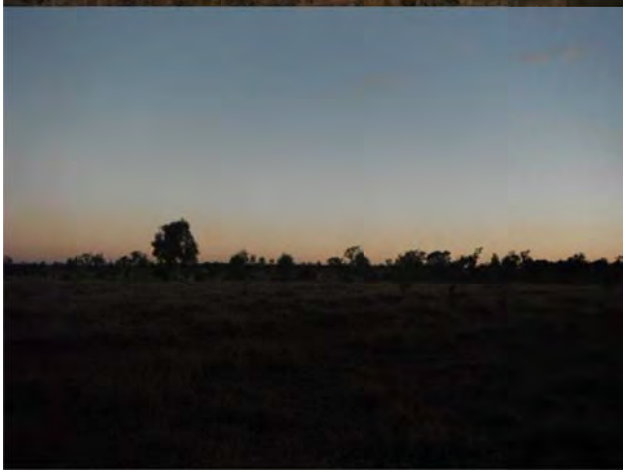
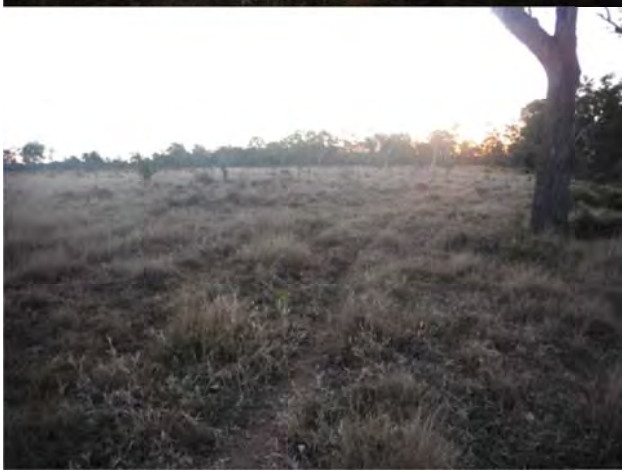



AB 4.8




AB 12.6



AB 23 400m East




AB 25.8




AB 50.5




AB 54.6




AB 58.5




AB 59.4




AB 63.3




AB 64.2




AB 71

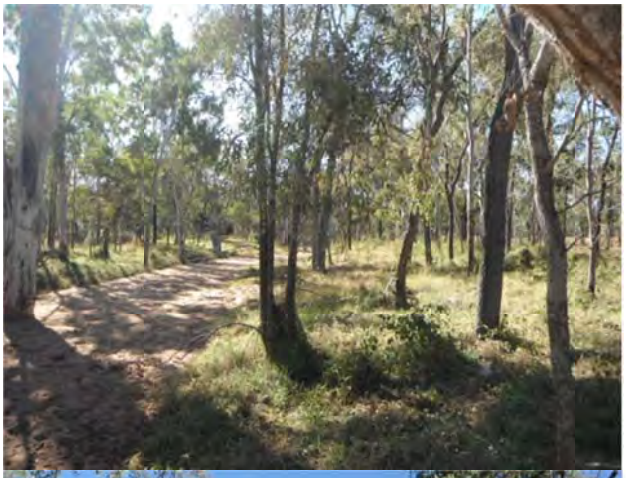



AB 73.5




AB 75.6 150m North


AB 97



AB 145.5

AB 165.2

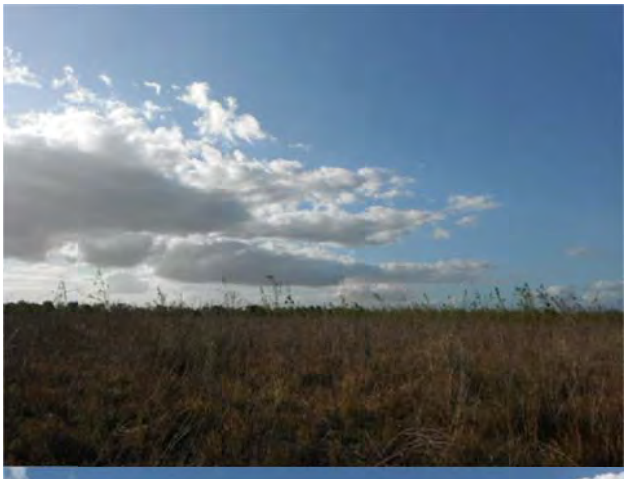
AB165.7 150m East

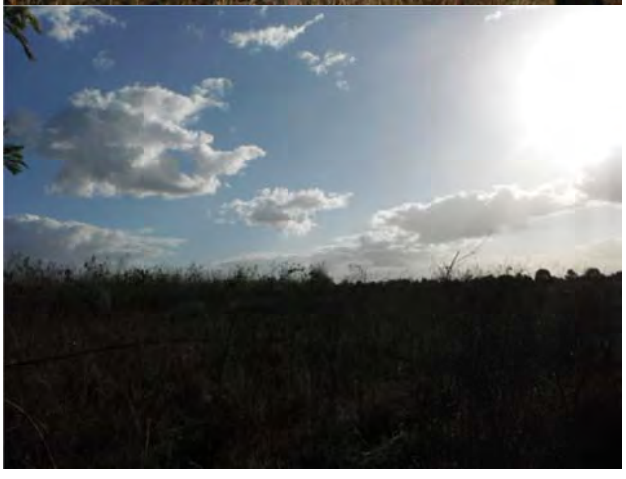
AB 165.5

AB 166.2




AB 217.1



AB 233 1km North




AB 234.1




AB 236.8

AB238.2

AB 239.7

AB 240.2

AB 245




AB 275.6



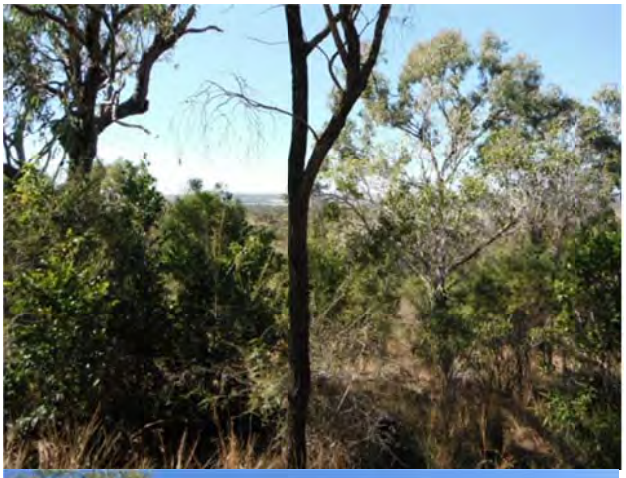

AB 276

AB 279

AB 308

AB 277.8

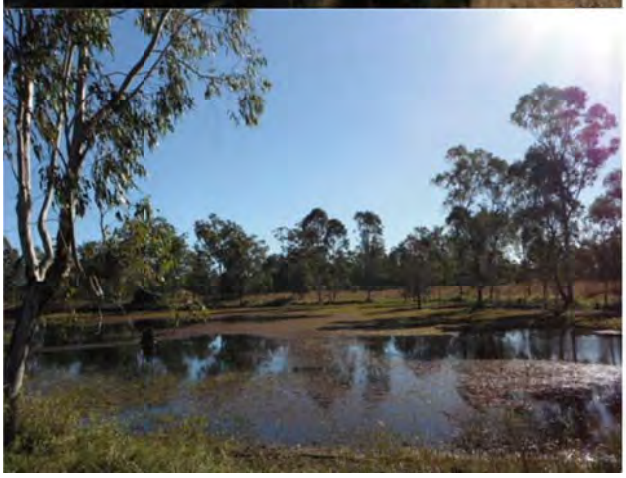
AB 280.5

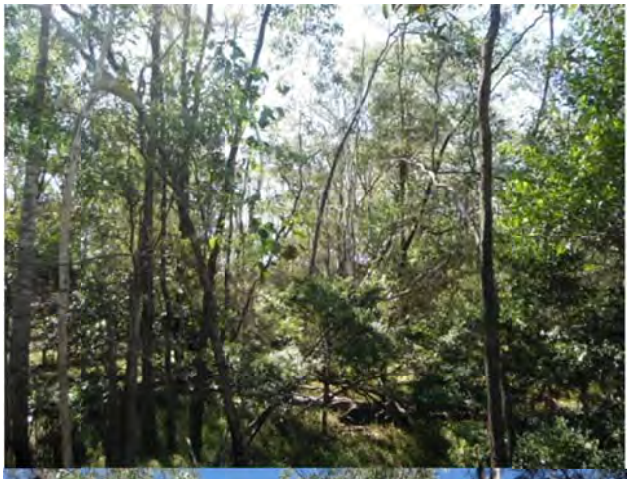
AB 303.5




AB 311.5



AB 312.5



AB 318

AB332

AB 319.5




AB 319.5 1km Upstream




AB 322




AB 322 150m West




AB 446




AB 458.6




AB 460




AB 460.5 5 km South-West




AB 461




AB 465 100m North




AB 469

SL 0.5




SL 6.5

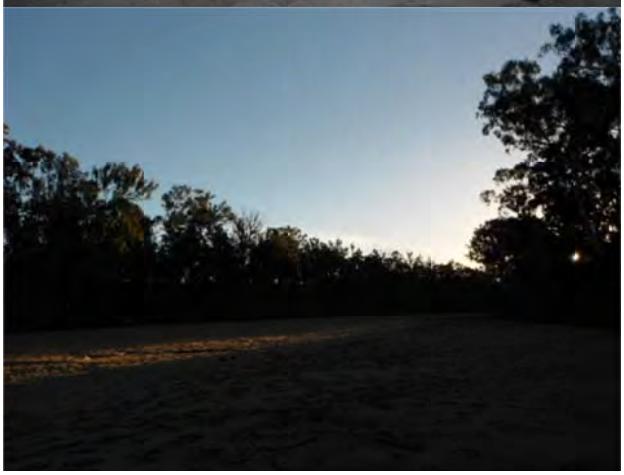



SL 19

SL 19 Alternative Crossing

AB 19 White-bellied Sea-eagle

SL 19 700M West



EL 2.7




EL 8.3




EL 11.8




EL 19.5




EL 19.5 1km West



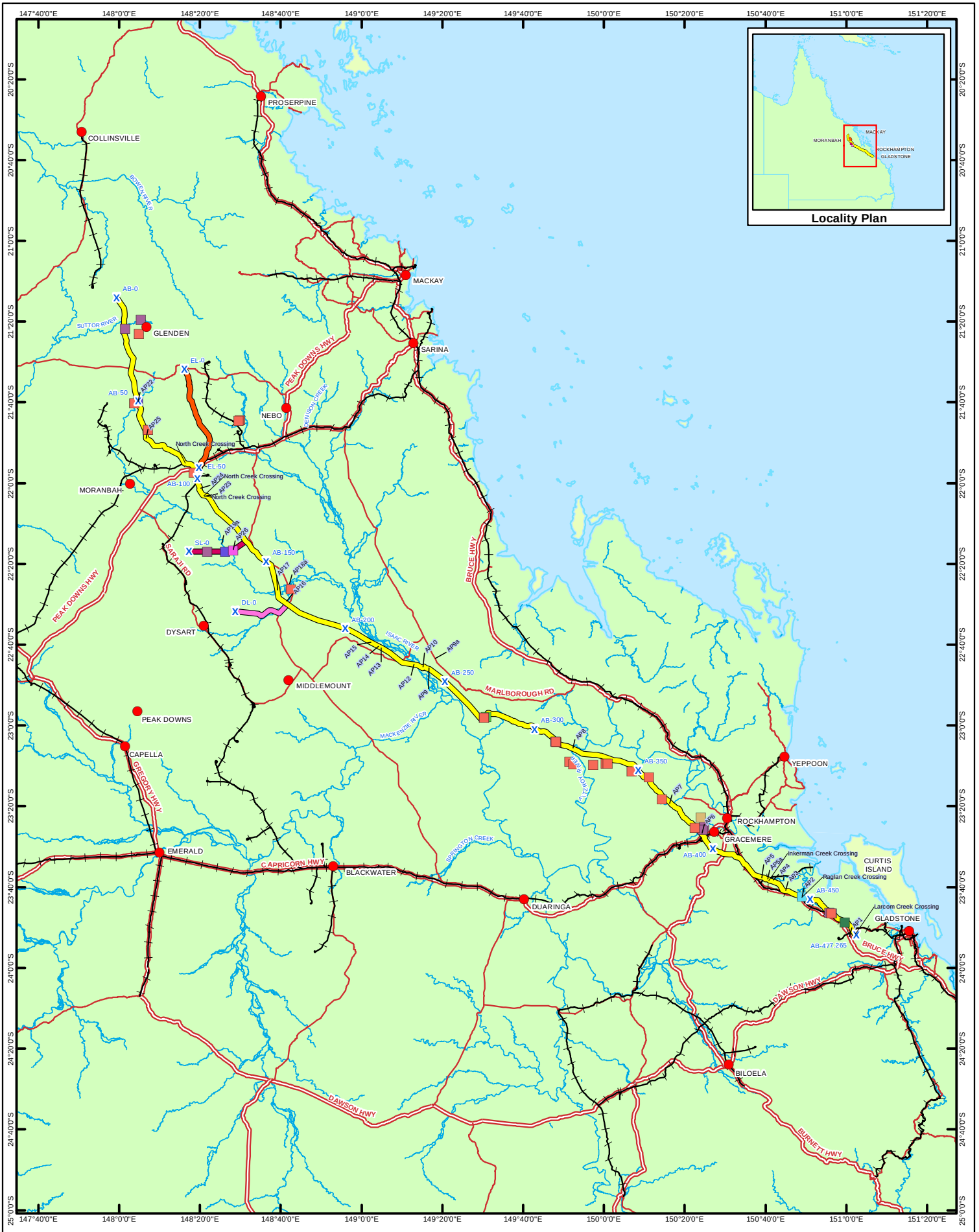

EL 48




EL 50

Appendix E Significant Species Locations

ARROW BOWEN PIPELINE PRELIMINARY ROUTE (REV D)



Appendix E - Significant Species Locations

Legend

Fauna Survey Sites
- Cotton Pygmy Goose
- Grey Goshawk
- Grey Headed Flying Fox
- Grey Snake
- Little Pied Bat
- Powerful Owl
- Squatter Pigeon
- White-bellied Sea-eagle Nest

- Kilometre Posts
- Localities
- Highways
- Major Roads
- Railways
- Major Watercourses
- ABP Mainline Rev D
- Dysart Lateral Rev D
- Elphinstone Lateral Rev D
- Saraji Lateral Rev D

Data Sources:
StreetPro: Localities, Roads, Railways
DERM: Major Watercourses
Data Supplied by Arrow Energy:
ABP Mainline RevD,
ABP Lateral RevD
Kilometre Posts
Data Digitised by SKM: Aquatic Sites
Data Supplied by AECOM: AECOM
Watercourse Survey Points

N

arrow energy go further

0 25 50
Kilometres

Scale: 1:2,250,000 @ A4
Coordinate System: GCS GDA 1994

Document: I:\ENVR\Projects\EN02963\Spatial\ArcGIS\V3\Appendix_E_ECOSM_Significant_Species_Location_A4L.mxd Date: 25/10/2011

NOT FOR CONSTRUCTION

Appendix F Anabat Results, Winter 2011

Anabat Data Analysis Summary

Client: Ecological Survey & Management **Contact**: Steve Marston **Job no.:** ESM-1103
Survey Location & Period: Arrow Pipeline, June 2011

Species ID summary:

Numbers in columns refer to number of calls attributed to a species for a given night/site. Please note that these ***numbers do not imply relative abundance*** of the various species recorded. They may, however, be construed to represent relative differences in activity levels between the species.

Site:	166.2	311.5	38	456	456.7	50.5	DL18.3	EL 0-12	EL 19.5	EL 2.7	EL 48	SL 16.5	SL 19
Species positively identified													
Chalinolobus gouldii	7	10	5	1	3	250	120	4	6	24	23		139
Chalinolobus picatus		2				1						1	
Nyctophilus sp					1	2							
Scotorepens balstoni						37		1					2
Miniopterus australis		17			1								
Miniopterus orianae oceanensis					2	1							
Austronomus australis		9		1	1							1	
Chaerephon jobensis	10	64			6	7	15	1	2	8	3	1	5
Mormopterus beccarii	4					4			1	3			2
Saccolaimus flaviventris		36			2		1	26	1	59	1	1	4
Calls NOT positively identified *													
C. gouldii or Mormopterus ridei		11	5	1		10	1		2	9	46	2	4
Scotorepens greyii or S. sanborni or Chalinolobus nigrogriseus	18	51				57	2			1	2	3	1
S. greyii or S. sanborni or C. picatus		13				21			1	6	1		1
Mormopterus eleryii	**?**	**?**				**?**	**?**		**?**	**?**	**?**	**?**	**?**
S. flaviventris or C. jobensis		6					2			32	3		
S. flaviventris or Taphozous troughtoni or M. beccarii										1		3	4
Unidentified bat calls		2	2			3				4	2	2	

* Species listed in this section but not in the top half of the table should be shown as 'probable occurrence' in all reports based on this analysis. See the "notes" section, below, for an explanation of call identity issues and discussion of likelihood of species presence for those without positive call identification.

Prepared by Greg Ford
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PO Box 1744, Toowoomba Qld 4350

Client: Ecological Survey & Management **Contact**: Steve Marston **Job no.:** ESM-1103

Survey Location & Period: Arrow Pipeline, June 2011

Species nomenclature:

Species names used in this summary follow Churchill (2008), ecept for *Mormopterus eleryi* (after Reardon *et al* 2008).

Call identification & reporting standard:

Call identification for this data set was based on call descriptions and keys presented in Reinhold *et al.* (2001) and/or Pennay *et al.* (2004) as well as reference calls collected in eastern Queensland.

Species' identification was further refined by considering probability of occurrence based on distributional information presented in Churchill (2008) and van Dyck & Strahan (2008).

The format and content of this report complies with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon 2003); latest version available from the Australasian Bat Society on-line at http://www.ausbats.org.au/.

Notes - species/calls not reliably identified

***Nyctophilus* species**

The long-eared bats have distinctive calls that are unlike most other bat calls; however, the species within the genus cannot be differentiated. The few *Nyctophilus* calls recorded in this survey may have come from *N. geoffroyi* and/or *N. gouldi* .

Chalinolobus gouldii* or *Mormopterus ridei

C. gouldii calls generally have steep, high band-width, curved pulses with almost flat base and which alternate in frequency. *M. ridei* calls at the same frequency usually have flat to gently-curved, low band-width pulses at uniform frequency. In some circumstances, however, both produce calls with intermediate features (i.e. no alternation and uniform or variable curves of varying band-width). Numerous calls were positively attributable to *C. gouldii* , but none could be positively identified as *M. ridei.* A large number of 29-31kHz calls, mostly with less than 5 clear pulses, had intermediate characteristics and could not be reliably attributed to either species.

***Scotorepens greyii* or *S. sanborni* or *Chalinolobus nigrogriseus* (Characteristic frequency 37-39kHz)**

Calls from these species are often indistinguishable and all three probably occur in the study area. Pulse characteristics were frequently inconsistent within calls and spanned the range of characteristics described for each species (Reinhold *et al.* 2001). As such it was not possible to reliably attribute any calls to one or other of these species.

***Scotorepens* spp. or *C. picatus* (Characteristic frequency 39-42kHz)**

S. greyii and *S. sanborni* calls also overlap in frequency and can be confused with those of *C. picatus* . *C. picatus* calls (39-44kHz) often have alternating pulse frequency (*cf.* uniform frequency on the *Scotorepens* spp.); and a few such calls were positively attributed to *C. picatus* for this survey. Many calls, however, had inconsistent evidence of uniformity or alternation and could have been from any of these species.

Mormopterus eleryi

The distributional range of this species is not fully understood, but it potentially includes the current study area. The species' calls are also poorly known, but currently available evidence suggests they are very similar to those of *Scotorepens greyii* and *S. sanborni* (Reardon *et al.* 2008). As such, it is possible that some of the calls attributed to the two groups described above may have been from *M. eleryi* .

Saccolaimus flaviventris* or *Chaerephon jobensis

C. jobensis is generally easy to distinguish from *S. flaviventris* by its lower frequency (15-17kHz) and flatter pulse shapes; and where calls overlap in frequency (>17kHz), *C. jobensis* pulses are mostly steeper and exhibit erratic changes in pulse shape. Numerous calls were positively attributed to each species, but a number calls in the frequency overlap zone lacked definitive characteristics and could not be differentiated.

S. flaviventris or Taphozous troughtoni or M. beccarii

These species' calls overlap around 21-23kHz and brief or poorly-recorded calls can be difficult to differentiate. A number of calls were positively identified based on frequencies outside the overlap range - *S. flaviventris* (<21kHz) and *M. beccarii* (>24kHz). Several calls around 22kHz, however, had a mix of flat and curved pulses and species identity was not clear. These may have been from either of the identified species, but could also have been from *T. troughtoni* .

Unidentified bat calls

These are calls that were too brief and/or weak and/or noisy to be reliably identified. All were within the ranges of species otherwise listed and do not represent additional species.

References:

Churchill, S. (2008). *Australian Bats* . Jacana Books, Allen & Unwin; Sydney.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales.* Department of Environment and Conservation, Hurstville.

Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.

Reardon, T., Adams, M., McKenzie, N. and Jenkins, P. (2008). A new species of Australian freetail bat *Mormopterus eleryi* sp. nov. (Chiroptera: Molossidae) and a taxonomic reappraisal of *M. norfolkensis* (Gray). *Zootaxa* **1875:** 1-31.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales.* Department of Natural Resources and Mines, Brisbane.

van Dyck, S. and Strahan, R. (ed.) (2008). *The Mammals of Australia* (Third Edition); New Holland; Sydney.

Anabat Data Analysis Summary

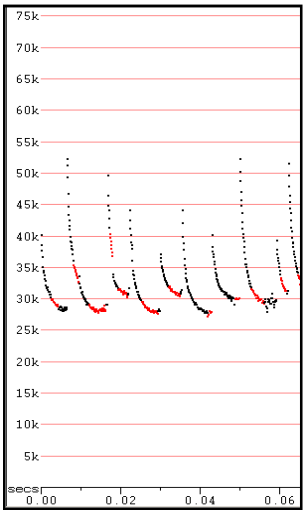
Client: Ecological Survey & Management **Contact**: Steve Marston **Job no.:** ESM-1103

Survey Location & Period: Arrow Pipeline, June 2011

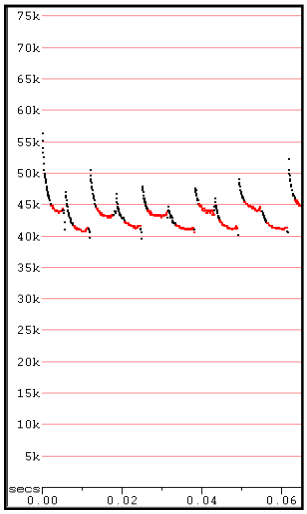
Sample calls extracted from the survey data

Scale: 10 msec per tick; time between pulses removed (*AnalookW* F7 compressed mode)

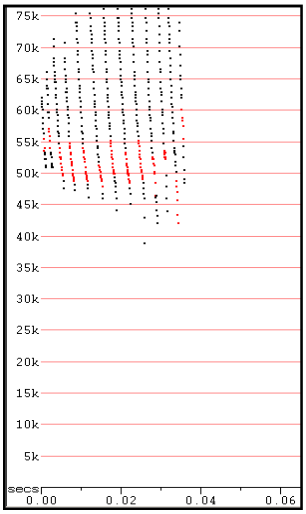
Species positively identified



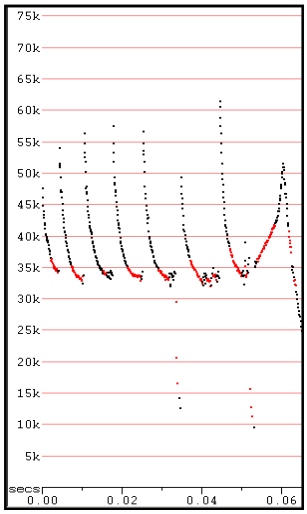
Chalinolobus gouldii



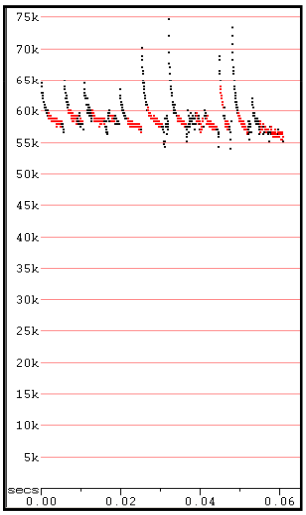
Chalinolobus picatus



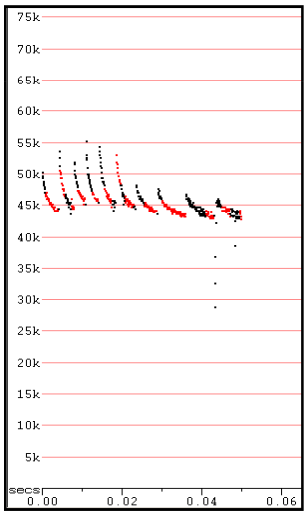
Nyctophilus sp



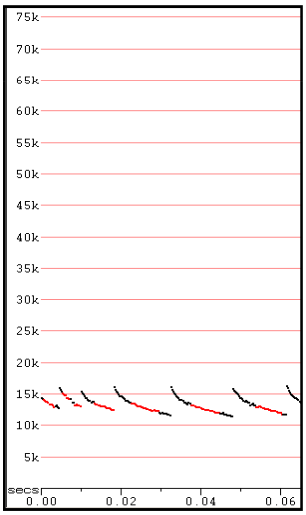
Scotorepens balstoni



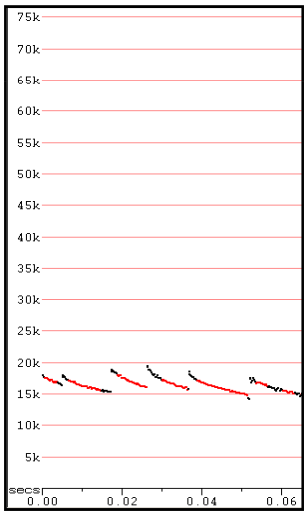
Miniopterus australis



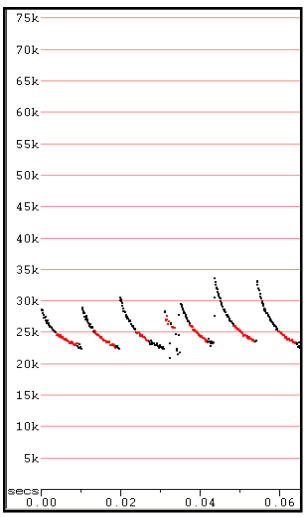
Miniopterus o. oceanensis



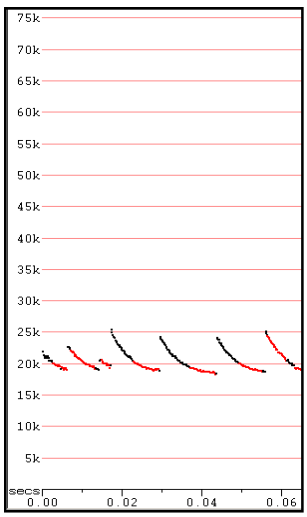
Austronomus australis



Chaerephon jobensis



Mormopterus beccarii



Saccolaimus flaviventris

Anabat Data Analysis Summary

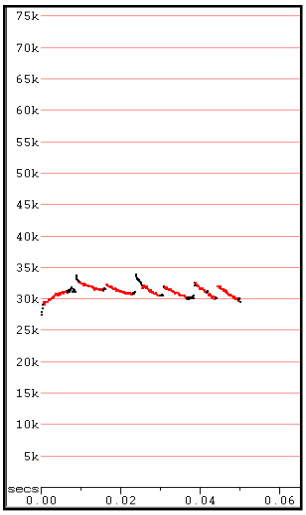
Client: Ecological Survey & Management **Contact**: Steve Marston **Job no.:** ESM-1103

Survey Location & Period: Arrow Pipeline, June 2011

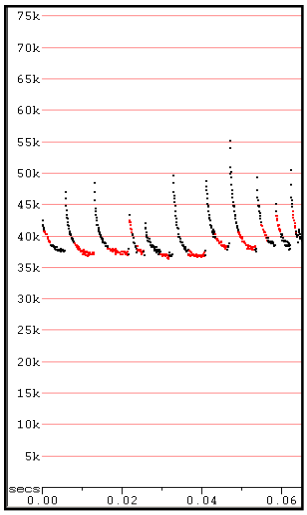
Sample calls extracted from the survey data

Scale: 10 msec per tick; time between pulses removed (*AnalookW* F7 compressed mode)

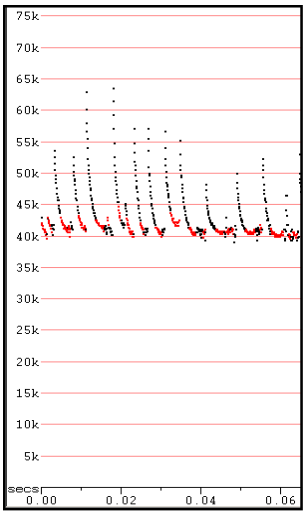
Calls NOT positively identified



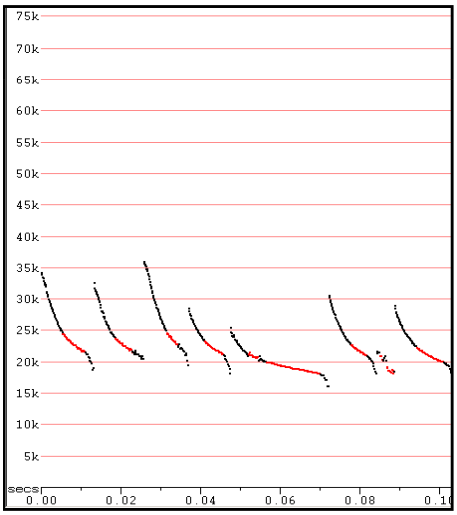
C. gouldii or *M. ridei*



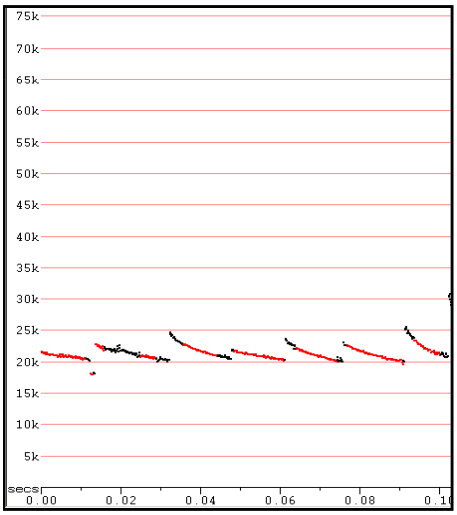
Scot. sp or *C. nigrogriseus*



Scot. spp or *C. picatus*



S. flaviventris or *C. jobensis*



S. flaviventris or *T. troughtoni* or *M. beccarii*

Appendix G Anabat Results, Spring 2011

Anabat Data Analysis Summary

Client: Ecological Survey & Management **Contact**: Ben Nottidge/Steve Marston **Job no.:** ESM-1104

Survey Location & Period: Arrow Pipeline Surveys, September 2011

Call ID summary - TEAM 1

Numbers in columns refer to number of calls attributed to a species for a given night/site. Please note that these ***numbers do not imply relative abundance*** of the various species recorded. They may, however, be construed to represent relative differences in activity levels between the species.

Date	6-Sep	7-Sep	8-Sep	9-Sep	12-Sep	13-Sep	14-Sep	15-Sep
Location	AB 469	AB 465	AB 439	AB 462	AB 391	AB 420	AB 382	AB 400
Species positively identified								
Chalinolobus gouldii	63	3	6		2	9	12	
Chalinolobus morio		4				2		
Chalinolobus nigrogriseus	1		1	4		7		
Chalinolobus picatus				4				
Nyctophilus species			711	10	49	2		
Scotorepens greyii/S. sanborni	2			2			16	
Miniopterus asutralis	602	4	6		45	126	34	1
Miniopterus orianae oceanensis		13	31	1	6	7	8	1
Austronomus australis	1	1						
Chaerephon jobensis	19	12	66	1	1	13	5	
Mormopterus ridei			14					
Saccolaimus flaviventris			13		1	4	3	2
Calls NOT positively identified								
C. gouldii or S. balstoni	4		3			11	31	
C. gouldii or M. ridei	15	8	91		6	15		
C. morio or V. troughtoni			10		3	2		
Scotorepens spp or C. nigrogriseus		1	14	41	19	7	66	20
S. spp or C. nigrogriseus or C. picatus	303	1	2		3	1	6	1
V. troughtonii or M. o. oceanensis			47			3		
S. flaviventris or C. jobensis		1	18				1	
S. flaviventris or M. beccarii			19		2	2	4	1
Unidentified bat calls	2163	5	83	25	45	52	30	18

* Species listed in this section but not in the top half of the table should be shown as 'probable occurrence' in all reports based on this analysis. See the "notes" section, below, for an explanation of call identity issues and discussion of likelihood of species presence for those without positive call identification.

Prepared by Greg Ford

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Anabat Data Analysis Summary

Client: Ecological Survey & Management **Contact**: Ben Nottidge/Steve Marston **Job no.:** ESM-1104

Survey Location & Period: Arrow Pipeline Surveys, September 2011

Call ID summary - TEAM 2

Numbers in columns refer to number of calls attributed to a species for a given night/site. Please note that these ***numbers do not imply relative abundance*** of the various species recorded. They may, however, be construed to represent relative differences in activity levels between the species.

Date	7-Sep	8-Sep	9-Sep	11-Sep	12-Sep	13-Sep	15-Sep	16-Sep
Location	AB303	AB308.2	AB303	AB234	AB233.8	AB275.6	AB274.7	AB279
Species positively identified								
Chalinolobus gouldii	19	15	4	21	254	4	348	4
Chalinolobus morio				1	23		4	
Chalinolobus nigrogriseus	8	1				41	16	
Chalinolobus picatus							5	
Scotorepens greyii/S. sanborni							1	
Miniopterus australis	2	1	1			1	14	
Miniopterus orianae oceanensis	13	2	1			1	1	
Austronomus australis	5	1			2	5	2	1
Chaerephon jobensis	142	188	14	15	46		4	3
Mormopterus beccarii				2		1	1	1
Mormopterus ridei	1	26		11	1			
Saccolaimus flaviventris	59	49	1	18	3	1	57	1
Calls NOT positively identified								
C. gouldii or S. balstoni	2	2			20	11	28	
C. gouldii or M. ridei	17	19	12	44	95		12	
C. morio or V. troughtoni				1			7	
Scotorepens spp or C. nigrogriseus	63	20	7	14	6	57	146	14
S. flaviventris or C. jobensis		26		1			2	
S. flaviventris or M. beccarii		5					1	
Unidentified bat calls	87	64	9	74	22	33	33	

* Species listed in this section but not in the top half of the table should be shown as 'probable occurrence' in all reports based on this analysis. See the "notes" section, below, for an explanation of call identity issues and discussion of likelihood of species presence for those without positive call identification.

Anabat Data Analysis Summary

Client: Ecological Survey & Management **Contact**: Ben Nottidge/Steve Marston **Job no.:** ESM-1104

Survey Location & Period: Arrow Pipeline Surveys, September 2011

Call ID summary - TEAM 3

Numbers in columns refer to number of calls attributed to a species for a given night/site. Please note that these ***numbers do not imply relative abundance*** of the various species recorded. They may, however, be construed to represent relative differences in activity levels between the species.

Date	7-Sep	8-Sep	9-Sep
Location	AB25.5	AB25.5	AB75.6
Species positively identified			
Chalinolobus gouldii	15	88	
Chalinolobus morio	2	5	
Chalinolobus nigrogriseus		1	
Nyctophilus species	2		
Miniopterus australis	1	6	
Chaerephon jobensis	2		
Mormopterus beccarii	1		
Saccolaimus flaviventris	78	43	1
Calls NOT positively identified			
C. gouldii or S. balstoni		7	
C. gouldii or M. ridei	1	151	
C. morio or V. troughtoni	6		
S. spp or C. nigrogriseus or C. picatus	2	15	
Unidentified calls	2	10	

* Species listed in this section but not in the top half of the table should be shown as 'probable occurrence' in all reports based on this analysis. See the "notes" section, below, for an explanation of call identity issues and discussion of likelihood of species presence for those without positive call identification.

Prepared by Greg Ford

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PO Box 1744, Toowoomba Qld 4350

Anabat Data Analysis Summary

Client: Ecological Survey & Management **Contact**: Ben Nottidge/Steve Marston **Job no.:** ESM-1104

Survey Location & Period: Arrow Pipeline Surveys, September 2011

Species nomenclature:

Species names used in this summary follow Churchill (2008), ecept for *Mormopterus eleryi* (after Reardon *et al* 2008).

Call identification & reporting standard:

Call identification for this data set was based on call descriptions and keys presented in Reinhold *et al.* (2001) and/or Pennay *et al.* (2004) as well as reference calls collected in eastern Queensland.

Species' identification was further refined by considering probability of occurrence based on distributional information presented in Churchill (2008) and van Dyck & Strahan (2008).

The format and content of this report complies with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon 2003); latest version available from the Australasian Bat Society on-line at http://www.ausbats.org.au/.

Notes - species/calls not reliably identified

***Nyctophilus* species**

The long-eared bats have distinctive calls that are unlike most other bat calls; however, the species within the genus cannot be differentiated. The few *Nyctophilus* calls recorded in this survey may have come from *N. geoffroyi* and/or *N. gouldi*.

Chalinolobus gouldii* or *Mormopterus ridei

C. gouldii calls generally have steep, high band-width, curved pulses with almost flat base and which alternate in frequency. *M. ridei* calls at the same frequency usually have flat to gently-curved, low band-width pulses at uniform frequency. In some circumstances, however, both produce calls with intermediate features (i.e. no alternation and uniform or variable curves of varying band-width). Numerous calls were positively attributable to *C. gouldii*, and a number also to *M. ridei.* A large number of 29-31kHz calls, however, had intermediate characteristics and could not be reliably attributed to either species.

Chalinolobus gouldii* or *Scotorepens balstoni

Both species produce calls with high band-width pulses and characteristic frequency overlapping around 30-33kHz. *S. balstoni* calls generally lack the frequency alternation typical of *C. gouldii*. Most calls were attributable to *C. gouldii* but a number of calls had poor or inconsistent evidence of alternation and could have been from either species.

Chalinolobus morio* or *Vespadelus troughtoni

Significant overlap in characteristic frequency (48-53kHz) makes these species difficult to distinguish, although better quality calls exhibit distinctive pulse shapes (pulses have down-ward sloping body and tail in *C. morio cf.* curved body with up-swept tail in *V. troughtoni*). A number of calls were positively attributed to *C. morio* but some calls had inclonclusive pulse shapes and could have been from either species.

***Scotorepens greyii* or *S. sanborni* or *Chalinolobus nigrogriseus* (Characteristic frequency 37-39kHz)**

S. greyii and *S. sanborni* calls cannot be differentiated and both may occur in the study area. Their calls are also often indistinguishable from those of *C. nigrogriseus.* A number of good quality calls were reliably attributable to either *Scotorepens* sp or *C. nigrogriseus*, based on pulse shapes (shorther duration with up-curved tails in *Scotorepens cf.* longer duration with flat or no tails in *C. nigrogriseus*). In most calls, however, the pulse characteristics were variable and spanned the range of characteristics described for each species (Reinhold *et al.* 2001).

***Scotorepens* spp. or *C. picatus* (Characteristic frequency 39-42kHz)**

S. greyii and *S. sanborni* calls also overlap in frequency and can be confused with those of *C. picatus*. *C. picatus* calls (39-44kHz) often have alternating pulse frequency (*cf.* uniform frequency on the *Scotorepens* spp.); and a few such calls were positively attributed to *C. picatus* for this survey. Many calls, however, had inconsistent evidence of uniformity or alternation and could have been from any of these species.

Vespadelus troughtonii* or *Miniopterus orianae oceanensis

These species usualy call at different frequencies, although there is minor overlap around 48.5±1kHz. A number of calls within this overlap zone were observed and could not be reliably attributed to either species. Most had pulse shapes more similar to *V. troughtoni*, but these calls were very messy with variable pulse shapes and interfering call fragments from other bats.

Mormopterus eleryi

The distributional range of this species is not fully understood, but it potentially includes the current study area. The species' calls are also poorly known, but currently available evidence suggests they are very similar to those of *Scotorepens greyii* and *S. sanborni* (Reardon *et al.* 2008). As such, it is possible that some of the calls attributed to the two groups described above may have been from *M. eleryi* .

Saccolaimus flaviventris* or *Chaerephon jobensis

C. jobensis is generally easy to distinguish from *S. flaviventris* by its lower frequency (15-17kHz) and flatter pulse shapes; and where calls overlap in frequency (>17kHz), *C. jobensis* pulses are mostly steeper and exhibit erratic changes in pulse shape. Numerous calls were positively attributed to each species, but a number calls in the frequency overlap zone lacked definitive characteristics and could not be differentiated.

S. flaviventris or M. beccarii

These species' calls overlap around 21-23kHz and brief or poorly-recorded calls can be difficult to differentiate. A number of calls were positively identified based on frequencies outside the overlap range - *S. flaviventris* (<21kHz) and *M. beccarii* (>24kHz). Several calls around 22kHz, however, had a mix of flat and curved pulses and species identity was not clear. These may have been from either species.

Unidentified bat calls

These are calls that were too brief and/or weak and/or noisy to be reliably identified. All were within the ranges of species otherwise listed and do not represent additional species.

References:

Churchill, S. (2008). *Australian Bats* . Jacana Books, Allen & Unwin; Sydney.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales.* Department of Environment and Conservation, Hurstville.

Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.

Reardon, T., Adams, M., McKenzie, N. and Jenkins, P. (2008). A new species of Australian freetail bat *Mormopterus eleryi* sp. nov. (Chiroptera: Molossidae) and a taxonomic reappraisal of *M. norfolkensis* (Gray). *Zootaxa* **1875:** 1-31.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales.* Department of Natural Resources and Mines, Brisbane.

van Dyck, S. and Strahan, R. (ed.) (2008). *The Mammals of Australia* (Third Edition); New Holland; Sydney.

Anabat Data Analysis Summary

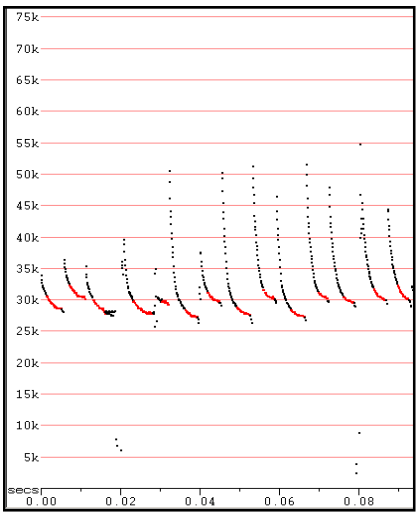
Client: Ecological Survey & Management **Contact**: Ben Nottidge/Steve Marston **Job no.:** ESM-1104

Survey Location & Period: Arrow Pipeline Surveys, September 2011

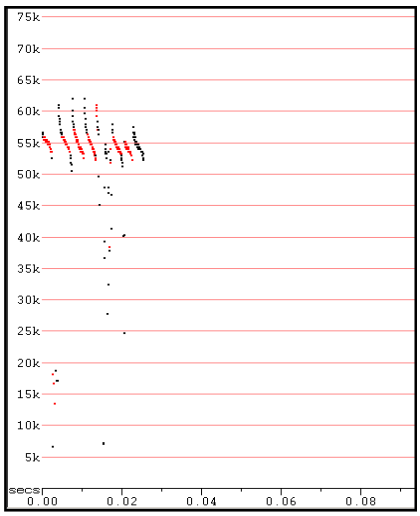
Sample calls extracted from the survey data

Scale: 10 msec per tick; time between pulses removed (*AnalookW* F7 compressed mode)

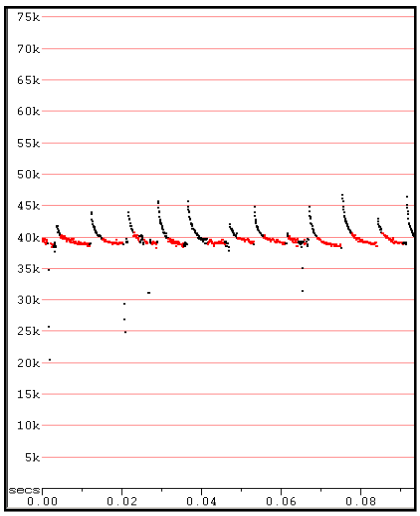
Species positively identified



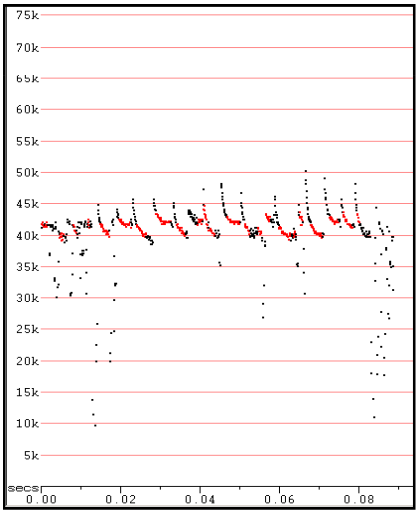
Chalinolobus gouldii



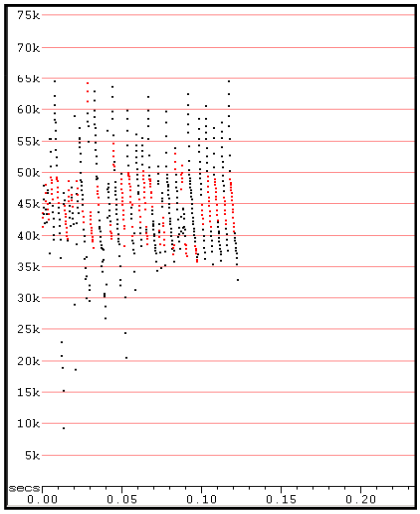
Chalinolobus morio



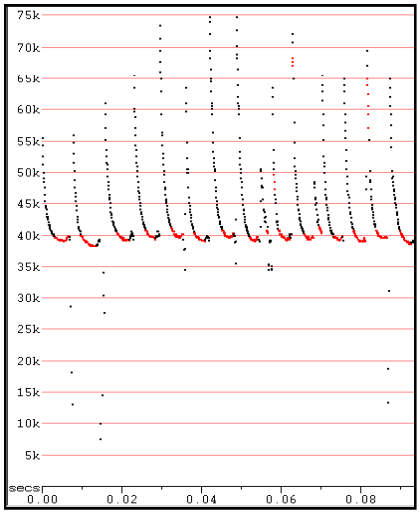
Chalinolobus nigrogriseus



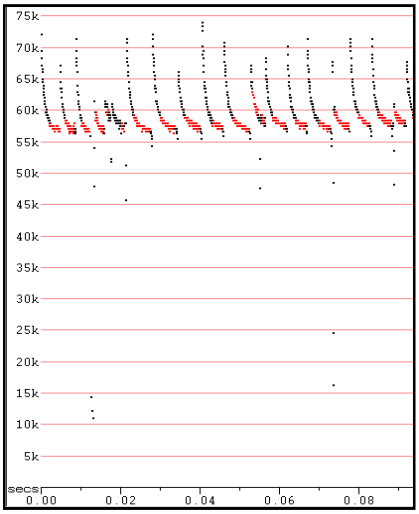
Chalinolobus picatus



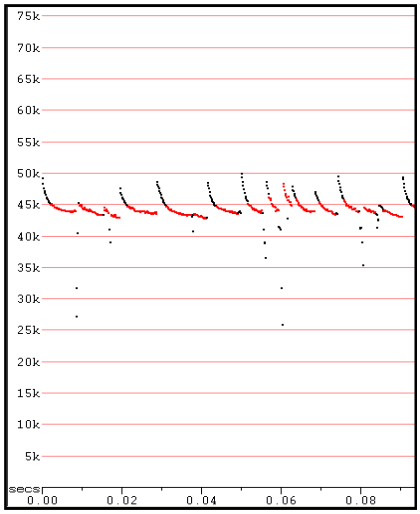
Nyctophilus species



S. greyii/S. sanborni



Miniopterus australis



Miniopterus o. oceanensis

Anabat Data Analysis Summary

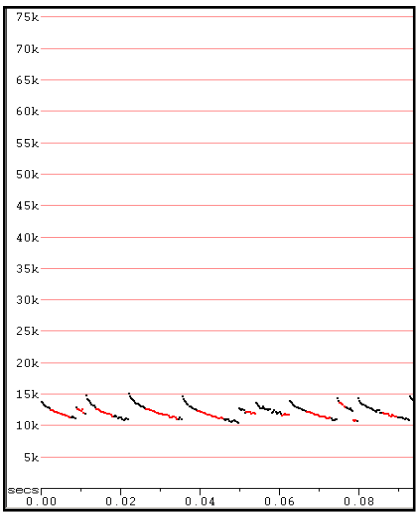
Client: Ecological Survey & Management **Contact**: Ben Nottidge/Steve Marston **Job no.:** ESM-1104

Survey Location & Period: Arrow Pipeline Surveys, September 2011

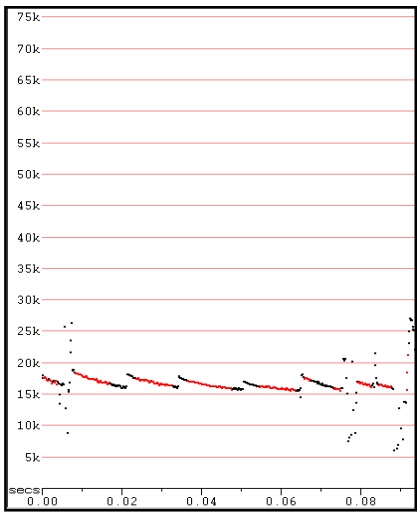
Sample calls extracted from the survey data

Scale: 10 msec per tick; time between pulses removed (*AnalookW* F7 compressed mode)

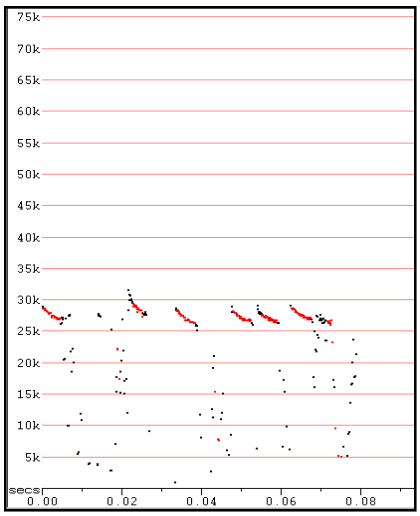
Species positively identified



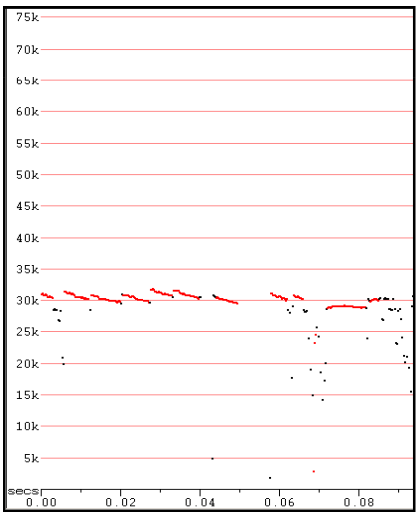
Austronomus australis



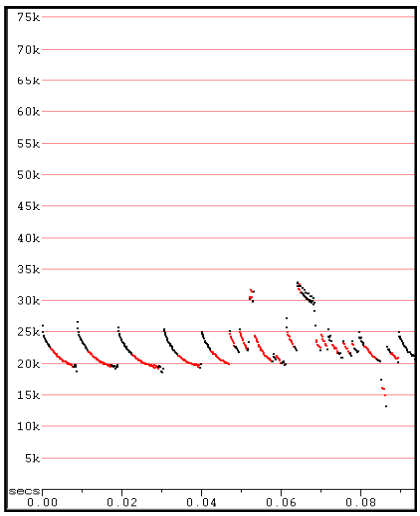
Chaerephon jobensis



Mormopterus beccarii



Mormopterus ridei



Saccolaimus flaviventris

Anabat Data Analysis Summary

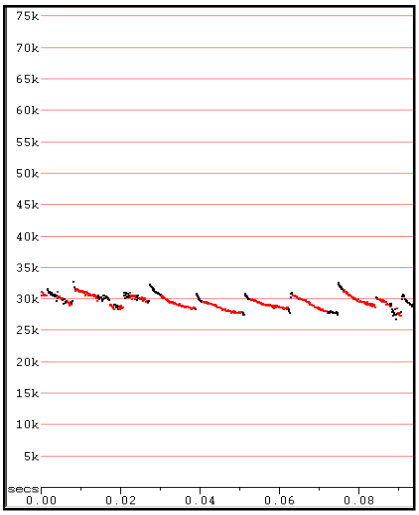
Client: Ecological Survey & Management **Contact**: Ben Nottidge/Steve Marston **Job no.:** ESM-1104

Survey Location & Period: Arrow Pipeline Surveys, September 2011

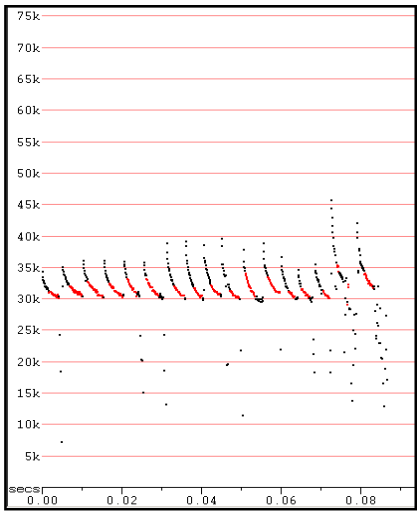
Sample calls extracted from the survey data

Scale: 10 msec per tick; time between pulses removed (*AnalookW* F7 compressed mode)

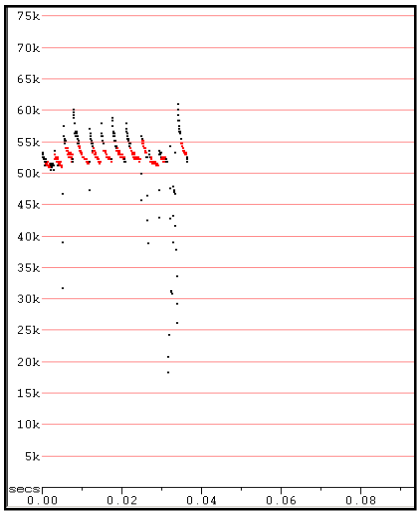
Calls NOT positively identified



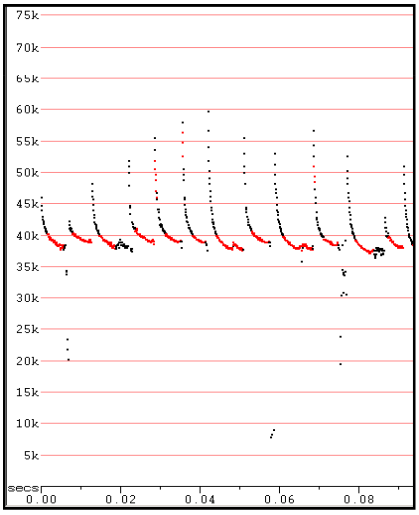
C. gouldii or *M. ridei*



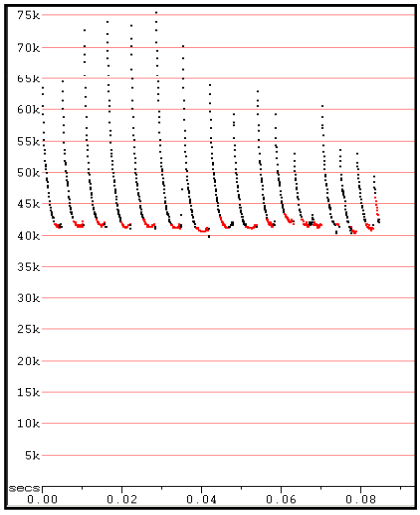
C. gouldii or S. balstoni



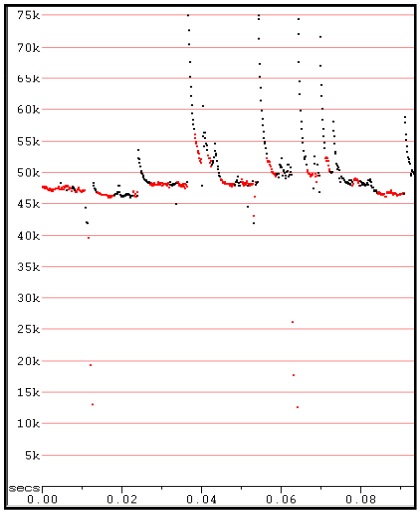
C. morio or V. troughtoni



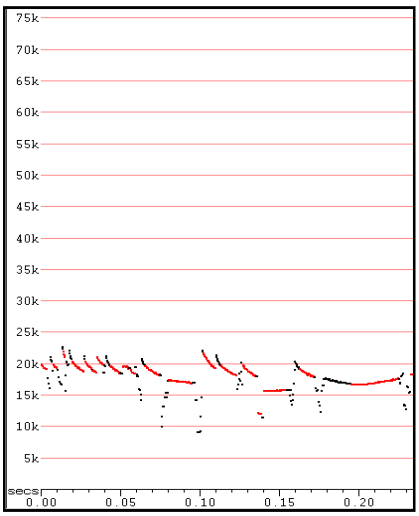
Scot. sp or *C. nigrogriseus*



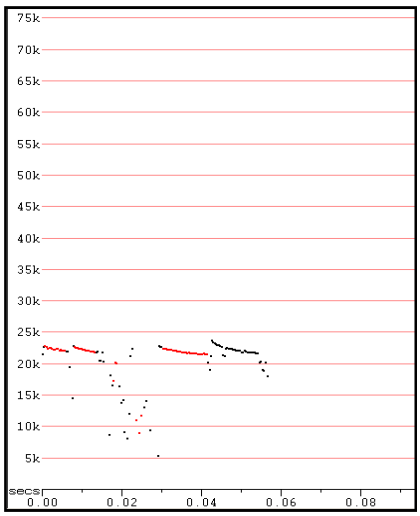
Scot. spp or *C. picatus*



V. troughtonii or M. o. oceanensis



S. flaviventris or C. jobensis



S. flaviventris or M. beccarii

balance!
PO Box 1744, Toowoomba Qld 4350