







## PROJECT REPORT

# Main Pipeline System - Pre-Clearance Survey Bridging Report

Q-1801-15-RP-0045

## Australia Pacific LNG Upstream Project

This Bridging Report provides standard habitat to be used across the Upstream Australia Pacific LNG Project and presents results of the Main Pipeline System pre-clearance surveys in terms of the standard habitat definitions.

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- **Should** indicates a recommended course of action
- **May** or **can** indicate a possible course of action.

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# 1. Introduction

## 1.1 Background

Australia Pacific LNG Pty Limited (Australia Pacific LNG) is undertaking a coal seam gas (CSG) to liquefied natural gas (LNG) project referred to as the Australia Pacific LNG Project. This Project consists of:

- Further development of Australia Pacific LNG existing CSG fields in the Surat and Bowen basins;
- Construction of high pressure gas pipelines from the gas fields to an LNG plant situated on Curtis Island near Gladstone; and
- Development of an LNG Facility on Curtis Island near Gladstone.

Australia Pacific LNG was required to submit an Environmental Impact Statement (EIS) and supplementary EIS (sEIS) to meet the requirements as a significant project under the Queensland State Government's *State Development and Public Works Organisation Act 1971* (SDPWO Act). Furthermore, the EIS and sEIS were required to address Matters of National Environmental Significance (MNES) defined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Approval for the Australia Pacific LNG Project was issued by the Coordinator-General (CG) on 9 November 2010 and the Department of Sustainability Environment Water Population and Communities (DSEWPaC) on 21 February 2011.

Approval conditions issued by DSEWPaC (now Department of the Environment (DOTE) and referred to as such throughout the remainder of this report) for the pipeline component of the project (EPBC 2009/4976) require:

- The development of a Threatened Fauna Management Plan (TFMP) to help mitigate against potential impacts on EPBC Act listed, threatened fauna and migratory species that may be impacted by the pipeline activities. This has been completed and the TFMP has been approved by DOTE; and
- The completion of a pre-clearance survey (in accordance with Condition 6) before clearance of native vegetation for the pipeline ROW. These surveys have been completed.

Upon the request of DOTE, Australia Pacific LNG has committed to updating the approved TFMP with the results of the pre-clearance surveys. In addition, DOTE requested Australia Pacific LNG to revise habitat definitions used and to utilise consistent habitat definitions across the Upstream Australia Pacific LNG Project.

## 1.2. Purpose

The purpose of this document is to:

- Provide the standard habitat definitions that will be utilised across the Upstream component of the Australia Pacific LNG Project; and
- Present the results of the Pipeline Pre-clearance Surveys in terms of the amended habitat definitions.

The information presented in this document will be used to update the Pipeline Threatened Fauna Management Plan (TFMP) (Q-LNG01-15-MP-0074) in terms of the quantification of unavoidable impacts to threatened fauna.

## 1.3. Scope

This document is applicable to the disturbance associated with the construction of high pressure gas pipeline Right Of Ways (ROWs) that are covered under the Australia Pacific LNG High Pressure Gas Pipeline EPBC Act Approval (EPBC 2009/4976) as follows (refer to Figure 1):

- Main Pipeline from Australia Pacific LNG Hub to Curtis Island LNG Facility
- Condabri Lateral from KP 22.292 to the Australia Pacific LNG Hub; and
- Woleebee Lateral from KP 43.025 to the Australia Pacific LNG Hub.

The scope of this document excludes the results of pre-clearance surveys for the marine component of the pipeline crossing from the mainland to Curtis Island landfall (approximately KP 357.7-363.7). This section of the ROW (the Narrows Crossing Project) is shared between two LNG proponents, Australia Pacific LNG and QCLNG. Clearing activities associated with the Narrows Crossing Project were undertaken by QCLNG, along with management and mitigation of any fauna habitat impacted by construction activities. The QCLNG Export Pipeline Narrows Crossing Project - Significant Species Management Plan is the relevant fauna management plan for construction of the co-located section.

## 1.4 Document References

Reports and Management Plans prepared for the Main Pipeline and which have been relied upon, and Commonwealth approvals referenced in this document are identified in Table 1.

**Table 1: Associated Document References**

Document Number	Title
EPBC 2009/4976	EPBC Approval to develop, construct, operate and decommission a high pressure gas transmission pipeline network to link the coal seam Gas Fields to a proposed LNG facility on Curtis Island.
Q-LNG01-15-MP-0074	Pipeline Threatened Fauna Management Plan.
Q-1801-15-RP-0008	Pre-clearance Survey Report: Mainline Hub-Midline Station.
Q-1801-15-RP-0019	Pre-clearance Survey Report: Midline Station-Mainline Valve 2.
Q-1801-15-RP-0009	Pre-clearance Survey Report: Mainline Valve 2-Dawson Highway Crossing.
Q-1801-15-RP-0020	Pre-clearance Survey Report: Dawson Highway Crossing-Mainline Valve 4.
Q-1801-15-RP-0010	Pre-clearance Survey Report: Mainline Valve 4-LNG Plant.
Q-1805-15-RP-0002	Pre-clearance Survey Report: Condabri Lateral (KP 22.292-73.44)
Q-1806-15-RP-0002	Pre-clearance Survey Report - Woleebee Lateral Eastern Portion (KP 43.025-Hub)

**Figure 1: ROWs within the Australia Pacific LNG High Pressure Gas Transmission Pipeline EPBC Act Approval  
(EPBC 2009/4976)**

## 2. Terms and Abbreviations

### 2.1 Document Terms and Definitions

Table 2: Terms and Definitions

Term	Definition
Core Habitat	Consists of Essential Habitat in which the species is known and the habitat is recognised under relevant recovery plans or other relevant plan/policies/regulations. Also included in this category are populations that are geographically limited within the region.
Essential Habitat	Is an area within General Habitat containing resources that are considered essential for the maintenance of sustainable populations of the species. This may include breeding places, roosting, foraging, shelter sites, for migratory and non-migratory species.
General Habitat	Consists of areas or locations that are used by transient individuals or where species may have been recorded but where there is insufficient information to assess the area as essential or Core Habitat. General Habitat included habitat areas which are not considered essential for the maintenance of a sustainable population.
Microhabitat features	Non-living and/or biological features which contribute to any part of the lifecycle of any given fauna species (e.g. rocky outcrops, hollow bearing trees, waterways, burrows).
Migratory fauna species	The entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.
Potential Habitat	Fauna habitat identified through a desktop assessment of DEHP regional ecosystem (RE), based upon RE associations documented within the Threatened Fauna Management Plan (TFMP).
Preferred Habitat	Areas where fauna species have the potential to occur based on species' general habitat preferences
Project	Australia Pacific LNG Upstream Project.
Survey corridor	A 150 m wide corridor based (75 m either side of the ROW centreline) which was surveyed by botanists during the pre-clearance surveys.
Threatened fauna	Fauna species listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Unavoidable Impact	Spatial extent of Core, Essential or General Habitat impacted by development, construction and operation of a high pressure gas transmission pipeline network approved within the scope of EPBC 2009/4976.
Unlikely Habitat	Areas that do not contain records of the particular species and contain no habitat values to support the presence or existence of resident or migratory individuals or populations of the species.

### 2.2 Abbreviations

Table 3: Abbreviations

Abbreviation	Description
CE	<i>Critically Endangered</i>
CSG	Coal Seam Gas
DEIS	Detailed Environmental Infield Studies
DOTE	Department of the Environment (Cwth)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (Cwth)
E	<i>Endangered</i>



Abbreviation	Description
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EIS	Environmental Impact Statement
KP	Kilometre Point
LNG	Liquefied Natural Gas
Mi	<i>Migratory</i>
RE	Regional Ecosystem
ROW	Right-of-Way
SDPWO Act	<i>State Development and Public Works Organisation Act 1971</i>
SPRAT	Species Profile and Threats Database
TFMP	Threatened Fauna Management Plan
V	<i>Vulnerable</i>

## 3. Summary of Habitat Definitions

### 3.1 Threatened Fauna Management Plan

The TFMP (Q-1801-15-MP-0012) was first approved by DOTE on 19 December 2011. As required by Condition 8d of the Pipeline EPBC Act Approval (EPBC 2009/4976), the TFMP quantifies unavoidable impacts by identifying areas of habitat for each threatened fauna species.

Habitat quantified in the TFMP (potential habitat) was based on the presence of associated remnant Regional Ecosystems (REs) as mapped by the Department of Environment and Heritage Protection (DEHP) RE Mapping (Version 6.1). RE associations used for the purpose of quantifying potential habitat documented within the TFMP was based on:

- Desktop assessment undertaken by Biodiversity Assessment and Management (BAAM) for the purpose of the Australia Pacific LNG Environmental Impact Statement (EIS). The REs extracted from this report were the results of a workshop that encompassed an expert panel of fauna specialists (BAAM 2010)
- The DOTE Species Profile and Threats Database (SPRAT); and
- Peer reviewed literature and DOTE approved ecologists' expert knowledge.

Unverified DEHP RE mapping was utilised for the analysis at the time the TFMP was prepared; pre-clearance surveys had not been undertaken.

### 3.2 Pre-Clearance Survey Reports

In accordance with Condition 5 of the Pipeline EPBC Act Approval (EPBC 2009/4976), pre-clearance surveys were undertaken by DOTE approved ecologists along the ROW of the pipelines that fall within the scope of this approval between July 2011 and August 2012. The results of these surveys were documented in the following pre-clearance reports:

- Pre-Clearance Survey Report - Condabri Lateral (KP 22.29-73.44) (Q-1805-15-RP-0002);
- Pre-Clearance Survey Report - Woleebee Lateral Eastern Portion (KP 43.025-Hub) (Q-1806-15-RP-0002);
- Pre-Clearance Survey Report - Mainline (Hub-Midline Station) (Q-1801-15-RP-0008);
- Pre-Clearance Survey Report - Mainline (Midline Station-Mainline Valve 2) (Q-1801-15-RP-0019);
- Pre-Clearance Survey Report - Mainline (Mainline Valve 2-Dawson Highway Crossing) (Q-1801-15-RP-0009);
- Pre-Clearance Survey Report - Mainline (Dawson Highway Crossing-Mainline Valve 4) (Q-1801-15-RP-0020); and
- Pre-Clearance Survey Report - Mainline (Mainline Valve 4-LNG Plant Valve) (Q-1801-15-RP-0010).

In the pre-clearance reports, DEHP RE mapping was ground-truthed within the proposed pipeline ROWs. Furthermore, habitat for listed threatened and migratory fauna species was identified in terms of 'Preferred Habitat', which was defined as 'areas where fauna species have the potential to occur based on species' general habitat preferences'.

Preferred Habitat was identified on the basis of RE associations and the presence of micro-habitat features as identified during the pre-clearance surveys. A more detailed description of the methodology used during the pre-clearance surveys is documented in the Pre-clearance Survey Reports (available on the Australia Pacific LNG website).

### 3.3 Revised Fauna Habitat Definitions

At the request of DOTE, the following habitat definitions have been adopted across the Upstream component of the Australia Pacific LNG Project:

- Core Habitat
  - *Consists of Essential Habitat in which the species is known and the habitat is recognised under relevant recovery plans or other relevant plans/policies/regulations. Also included in this category are populations that are geographically limited within the region.*
- Essential Habitat
  - *Is an area within General Habitat containing resources that are considered essential for the maintenance of sustainable populations of the species. This may include breeding places, roosting, foraging, shelter sites, for migratory and non-migratory species.*
- General Habitat
  - *Consists of areas or locations that are used by transient individuals or where species may have been recorded but where there is insufficient information to assess the area as essential or Core Habitat. General Habitat included habitat areas which are not considered essential for the maintenance of a sustainable population.*
- Unlikely Habitat
  - *Areas that do not contain records of the particular species and contain no habitat values to support the presence or existence of resident or migratory individuals or populations of the species.*

These definitions were agreed with DOTE on 14th March 2013. The methodology adopted to present the results of the pre-clearance surveys (completed prior to the adoption of the above habitat definitions) in terms of the revised definitions is provided in Section 4, while the results are provided in Section 5. No additional survey work has been completed as part of this process.

## 4. Methodology for Identification and Quantification of General, Essential and Core Habitat

The methodology used to identify and quantify areas of General Habitat, Essential Habitat and Core Habitat for migratory and threatened fauna species is described below.

### 4.1. Habitat Identification

A desktop review of the results of the pre-clearance surveys was undertaken to identify all listed threatened and migratory fauna species which were identified as having Preferred Habitat within the pipeline ROWs. These species are listed in Table 4.

Table 4: Species Identified as Having Preferred Habitat during the Pre-Clearance Surveys

Species	Common Name	Status	
		EPBC Status	NC Act Status
<b>Birds</b>			
Australian painted snipe	<i>Rostratula australis</i>	V	V
black-breasted button-quail	<i>Turnix melanogaster</i>	V	V
black-tailed godwit	<i>Limosa limosa</i>	Mi	SLC
Caspian tern	<i>Hydroprogne caspia</i>	Mi	SLC
cattle egret	<i>Ardea ibis</i>	Mi	SLC
eastern curlew	<i>Numenius madagascariensis</i>	Mi	NT
eastern great egret	<i>Ardea modesta</i>	Mi	SLC
eastern osprey	<i>Pandion cristatus</i>	Mi	SLC
eastern reef egret	<i>Egretta sacra</i>	Mi	SLC
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC
Latham's snipe	<i>Gallinago hardwickii</i>	Mi	SLC
little tern	<i>Sternula (syn. Sterna) albifrons</i>	Mi	E
Pacific golden plover	<i>Pluvialis fulva</i>	Mi	SLC
plains-wanderer	<i>Pedionomus torquatus</i>	V	V
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC
red goshawk	<i>Erythrotriorchis radiatus</i>	V	E
rufous fantail	<i>Rhipidura rufifrons</i>	Mi	SLC
satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	SLC
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V
whimbrel	<i>Numenius phaeopus</i>	Mi	SLC
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	Mi	SLC
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC
<b>Mammals</b>			
koala	<i>Phascolarctos cinereus</i>	V	SLC
large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	V
northern quoll	<i>Dasyurus hallucatus</i>	E	-

Species	Common Name	Status	
		EPBC Status	NC Act Status
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	V
<b>Reptiles</b>			
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	V
collared delma	<i>Delma torquata</i>	V	V
Dunmall's snake	<i>Furina dunmalli</i>	V	V
ornamental snake	<i>Denisonia maculata</i>	V	V
yakka skink	<i>Egernia rugosa</i>	V	V

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).

A detailed review of existing information contained within the approved TFMP, government publication and regulatory guidelines was undertaken by DOTE approved ecologists to develop a concise description of what would be considered General and Essential Habitat for all species as listed in Table 4. This information is presented in **Appendix A**. The methodology for how General, Essential and Core Habitat was determined is presented in the following sections.

## 4.2. General Habitat

General Habitat was identified and quantified based on the areas of Preferred Habitat identified in the pre-clearance survey reports. This included an analysis of species specific micro-habitat features and/or species preferences for particular vegetation types (REs) that are expected to represent General Habitat for each species (outlined in **Appendix A**).

For a number of species, the General Habitat results do not align with the preferred habitat identified within pre-clearance surveys. This is due to a reassessment of the habitat requirements for these particular species based upon more up to date information or the result of increased experience with these species in the Brigalow Belt Bioregion. A comparative summary and justification for these variations is provided in **Section 5.2**.

Throughout the habitat assessment process for the preparation of this Bridging Report, Preferred Habitat for each species was thoroughly reviewed to ensure accuracy and consistency across faunal groups. In some instances the review process identified the need to reassess Preferred Habitat, particularly for cosmopolitan and wetland bird species, where it was determined that the prevalence of Preferred Habitat was originally overstated. Following the review process, the following species were reassessed to accurately identify their General Habitat located within the ROW:

- white-throated needletail (*Hirundapus caudacutus*)
- red goshawk (*Erythrotriorchis radiatus*)
- fork-tailed swift (*Apus pacificus*)
- rainbow bee-eater (*Merops ornatus*)
- eastern reef egret (*Egretta sacra*)
- plains wanderer (*Pedionomus torquatus*)
- squatter pigeon (*Geophaps scripta scripta*)
- black-tailed godwit (*Limosa limosa*)
- eastern curlew (*Numenius madagascariensis*)
- little tern (*Sternula* (syn. *Sterna*) *albifrons*)

- Pacific golden-plover (*Pluvialis fulva*)
- whimbrel (*Numenius phaeopus*)
- ornamental snake (*Denisonia maculata*); and
- brigalow scaly-foot (*Paradelma orientalis*).

### 4.3. Essential Habitat

Essential Habitat refines areas identified as General Habitat (Section 4.2) to include only those habitats that contain resources considered essential for the maintenance of sustainable populations.

Essential Habitat was identified by a team of DOTE approved fauna ecologists who applied their expert knowledge of each individual species to refine General Habitat. This assessment involved an interactive workshop attended by Mitchell Taylor, Jason Richard and Andrew Dickinson (see CVs in Appendix B) and GIS personnel, and involved the detailed review of the following information:

- Proposed pipeline locations
- High-resolution aerial imagery of the immediate area and region
- Ground-truthed REs (vegetation structure, species composition and density) collected during Detailed Ecological Infield Studies (DEIS)
- Habitat features recorded during the pre-clearance surveys
- Micro-habitat data and scores recorded during the pre-clearance surveys; and
- Watercourses and wetlands.

Using the fauna ecologists' knowledge of threatened species, Essential Habitat was identified based on the presence of habitat values considered essential for the maintenance of a population of a threatened fauna species. This included analysing micro-habitat features and vegetation that may represent important breeding, foraging, shelter and/or roosting habitat. Also taken into consideration was the connectivity of a particular site to nearby vegetated areas, proximity to surface water features (e.g. large dams, waterways or wetlands) and the extent of suitable habitat in the surrounding area. Mitchell Taylor and Jason Richard were involved in the initial pre-clearance surveys and were therefore in a position to apply their field knowledge of the landscape intersected by the pipeline ROW.

All areas considered to be General Habitat were assessed for the presence of Essential Habitat. Where a polygon of habitat *was not* identified as Essential Habitat due to a necessary habitat feature/s being absent (thus remaining as General Habitat) reasoning for this was recorded. Conversely, where a polygon of habitat *was* identified as Essential Habitat, descriptors were provided to clearly and transparently verify why a species was potentially reliant on this habitat.

In the Essential Habitat descriptions included in Appendix A and Appendix C, for ease of reading, where a necessary habitat feature (e.g. breeding, roosting, foraging habitat) is not explicitly discussed or discounted this feature was not deemed essential for the maintenance of the species by the DOTE approved ecologists undertaking the assessment.

Once this review process was complete, the GIS team finalised all polygons and their associated areas of impacts, providing tabulated outputs of KP intercepts and spatial extent of habitat. The team of fauna ecologists performed a check of these results to check for any inconsistencies.

The outputs of this stage are provided in Appendix C.

### 4.4. Core Habitat

Core Habitat refines areas identified as Essential Habitat (Section 4.3) to only include those locations where the species is known and the particular habitat location is recognised under relevant recovery plans or other relevant plans, policies and/or regulations.

Core Habitat was identified by the same team of DOTE approved fauna ecologists identified in Section 4.3. The methodology employed for the identification of Core Habitat is outlined below:

- Step 1 - Literature review; and

- Step 2 - Assessment against Essential Habitat results.

#### 4.4.1 Literature Review

In order to identify Core Habitat, the “relevant recovery plans” and “other relevant plans/policies/regulations” were determined to consist of the DOTE SPRAT Database and any relevant documentation included for the species therein. Specifically, the literature review for each species focused on the following sections of each SPRAT profile:

- Australian Distribution
- Population Information
- Recovery Plans; and
- Policy Statements and Guidelines.

From this literature review process, a series of known locations for each of the species and/or its habitat was generated.

#### 4.4.2 Assessment Against Essential Habitat Results

The locations identified through the literature review as being known locations for a certain listed threatened or migratory fauna species (or its habitat) was then compared with the Essential Habitat locations for these species identified through the process described in **Section 4.3**.

Where known locations of a species or its habitat corresponded with Essential Habitat within the ROW, it was determined that Core Habitat existed for the particular species in question. In determining Core Habitat, the ecologists pragmatically considered the presence of contiguous vegetation between a section of the pipeline and a known location of the species.

Full details regarding the Core Habitat assessment for each species with Essential Habitat is provided in **Appendix C**.

## 5. Summary of Results

### 5.1 General, Essential and Core Habitat

A summary of General Habitat, Essential Habitat and Core Habitat for each of the following pipelines sections is presented in Table 5:

- Condabri Lateral North Pipeline Alignment (Rev F1)
- Mainline (including Mainline North (Rev H) and South (Rev H2)); and
- Woleebee Lateral East Pipeline Alignment (Rev H).

Based on the results of the associated pre-clearance surveys and additional interpretation of the survey results to identify general, essential and core habitat 26 threatened fauna species were identified as having General Habitat present within the ROW, 11 species were identified as having Essential Habitat within the ROW and 1 species was determined to have Core Habitat within the ROW.

A full analysis of General, Essential and Core Habitat, including a description of necessary habitat features present or absent, KP intercepts and spatial extent within the ROW is provided in Appendix C.

**Table 5: Habitat within the Pipeline ROWs**

Species	Common Name	EPBC Act Status	Preferred Habitat (from Pre-Clearance Surveys)	Habitat (ha)		
				General Habitat	Essential Habitat	Core Habitat
<b>Birds</b>						
Australian painted snipe	<i>Rostratula australis</i>	V	0.44	0.43	0.00	0.00
black-breasted button-quail	<i>Turnix melanogaster</i>	V	0.12	0.11	0.00	0.00
Caspian tern	<i>Hydroprogne caspia</i>	Mi	24.65	21.80	0.00	0.00
cattle egret	<i>Ardea ibis</i>	Mi	521.63	4.34	0.00	0.00
eastern great egret	<i>Ardea modesta</i>	Mi	6.27	6.47	0.00	0.00
eastern reef egret	<i>Egretta sacra</i>	Mi	24.65	0.00	0.00	0.00
eastern osprey	<i>Pandion cristatus</i>	Mi	28.72	25.88	0.00	0.00
fork-tailed swift	<i>Apus pacificus</i>	Mi	1,820.40	1,817.2	0.00	0.00
Latham's snipe	<i>Gallinago hardwickii</i>	Mi	0.32	0.32	0.00	0.00
plains-wanderer	<i>Pedionomus torquatus</i>	V	1,372.69	0.00	0.00	0.00
rainbow bee-eater	<i>Merops ornatus</i>	Mi	823.83	1,817.2	52.78	0.00
red goshawk	<i>Erythrotriorchis radiatus</i>	V	952.69	2.79	2.52	0.00
rufous fantail	<i>Rhipidura rufifrons</i>	Mi	5.24	5.64	0.56	0.00



Species	Common Name	EPBC Act Status	Preferred Habitat (from Pre-Clearance Surveys)	Habitat (ha)		
				General Habitat	Essential Habitat	Core Habitat
satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	6.11	6.53	0.56	0.00
squatter pigeon	<i>Geophaps scripta scripta</i>	V	1,820.40	1,817.2	19.37	0.00
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	Mi	29.12	26.46	0.00	0.00
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	180.92	1,817.2	0.00	0.00
<b>Mammals</b>						
koala	<i>Phascolarctos cinereus</i>	V	0.34	0.56	0.56	0.00
large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	27.78	26.11	10.67	0.00
northern quoll	<i>Dasyurus hallucatus</i>	E	66.45	64.12	0.00	0.00
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	61.20	61.19	60.22	0.00
<b>Reptiles</b>						
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	40.84	40.96	39.27	10.61
collared delma	<i>Delma torquata</i>	V	0.12	0.11	0.00	0.00
Dunmall's snake	<i>Furina dunmalli</i>	V	0.75	0.74	0.31	0.00
ornamental snake	<i>Denisonia maculata</i>	V	41.84	0.00	0.00	0.00
yakka skink	<i>Egernia rugosa</i>	V	2.18	2.17	2.06	0.00

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi).

## 5.2 Differences Between this Report and Pre-Clearance Preferred Habitat Results

The figures presented in Table 5 demonstrate a number of differences between Preferred Habitat for species within the pre-clearance survey reports and the General Habitat calculated during the preparation of this Bridging Report. Where changes in area of greater than 1 ha were observed, justification is provided in Table 6. Changes of less than 1 ha were deemed to be minor alterations generally resulting from calculation changes and rounding of figures.

Table 6: Justification of Changes to Species Habitat Assessed

Species	Reason for Revised Assessment	Resultant Change (General Habitat)
Caspian tern ( <i>Hydroprogne caspia</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	The General Habitat of this species decreased by 2.85 ha.
cattle egret ( <i>Ardea ibis</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	The General Habitat of this species decreased by 517.29 ha.
eastern reef egret ( <i>Egretta sacra</i> )	Changes were required to the species' modelled distribution based on preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	This species has been removed from assessment.
eastern osprey ( <i>Pandion cristatus</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	The General Habitat of this species decreased by 2.85 ha.
fork-tailed swift ( <i>Apus pacificus</i> )	This species was deemed to be cosmopolitan and could therefore occur anywhere throughout the alignment.	A decrease of 3.2 ha has resulted due to improved calculation methods for the entire ROW (i.e. the ROW is more defined in some areas along the alignment).
plains wanderer ( <i>Pedionomus torquatus</i> )	The proposed ROW is outside the known distribution of this species. Changes were required to the species' modelled distribution based on preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	As the Project occurs outside the known distribution of this species, there has been a decrease of 1, 372.69 ha of General Habitat for this species in the Project area. This species has been removed from assessment.
rainbow bee-eater ( <i>Merops ornatus</i> )	This species was deemed to be cosmopolitan and could therefore occur anywhere along the ROW.	Habitat changed to reflect whole of ROW, rather than requiring the occurrence of REs and micro-habitats. Therefore an increase of 993.37 ha resulted.
red goshawk ( <i>Erythrotriorchis radiatus</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. Previously, these vastly	The General Habitat of this species decreased by 949.81 ha.

Species	Reason for Revised Assessment	Resultant Change (General Habitat)
	overstated the likely occurrence of this species. The changes have been made due to an increased knowledge of the species' distribution and habitat preferences within the region.	
squatter pigeon ( <i>Geophaps scripta scripta</i> )	This species was deemed to be cosmopolitan and could therefore occur anywhere along the ROW.	A minimal decrease of 3.2 ha has resulted due to improved calculation methods for the entire ROW (i.e. the ROW is more defined in some areas along the alignment).
white-bellied sea-eagle ( <i>Haliaeetus leucogaster</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	The General Habitat of this species decreased by 2.66 ha.
white-throated needletail ( <i>Hirundapus caudatus</i> )	This species was deemed to be cosmopolitan and could therefore occur anywhere throughout the ROW.	Habitat changed to reflect whole of ROW, rather than requiring the occurrence of REs and micro-habitats. An increase of 1,636.28 ha has resulted.
northern quoll ( <i>Dasyurus hallucatus</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	The General Habitat of this species has decreased by 2.33 ha.
large-eared pied bat ( <i>Chalinolobus dwyeri</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	The General Habitat of this species has decreased by 1.67 ha.
ornamental snake ( <i>Denisonia maculata</i> )	Changes were required to the species' preference for particular Regional Ecosystems and micro-habitat requirements. This has occurred due to an increased knowledge of the species' distribution and habitat preferences within the region.	The General Habitat of this species DOTEs not occur in the ROW resulting in a decrease in this species General Habitat of 41.84 ha.

## 6. Fauna Species Recorded During Pre-clearance Surveys

### 6.1 Fauna Survey Scope

Condition 6 (a) of the EPBC Act approval conditions all pre-clearance surveys to be undertaken in accordance with the relevant EPBC survey guidelines. The relevant survey guidelines reviewed in the development of this methodology were:

- EPBC significant impact guidelines for 36 migratory shorebird species

- Survey guidelines for Australia's threatened birds
- Survey guide for Australia's threatened bats
- Survey guidelines for Australia's threatened mammals
- Referral guidelines for the endangered northern quoll, *Dasyurus hallucatus*
- Survey guidelines for Australia's threatened reptiles
- Draft referral guidelines for the nationally listed Brigalow Belt reptiles; and
- Survey requirements described in the DOTE Species Profile and Threats (SPRAT) Database.

To address the requirements of relevant fauna survey guidelines a series of fauna survey trapping sites were surveyed throughout the study area at various times between July 2011 and August 2012. These sites were selected through consideration of:

- The presence and type of TECs and REs (particularly those known to provide habitat for MNES or EVNT-only species)
- Large un-fragmented areas of remnant vegetation
- Wildlife corridors (e.g. vegetated watercourses)
- Wildlife watering areas (e.g. dams, watercourses, etc.); and
- Other significant habitat features as identified by previous field investigations.

Prior to field assessment, habitats present within the corridor were determined from desktop analysis of mapped vegetation communities and aerial photography interpretation. These habitats were validated during the pre-clearance surveys and were subjected in the field to a variety of sampling techniques to identify component fauna. A detailed description of each of the fauna survey sites is provided within the relevant pre-clearance survey report for the pipeline section (see section 3.2).

## 6.2 Methodology

A description of the survey effort undertaken at each of the Fauna Survey Sites is provided in the relevant pre-clearance survey report (see section 3.2) and an overview of the general techniques adopted throughout the study area is provided in Table 7. Survey methodologies were separated into different target fauna groups based on their habitat/distribution patterns.

The survey techniques adopted are reflective of the EPBC survey guideline recommendations for the relevant species. The methodology involved combining survey techniques and effort for some groups of fauna, such that the timing requirements are not mutually exclusive.

A typical survey day involved the following:

- 0630-0930: Trap checking and incidental bird observations, call playback
- 0930-1230: Bird and reptile observations, habitat assessments
- 1400-1700: Bird and reptile observations, habitat assessments
- 1700-1800: Trap checking, re-setting of traps, bird observations, call playback
- 1800-2100: Spotlighting, hand-held Anabat recording, call playback; and
- 2100-0630: Unattended Anabat recordings in waterway/flyway areas.

**Table 7: Survey methodology for fauna groups**

Target Fauna Group	Surveying Techniques
Bird Species (including Migratory)	<p>Transects and point observations at key sites such as water points and flowering eucalyptus species.</p> <p>Call recognition for wetland birds and other cryptic species (including nocturnal birds).</p> <p>Opportunistic survey for the duration of the field assessment.</p> <p>Call playback opportunistically during both diurnal and nocturnal periods.</p>
Bats	<p>Ultrasonic recording and harp trapping at watering points and other habitat.</p> <p>Night investigation of flowering eucalyptus species (for grey-headed flying-fox (<i>Pteropus poliocephalus</i>)) with binoculars and spotlights.</p>
Mammals	<p>Placement of Elliott traps and camera traps for the northern quoll (<i>Dasyurus hallucatus</i>).</p> <p>Non-invasive latrine searches in suitable habitat.</p>
Reptiles	<p>Pitfall and funnel trap lines set up along fence lines.</p> <p>Transect surveys involving litter raking, turning of rocks, logs and bark debris.</p> <p>Elliott traps were set up in areas where yakka skink (<i>Egernia rugosa</i>) burrows were identified or potentially occur.</p> <p>Observations during night driving for snakes.</p>

### 6.3 Summary of Fauna Survey Results

A list of MNES fauna sightings and locations recorded during the pre-clearance surveys is provided in Table 8.

Table 8: Recorded MNES Fauna Sightings

MNES Fauna Sighting	Approximate Location
rufous fantail ( <i>Rhipidura rufifrons</i> )	Sighted during pre-clearance surveys along the Woleebee Lateral near KP 57.2.
rainbow bee-eater ( <i>Merops ornatus</i> )	Sighted during pre-clearance surveys along the Mainline near KPs 13.5, 44.5, 100.0, 104.0, 165.8, 169.5, 177.7, 181.6, 189.1, 190.2, 214.1, 221.4, 273.5, 275.5, 328.9, 310.9, 333.7 and 350.5.
squatter pigeon ( <i>Geophaps scripta</i> )	Sighted during pre-clearance surveys along the Mainline near KPs 303 and 337.0. Sighted during pre-clearance surveys along the Woleebee Lateral near KP 57.2.
Eastern great egret ( <i>Ardea modesta</i> )	Sighted during pre-clearance surveys along the Condabri Lateral near KPs 61.5 and 69.0. Sighted during pre-clearance surveys along the Mainline near KP 100.0
cattle egret ( <i>Ardea ibis</i> )	Sighted during pre-clearance surveys along the Condabri Lateral near KPs 61.5 and 69.0. Sighted during pre-clearance surveys along the Mainline near KPs 104.0, 181.6, 310.9 and 350.5.
South-eastern long-eared bat ( <i>Nyctophilus corbeni</i> )	Sighted during pre-clearance surveys along the Mainline near KP 13.5
satin flycatcher ( <i>Myiagra cyanoleuca</i> )	Sighted during pre-clearance surveys along the Mainline near KP 100.0, 264.4, 273.5, 303.3, 310.9, 337.0 and 350.5.
Latham's snipe ( <i>Gallinago hardwickii</i> )	Sighted during pre-clearance surveys along the Mainline near KP 221.4

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## Appendix A: Description of General and Essential Habitat for Threatened and Migratory Fauna Species

A summary of the General and Essential Habitat requirements for each relevant Threatened or Migratory fauna species is provided in the following table.

Table 9: Description of General and Essential Habitat for Threatened and Migratory Fauna Species

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat	Essential Habitat	Number of recorded sightings during pre-clearance surveys
<b>Birds</b>						
Australian painted snipe	<i>Rostratula australis</i>	V	V	<p>Wetland REs considered representative of General Habitat for the Australia painted snipe in the vicinity of the Main Pipeline includes REs 11.3.2, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.25h, 11.3.27a, 11.3.27b, 11.3.27c, 11.3.27d, 11.3.27e, 11.3.27f, 11.3.27g, 11.3.27h, 11.3.27i, 11.3.27j, 11.3.27x1a, 11.3.27x1b, 11.3.3, 11.4.3, 11.4.7, 11.9.5 and 11.9.5a (SEWPaC, 2013a).</p> <p>Microhabitats of the Australian painted snipe include shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps, gilgais/melon-holes and claypans (SEWPaC, 2013a). They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains though they do not necessarily breed in such habitat. (SEWPaC, 2013a).</p> <p>The Australian painted snipe has been recorded at wetlands in all states of Australia (Barrett <i>et al.</i>, 2003; Blakers <i>et al.</i>, 1984). It is most common in eastern Australia, where it has been recorded at scattered locations throughout much of Queensland, New South Wales, Victoria and south-eastern South Australia (SEWPaC, 2013a).</p>	As this species has generic foraging habitat requirements, only breeding habitat is considered Essential Habitat. Essential Habitat for the Australian painted snipe comprises well vegetated, shallow wetlands with areas of exposed mud.	No sightings.

<p>black-breasted button-quail</p>	<p><i>Turnix melanogaster</i></p>	<p>V</p>	<p>V</p>	<p>REs considered representative of General Habitat for the black-breasted button-quail in the vicinity of the Main Pipeline includes REs 11.8.3, 11.9.4 and 11.9.5 (SEWPaC, 2013b).</p> <p>The black-breasted button-quail is generally considered to be sedentary with possible home ranges of 2-6 ha. This species prefers habitats that have a low closed canopy and dense low shrub layer and groundcover with deep leaf litter such as occurring within rainforests, drier low closed forests, semi-evergreen vine thickets and acacia thickets (SEWPaC, 2013b), and areas containing vine thicket and lantana thickets beneath araucarian microphyll vine forest and hoop pine plantation (SEWPaC, 2013b). This species prefers connected patches or large tracts of open forest with a matrix of the above vegetation types of greater than 5 ha.</p> <p>The current known distribution in Queensland extends from near Byfield in the north, south to the New South Wales border and westwards to Palm Grove National Park and Barakula State Forest, with the most significant populations appear to be in the Yarraman-Nanango, Jimna-Conondale and Great Sandy regions (SEWPaC, 2013b).</p>	<p>Essential Habitat requirements for the black-breasted button-quail is considered to include areas with dense leaf litter and fallen woody debris (greater than 80% coverage) was present in combination with sparse vegetated groundcover (&lt;10% coverage), and where habitat patches are moderately to well-connected (moderate connectivity 10-50% or greater) and where remnant patches of are greater than 5 ha.</p>	<p>No sightings.</p>
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Caspian tern	<i>Hydroprogne caspia</i>	Mi	SLC	<p>REs considered representative of General Habitat for the Caspian tern in the vicinity of the Main Pipeline include all REs in Land Zone 1 and REs 11.3.25, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.25h, 11.3.27a, 11.3.27b, 11.3.27c, 11.3.27d, 11.3.27e, 11.3.27f, 11.3.27g, 11.3.27i, 11.3.27j, 11.3.27x1a and 11.3.27x1b (SEWPaC, 2013d).</p> <p>The Caspian tern is widespread in coastal regions from the southern Gulf of Carpentaria to the Torres Strait, and along the eastern coast. It is also recorded in western districts, especially the Lake Eyre Drainage Basin, north-west to the Gulf Country north of Mt Isa and Cloncurry (SEWPaC, 2013d). There are also scattered records for central Queensland.</p> <p>The Caspian tern is mostly found in sheltered coastal embayment's (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are General (SEWPaC, 2013d). They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. The Caspian tern prefers large expanses of water, including coastlines, large lakes, reservoirs and large rivers, features which are generally limited to coastal habitats (SEWPaC, 2013d).</p>	<p>Essential habitat in the Brigalow Belt is associated with Lacustrine wetlands which occur only within RE 11.3.27. Large wetlands consisting of vast expanses of water and complex aquatic ecosystems are recognised as essential habitat important for breeding purposes for this species.</p>	No sightings.
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cattle egret	<i>Ardea ibis</i>	Mi	SLC	<p>The cattle egret is widespread and common according to migration movements and breeding localities surveys. Two major distributions have been located; from north-east Western Australia to the Top End of the Northern Territory and around south-east Australia (SEWPaC, 2013e).</p> <p>The cattle egret predominantly occupies shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. It forages away from water on low lying grasslands, improved pastures and croplands (SEWPaC, 2013e).</p> <p>The cattle egret is a highly mobile species that predominately occupies grasslands, wooded lands and terrestrial wetlands; shallow, open and freshwater wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora (SEWPaC, 2013e). They have sometimes been observed in swamps with tall emergent vegetation (Marchant and Higgins, 1990).</p> <p>This species is commonly associated with the habitats of farm animals, particularly cows (<i>Bos taurus</i>), but also pigs (<i>Sus scrofa</i>), sheep (<i>Ovis aries.</i>), horses (<i>Equus caballus</i>) and deer (various species).</p>	<p>As this species has generic foraging habitat requirements, only breeding habitat is considered Essential Habitat. The cattle egret breeds communally (Blakers <i>et al.</i>, 1985), occasionally with other egrets and herons (SEWPaC, 2013e). Nests are constructed in wooded swamps including mangroves, melaleuca swamps and mixed eucalypt, acacia and in lignum swamps where nest trees are inundated (SEWPaC, 2013e). Breeding sites (rookeries) are predominantly coastal occurring from the New South Wales central coast to Ayr in Queensland (Barrett <i>et al.</i>, 2003).</p> <p>No rookeries known to support the species have been identified within the ROW and breeding habitat was absent within the vicinity of the Main Pipeline System.</p>	<p>Sighted during pre-clearance surveys along the Condabri Lateral near KPs 61.5 and 69.0.</p> <p>Sighted during pre-clearance surveys along the Mainline near KPs 104.0, 181.6, 310.9 and 350.5.</p>
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eastern great egret	<i>Ardea modesta</i>	Mi	SLC	<p>REs considered representative of General Habitat for the eastern great egret in the vicinity of the Main Pipeline include all REs on Land Zone 1 and REs 11.3.2, 11.3.3, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.27a, 11.3.27b, 11.3.27c, 11.3.27d, 11.3.27e, 11.3.27f, 11.3.27g, 11.3.25h, 11.3.27i, 11.3.27j, 11.3.27x1a and 11.3.27x1b (SEWPaC, 2013g).</p> <p>The eastern great egret is a highly mobile species found across the Australian mainland, with the exception of the central western deserts. It is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets (SEWPaC, 2013g), but most frequently it is found within wetland habitats including swamps and marshes, margins of rivers and lakes, damp or flooded grasslands, pastures or agricultural lands, reservoirs, sewage treatment ponds, drainage channels, salt pans and salt lakes, salt marshes, estuarine mudflats, tidal streams, mangrove swamps, coastal lagoons and offshore reefs (SEWPaC, 2013g).</p> <p>Important microhabitat features for this species include ephemeral to permanent waterways with permanent riparian vegetation supporting moderate to high levels of ground cover (SEWPaC, 2013g).</p>	<p>Essential Habitat for the eastern great egret is considered to be breeding habitat only as foraging habitats are widespread and foraging habitat requirements are generic. Important breeding sites in Queensland are reported from the Channel Country (Lake Eyre Basin) in the south-west of the state (SEWPaC, 2013g) although breeding sites are known from the south-east of the state (east of 151°E and south of 26°S) and north of 20°S (Barrett <i>et al.</i>, 2003). Important breeding habitat for this species is therefore any rookeries (breeding colonies) known to support the eastern great egret. These Colonies may be mono-specific or commonly mixed with other egrets, herons, ibises, spoonbills and/or cormorants.</p>	<p>Sighted during pre-clearance surveys along the Condabri Lateral near KPs 61.5 and 69.0.</p> <p>Sighted during pre-clearance surveys along the Mainline near KP 100.0.</p>
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<p>eastern osprey</p>	<p><i>Pandion cristatus</i></p>	<p>Mi</p>	<p>SLC</p>	<p>REs considered representative of General Habitat for the eastern osprey in the vicinity of the Main Pipeline include REs in Land Zone 1 and REs 11.3.25, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.25h, 11.3.27a, 11.3.27b, 11.3.27c, 11.3.27d, 11.3.27e, 11.3.27f, 11.3.27g, 11.3.27i, 11.3.27j, 11.3.27x1a and 11.3.27x1b (SEWPaC, 2013h).</p> <p>Eastern osprey occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands (SEWPaC, 2013h). The range of the eastern osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in New South Wales and South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island. Though mainly coastal, they occasionally travel inland along major rivers, particularly in northern Australia (Johnstone and Storr, 1998; Marchant and Higgins, 1993). They require extensive areas of open fresh, brackish or saline water for foraging (Marchant and Higgins, 1993) with fringing littoral or riparian vegetation for resting and roosting.</p> <p>Microhabitat requirements for the eastern osprey include wetlands, waterways with permanent water and riparian vegetation and a high degree of connectivity (SEWPaC, 2013h).</p>	<p>Eastern osprey nests in a variety of natural and artificial sites including cliffs, rocks or islets and on artificial nest platforms including pylons and jetties (SEWPaC, 2013h). Nests are always associated with extensive areas of open fresh, brackish or saline water which are essential for foraging (Marchant and Higgins, 1993). Essential habitat is considered to occur where nests or likely nesting habitat is present, typically tall overtopping trees associated with expansive water bodies. No nesting sites were identified within or adjacent to the Main Pipeline.</p>	<p>No sightings.</p>
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<p>fork-tailed swift</p>	<p><i>Apus pacificus</i></p>	<p>Mi</p>	<p>SLC</p>	<p>The fork-tailed swift is a migratory, aerial species which breeds in Asia, arriving in October in Australia (Blakers <i>et al.</i>, 1985). It is a highly mobile insectivorous species that feeds and roosts on the wing, though there are records of the species roosting in reedbeds, cliffs and tall trees (Blakers <i>et al.</i>, 1985). It ranges across much of Australia, excluding the western deserts. The species has been recorded within a broad range of habitats including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found utilising treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes (SEWPaC, 2013i). The species overflies remnant and non-remnant habitat. All RE types and non-remnant areas are considered representative of General Habitat for the fork-tailed swift (SEWPaC, 2013i). The fork-tailed swift is an aerial species, so microhabitat requirements are not applicable (SEWPaC, 2013i).</p>	<p>There is no Essential Habitat for the fork-tailed Swift in Australia as it is a highly mobile, non-breeding, aerial species which feeds and roosts on the wing and overflies a wide variety of habitats.</p>	<p>No sightings.</p>
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Latham's snipe	<i>Gallinago hardwickii</i>	Mi	SLC	<p>REs considered representative of General Habitat for Latham's snipe include 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.27a, 11.3.27b, 11.3.27c, 11.3.27d, 11.3.27e, 11.3.27f, 11.3.27g, 11.3.25h, 11.3.27i, 11.3.27j, 11.3.27x1a and 11.3.27x1b (SEWPaC, 2013j).</p> <p>Latham's snipe is a non-breeding visitor to south-eastern Australia (SEWPaC, 2013j). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia and Tasmania. It generally inhabits the shallow muddy margins of swamps, marshes and other types of freshwater, brackish and saline wetland, typically with vegetation that provides dense cover including wet grass, heath and occasionally flooded pasture and dams (Blakers <i>et al.</i>, 1985; SEWPaC, 2013j).</p>	<p>As Latham's snipe breeds in the northern hemisphere, within Australia Essential Habitat occurs at sites that are (SEWPaC, 2009):</p> <ul style="list-style-type: none"> <li>• Internationally important for the species; or</li> <li>• Sites that: <ul style="list-style-type: none"> <li>- Support at least 18 individuals of the species; and</li> <li>- Are naturally occurring open freshwater wetland with vegetation cover nearby (for example, tussock grasslands, sedges, lignum or reeds within 100 m of the wetland).</li> </ul> </li> </ul> <p>No areas as described above were detected during field surveys of the Main Pipeline.</p>	Sighted during pre-clearance surveys along the Mainline near KP 221.4.
little tern	<i>Sternula (syn. Sterna) albifrons</i>	Mi	E	<p>REs considered representative of General Habitat for the little tern in the vicinity of the Main Pipeline include all REs within Land Zone 1 and REs 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.27a, 11.3.27b, 11.3.27c, 11.3.27d, 11.3.27e, 11.3.27f, 11.3.27g, 11.3.27i, 11.3.27j, 11.3.27x1a and 11.3.27x1b (SEWPaC, 2013k).</p> <p>The little tern inhabits a variety of coastal habitats and wetland habitats within 1 km of the coastline (SEWPaC, 2013k).</p>	<p>Essential Habitat for the little tern is considered to be breeding, foraging and roosting habitat. Breeding occurs in coastal areas of all states except South Australia. In Queensland breeding is reported in Moreton Bay and north of Ayr (Barrett <i>et al.</i>, 2003). Shallow water estuaries and coastal lagoons are Essential Habitat for foraging and sand-spits, banks, bars and sandy shores in sheltered coastal environments for roosting (SEWPaC, 2013k).</p>	No sightings.

rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<p>The rainbow bee-eater is extensively distributed throughout mainland Australia, excluding the western deserts (Barrett <i>et al.</i>, 2003), primarily inhabiting open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins, 1999). This species is typically observed in open, cleared or lightly timbered areas that are often, but not always, located in proximity to permanent water (SEWPaC, 2013n), and distribution is largely determined by the availability of flying insects (Blakers <i>et al.</i>, 1985).</p> <p>The species is known to breed in a variety of habitats including naturally exposed banks of incised waterways and disturbed areas such as mines, quarries, gravel pits and road cuttings (SEWPaC, 2013n).</p> <p>The rainbow bee-eater utilises both remnant and non-remnant habitat. All REs and non-remnant areas are therefore considered representative of General Habitat for the rainbow bee-eater (SEWPaC, 2013n).</p>	<p>Essential habitat requirements for the rainbow bee-eater are considered to be ephemeral and permanent waterways with riparian vegetation and exposed sandy banks, where exposed banks provide suitable substrate for nesting (burrows). These areas are important for breeding. Foraging habitat requirements are not specific and foraging habitat is widespread and therefore not considered essential.</p>	<p>Sighted during pre-clearance surveys along the Mainline near KPs 13.5, 44.5, 100.0, 104.0, 165.8, 169.5, 177.7, 181.6, 189.1, 190.2, 214.1, 221.4, 273.5, 275.5, 328.9, 310.9, 333.7 and 350.5.</p>
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red goshawk	<i>Erythrotriorchis radiatus</i>	V	E	<p>REs considered representative of General Habitat for the red goshawk in the vicinity of the Main Pipeline include REs 11.3.25, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.25h, 11.3.39, 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.26, 11.3.27b, and 12.3.11 (SEWPaC, 2013o).</p> <p>Microhabitat requirements for this species include large patches of remnant vegetation (&gt;100 ha) with high ecological connectivity (connectivity 50-100%) which are in close proximity to permanent waterways (SEWPaC, 2013o).</p>	<p>Essential Habitat for this species within the ROW comprises large areas of remnant vegetation with a high level of connectivity proximate to permanent water. These areas provide both foraging and breeding opportunities for the species. The red goshawk requires large remnant trees in open biologically rich forest or woodland on, or within 1 km of, permanent water for nesting (SEWPaC, 2013o). Foraging habitat has to be open enough for fast attack and manoeuvring in flight, but provide cover for ambushing of prey (SEWPaC, 2013o)</p>	No sightings.
rufous fantail	<i>Rhipidura rufifrons</i>	Mi	SLC	<p>REs considered representative of General Habitat for the rufous fantail include REs 11.3.25, 11.3.27b, 11.4.3a, 11.8.3, 11.9.4, 11.9.5 and 12.3.11 (SEWPaC, 2013p).</p> <p>Microhabitat requirements for the rufous fantail include associated REs which are moderate to highly connected (10-50% ecological connectivity) and form a patch size of greater than 5 ha (5-100 ha) or occur within close proximity to permanent or ephemeral water (SEWPaC, 2013p).</p>	<p>Essential Habitat for the rufous fantail is considered to be wet dense forests and gullies which this species requires for breeding and foraging. (SEWPaC, 2013p). Within these habitats the rufous fantail nests in trees, shrub or vines (0.1-9 m above the ground) (Higgins <i>et al.</i>, 2006).</p>	Sighted during pre-clearance surveys along the Woleebee Lateral near KP 57.2.



satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	SLC	<p>REs considered representative of General Habitat for the satin flycatcher in the vicinity of the Main Pipeline are REs 11.3.25, 11.3.27b, 11.4.3a, 11.8.3, 11.9.4, 11.9.5, 11.9.5a and 12.3.11.</p> <p>Microhabitat requirements for the satin flycatcher include moderate ecological connectivity (10-50%) and patch sizes of greater than 5 ha (5-100 ha) (Morcombe, 2011).</p> <p>Breeding typically occurs in moist denser habitats and once young have left the nest they move to drier, open forest habitat types (Blakers <i>et al.</i>, 1985).</p>	<p>Essential Habitat for this species includes breeding and foraging habitat consisting of layered dense gullies of eucalypt forest (Morcombe, 2011). Typically these areas are associated with the great dividing range and coastal drainages. That is, breeding is seldom recorded away from coastal districts.</p>	<p>Sighted during pre-clearance surveys along the Mainline near KP 100.0, 264.4, 273.5, 303.3, 310.9, 337.0 and 350.5.</p>
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<p>General Habitat in the vicinity of the Main Pipeline is considered to include non-remnant vegetation and REs 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.19, 11.3.25, 11.3.26, 11.3.27b, 11.3.39, 11.4.7, 11.4.12, 11.5.1, 11.5.4, 11.5.4a, 11.5.5, 11.5.20, 11.5.21, 11.7.4, 11.7.4c, 11.7.6, 11.9.9, 11.10.1, 11.10.1d, 11.10.7, 11.10.9, 11.10.11 and 11.10.13.</p> <p>Microhabitat requirements for the squatter pigeon include moderate to dense groundcover vegetation (10-80% coverage) (Blakers <i>et al.</i>, 1985).</p>	<p>Essential Habitat for squatter pigeon includes breeding habitats only. Foraging habitats are widespread and not-specific, including cleared and disturbed lands and are therefore not considered Essential Habitat.</p> <p>Remnant grassy woodlands supporting moderate to dense groundcover with sandy substrate close to permanent water (typically less than 500 m), which are necessary for breeding (Blakers <i>et al.</i>, 1985) represents Essential Habitat for this species.</p>	<p>Sighted during pre-clearance surveys along the Mainline near KPs 303 and 337.0.</p> <p>Sighted during pre-clearance surveys along the Woleebee Lateral near KP 57.2.</p>

swift parrot	<i>Lathamus discolor</i>	E	E	Although historically swift parrot is recorded from more northerly latitudes in coastal areas (i.e. Bundaberg), the Nielsen (1969) record is considered to represent the most north westerly range extent for this species and is situated some 65 km to the south of the Condabri Hub (Woleebee Lateral KP 88/Australia Pacific LNG Hub (Mainline) KP 0.0). Furthermore, as it is highly likely that the swift parrot presently DOTEs not range north of Brisbane, or west of Toowoomba (D. Tzaros, Swift Parrot Recovery Co-ordinator, Birds Australia, pers. comm., 9/01/2013), it is unlikely this species occurs within the Mainline pipelines approval area. As such, there is no General Habitat present.	There is no Essential Habitat present for this species as the swift parrot breeds in Tasmania, and the Main Pipeline is outside of the known distribution of the species.	No sightings.
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	Mi	SLC	REs considered to be representative of General Habitat for the white-bellied sea-eagle in the vicinity of the Main Pipeline include all REs in Land Zone 1 and REs 11.3.25, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.27a, 11.3.27b, 11.3.27c, 11.3.27d, 11.3.27e, 11.3.27f, 11.3.27g, 11.3.27i, 11.3.27j, 11.3.27x1a and 11.3.27x1b.	Essential habitat for the white-bellied sea eagle consists of large areas of open water (larger rivers, swamps, lakes, sea) over which the species forages. The white-bellied sea-eagle typically nests in tall remnant trees or cliff ledges generally within sight of large bodies of water (Morcombe, 2011).  No large water bodies sufficient to provide essential foraging habitat for this species were identified within the vicinity of the Main Pipeline.	No sightings.

white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<p>The white-throated needletail is a highly-mobile species capable of foraging over a wide variety of habitat types throughout its distribution (SEWPaC, 2013w). Both remnant and non-remnant vegetation provide suitable foraging habitat for the species. This species DOTES not breed in Australia and is thought to forage almost exclusively on the wing (SEWPaC, 2013w). It is difficult to quantify specific microhabitat features for this species given its ability to persist in such a wide array of habitats.</p> <p>The white-throated needletail overflies remnant and non-remnant habitat. General Habitat for the white-throated needletail in the vicinity of the Main Pipeline included non-remnant vegetation and all RE types.</p> <p>The white-throated needletail is an aerial species, so microhabitat requirements are not applicable.</p>	<p>There is no Essential Habitat for the white-throated needletail in Australia or within the vicinity of the Main Pipeline as it is a highly mobile, non-breeding, aerial species which feeds and roosts on the wing and overflies a wide variety of habitats.</p>	No sightings.
<b>Mammals</b>						

koala	<i>Phascolarctos cinereus</i>	V	SLC	<p>REs considered to be representative of General Habitat for the koala in the vicinity of the Main Pipeline includes REs 11.3.2, 11.3.4, 11.3.23, 11.3.25, 11.3.26, 11.3.37, 11.3.38, 11.4.10, 11.5.20, 11.9.13, 11.10.11, 11.10.7, 11.10.12, 11.11.1, 11.11.4, 11.11.9, 11.11.10, 11.11.15, 11.11.16, 11.12.6, 11.12.7, 11.12.17 and 12.3.11.</p> <p>Landscape level requirements for the koala include moderately to highly connected (connectivity &gt;10%) or moderate to large patches of remnant vegetation (patch size 5-100 ha or &gt;100 ha) (Munks <i>et al.</i>, 1996).</p>	<p>Essential Habitat for the koala comprises moderate to large or well-connected areas of remnant vegetation which possess an abundance of feed trees from the genus <i>Eucalyptus</i> in which this species feeds, breeds and sleeps within.</p> <p>The distribution of the koala is also affected by altitude (limited to &lt;800 m above sea level), temperature and, in the drier areas of their range, leaf moisture (Munks <i>et al.</i>, 1996).</p>	No sightings.
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<p>large-eared pied bat</p>	<p><i>Chalinolobus dwyeri</i></p>	<p>V</p>	<p>V</p>	<p>REs considered to be representative of General Habitat for the large-eared pied bat in the vicinity of the Main Pipeline include REs 11.3.14, 11.3.18, 11.7.5, 11.9.4a, 11.10.1, 11.9.9b, 11.11.3, 11.10.3, 11.10.7, 11.10.9, 11.10.13 and 12.3.11.</p> <p>Microhabitat requirements for the large-eared pied bat include moderate to large sized or highly connected patches of suitable vegetation supporting hollows (medium hollows with moderate abundance) (Churchill, 2008).</p>	<p>Essential Habitat for this species occurs where there is a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. Almost all records have been found within several kilometres of cliff lines or rocky terrain (Churchill, 2008).</p> <p>The structure of primary nursery roosts appears to be very specific, i.e. arch caves with dome roofs (that need to be deep enough to allow juvenile bats to learn to fly safely inside) and with indentations in the roof (presumably to allow the capture of heat). These physical characteristics are not very common in the landscape and therefore are a limiting factor. Essential Habitat occurs only where these conditions are met (Churchill, 2008).</p> <p>There is a suggestion that this species may occasionally roost in tree hollows and abandoned fairy martin nests. However, these temporary roosts do not represent essential habitat as they are not used for breeding or on a regular basis (Churchill, 2008).</p>	<p>No sightings.</p>
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northern quoll	<i>Dasyurus hallucatus</i>	E	-	<p>REs considered to be representative of General Habitat for the northern in the vicinity of the Main Pipeline include all REs on Land Zones 1 and 7-12 (SEWPaC, 2013ac).</p> <p>Important microhabitat features for this species include moderately sized patches of vegetation (5-100 ha), hollows (medium and large hollows which are present in moderate abundance), waterways (ephemeral water and permanent riparian vegetation), a moderate groundcover layer (vegetation 10-80% cover), logs (&gt;30 cm diameter and present in medium abundance) and/or the presence of burrows.</p>	<p>Essential habitat for this species occurs within moderate to large patches of General Habitat which support an abundance of large rocks or dissected rocky escarpment habitat which this species uses for denning purposes. Vegetated habitat (e.g. eucalypt forests and woodlands, rainforests, sandy lowlands and beaches, shrublands, grasslands) surrounding these rocky features provide essential habitat for foraging and dispersal (SEWPaC, 2013ac).</p>	No sightings.
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	V	<p>REs considered to be representative of General Habitat for the south-eastern long-eared bat in the vicinity of the Main Pipeline include REs 11.3.1, 11.3.2, 11.3.14, 11.3.17, 11.3.18, 11.3.19, 11.3.26, 11.4.3, 11.4.7, 11.4.10, 11.4.12, 11.5.1, 11.5.1a, 11.5.5, 11.5.20, 11.5.21, 11.7.1, 11.7.4, 11.7.4c, 11.7.6, 11.7.7, 11.8.3, 11.9.1, 11.9.4, 11.9.5, 11.9.7, 11.10.1, 11.10.3, 11.10.7, 11.10.9 and 11.10.11 (SEWPaC, 2013ad).</p> <p>Microhabitat requirements for the south-eastern long-eared bat include moderate to large parcels of vegetation (patch size 5-100 ha), highly connected patches of vegetation (connectivity 10-50%), and/or waterways (ephemeral water and permanent riparian vegetation), and mediums hollows (present in moderate to high abundance) (SEWPaC, 2013ad).</p>	<p>Essential habitat for this species comprises large or highly connected patches of suitable General Habitat which support a distinct canopy and dense shrub layer which this species uses for foraging and dispersal; and hollows in live hollow-bearing trees, fissures in branches and under sheets of decorticating bark still attached to the trunk in which this species roosts (Churchill, 2008; SEWPaC, 2013ad).</p>	Sighted during pre-clearance surveys along the Mainline near KP 13.5.

Reptiles						
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	V	<p>Brigalow Belt REs considered representative of General Habitat for the brigalow scaly-foot in the vicinity of the Main Pipeline include 11.3.1, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.19, 11.3.27b, 11.3.39, 11.4.3, 11.4.3a, 11.4.7, 11.4.10, 11.4.12, 11.5.1, 11.5.1a, 11.5.4, 11.5.4a, 11.5.5, 11.5.20, 11.5.21, 11.7.1, 11.7.2, 11.7.4, 11.7.4c, 11.7.5, 11.7.6, 11.7.7, 11.9.1, 11.9.4, 11.9.5, 11.9.6, 11.9.7, 11.9.9, REs 11.10.1, 11.10.1d, 11.9.10, 11.10.3, 11.10.7, 11.10.9, 11.10.11 and 11.10.13.</p> <p>Microhabitat requirements for the brigalow scaly-foot include moderate to large patches (5-100 ha) or moderately to highly connected (connectivity 10-50%) patches of vegetation supporting a moderate to high abundance of leaf litter and sticks and/or logs and/or the presence of cracking and/or moderate to dense groundcover vegetation (&gt;10% cover).</p>	<p>Essential habitat for the brigalow scaly-foot includes patches of suitable RE which are large or highly connected, and possess a moderate to high abundance of leaf litter, sticks, logs, cracking clays or vegetative groundcover in which this species can seek refuge and shelter, breed, and forage.</p>	No sightings.

<p>collared delma</p>	<p><i>Delma torquata</i></p>	<p>V</p>	<p>V</p>	<p>REs considered to be representative of General Habitat for the collared delma in the vicinity of the Main Pipeline include REs 11.3.2, 11.3.1, 11.4.3, 11.4.7, 11.4.10, 11.7.1, 11.7.2, 11.7.4, 11.7.4c, 11.7.7, 11.9.1, 11.9.5, 11.10.1, 11.10.1d, 11.10.7, 11.10.11 and 11.10.13.</p> <p>Microhabitat requirements for the collared delma include moderately to large patches of General Habitat (5-100 ha) or highly connected patches (moderate connectivity 10-50%) of vegetation supporting large rocks, leaf litter and sticks or logs in medium to high abundance (SEWPaC, 2013ah).</p> <p>Within Queensland the collared delma is most commonly recorded within the western suburbs of Brisbane and the Toowoomba ranges (Curtis <i>et al.</i>, 2012) with outlying records at Blackdown Tablelands and Roma (SEWPaC, 2013ah).</p>	<p>Essential Habitat requirements for the collared delma include moderate to large (5-100 ha) or highly connected patches of General Habitat which support shelter, foraging and breeding habitat in the form of large rocks, leaf litter and sticks or logs (SEWPaC, 2013ah).</p>	<p>No sightings.</p>
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Dunmall's snake	<i>Furina dunmalli</i>	V	V	<p>REs considered representative of General Habitat for Dunmall's snake in the vicinity of the Main Pipeline include REs 11.3.1, 11.3.17, 11.3.25, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.25h, 11.4.3, 11.4.3a, 11.5.1, 11.5.4, 11.5.5, 11.7.1, 11.9.4, 11.9.5, 11.9.6, 11.9.10 and 11.10.9.</p> <p>Microhabitat requirements for Dunmall's snake include moderate to large patches (&gt;5 ha) or moderately to highly connected patches of vegetation supporting deep cracking clays, logs, leaf litter and sticks (&gt;10% cover), and moderate to dense groundcover vegetation (&gt;10% cover).</p> <p>Dunmall's snake is rarely encountered throughout its range and is considered to be genuinely rare (Curtis <i>et al.</i>, 2012; Wilson and Swan, 2010).</p>	<p>Essential Habitat for this species comprises large or well to moderately connected areas of General Habitat where deep cracking clays provide shelter and fallen coarse woody debris (ground logs) and / or groundcover vegetation is present in sufficient abundance to provide adequate foraging and breeding habitat for this species (Wilson, 2005).</p>	No sightings.
Ornamental snake	<i>Denisonia maculata</i>	V	V	<p>The most common RE in which this species is encountered consists of 11.4.3, 11.4.6, 11.4.8, and 11.4.9.</p> <p>Microhabitat requirements for ornamental snake indicate that:</p> <ul style="list-style-type: none"> <li>They are located within the lowest part of the catchment. The Ornamental Snake has been found in greatest numbers in shallow water where some aquatic vegetation is present, or where fringing groundcover vegetation has been inundated, especially in flooded gilgais where the dominant aquatic macrophyte is Bog Hyacinth (<i>Monochoria cyanea</i>) (Agnew 2010 pers. comm.).</li> </ul>	<p>Essential Habitat for this species comprises large or well to moderately connected areas of General Habitat where deep cracking clays provide shelter and fallen coarse woody debris (ground logs) and / or groundcover vegetation is present in sufficient abundance to provide adequate foraging and breeding habitat for this species (Wilson, 2005).</p>	No sightings.

				<ul style="list-style-type: none"> <li>• They have diversity of gilgai size and depth (if deep, then broad with gently sloping gradients at the sides).</li> <li>• There are soils of high clay content and deep-cracking characteristics. Water retention capacity increases with an increase in the fine clay particle fraction of soils. This, in turn, influences certain habitat conditions that are important for the Ornamental Snake and the frog species it preys upon. Cracking clays with higher sand and more sodic cracking clays, often associated with Brigalow / Belah-dominated communities, have a lower fine clay particle fraction and are likely to have lesser water retention capacity.</li> <li>• Ground timber is usually relatively common (especially piles adjacent to or close by to gilgais).</li> <li>• Where burrowing frogs (Cyclorana species) are abundant (see information on the feeding behaviour of the species).</li> <li>• Habitat patches are typically greater than 10 ha in area and are within, or connected, to larger areas of remnant vegetation.</li> </ul>		
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yakka skink	<i>Egernia rugosa</i>	V	V	<p>REs considered to be representative of General Habitat for the yakka skink in the vicinity of the Main Pipeline include REs 11.3.2, 11.5.1, 11.5.1a, 11.7.7, 11.3.1, 11.3.14, 11.3.17, 11.3.18, 11.3.19, 11.4.3, 11.4.3a, 11.4.10, 11.4.12, 11.5.20, 11.5.21, 11.7.1, 11.7.2, 11.7.4, 11.7.4c, 11.7.5, 11.9.1, 11.9.5, 11.9.6, 11.9.1, 11.9.5, 11.9.6, 11.9.7, 11.9.9, 11.9.10, 11.10.1, 11.10.1d, 11.10.7, 11.10.9 and 11.10.11 (SEWPaC, 2013ag).</p> <p>Micro habitat requirements for the yakka skink include moderate to large patches (&gt;5 ha) or moderately to highly connected patches (10-50% connectivity) of remnant vegetation, an abundance of large logs, burrows, leaf litter and sticks (&gt;10% cover) and groundcover vegetation (&gt;10% cover).</p>	<p>Essential Habitat for this species comprises areas with hollow fallen timber, piled logs, abandoned rabbit warrens or rock crevices, where it shelters and breeds in communal burrows (Curtis <i>et al.</i>, 2012; SEWPaC, 2013ag; Wilson and Swan, 2010). Surrounding moderate to large or well-connected areas of vegetated habitat is important for foraging (SEWPaC, 2013ag).</p>	No sightings.
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Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).

## Appendix B: Ecologist CVs

## Mitchell Taylor

### Senior Ecologist

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#### Professional summary

Mitchell is a senior ecologist with over eight years consulting experience in Queensland and New South Wales. He has worked on a range of projects across many industry sectors including mining and extractive industries, coal seam gas, eco-tourism, rail, road and water infrastructure, strategic, industrial and urban development for a private, public and government clients. The scale of these has ranged from small single lot developments through to the country's most significant mining, industrial and residential developments.

Mitchell has managed teams undertaking broad and specific ecological assessments for the mining sector, authoring ecological impact assessment reports and liaising directly with Commonwealth, State and Local government agencies on a range of projects. Mitchell has undertaken many applications under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) as well as the various principal Queensland environmental legislations and approval requirements.

Mitchell has provided a wide range of services to clients covering many aspects of ecological management. Through his experience Mitchell understands the practical application of ecology and the need to identify and liaise directly with clients to achieve a sound scientific outcome whilst incorporating the ultimate goal of the project.

#### Education

Bachelor of Environmental Science, Australian Catholic University, North Sydney, Australia, 2005

#### Memberships/Affiliations

NSW Fire Service

#### Languages

English

#### Employment history

AMEC Environment and Infrastructure, Senior Ecologist, 2011 to present  
PLACE Design Group Senior Ecologist / Environmental Scientist, 2007 to 2011  
Cumberland Ecology, Ecologist, 2005 to 2007

#### Representative projects

Mitchell is a Senior Ecologist in AMEC's Brisbane Office. In this role he is responsible for project management, as well as co-ordinating applied ecological studies servicing Commonwealth, State and Local Government Regulatory Approvals for the energy, mineral, infrastructure, industrial and urban development sectors.

#### Surat and Bowen gas fields

*APLNG/Origin, Queensland, Australia, 2011 - Present*

Mitchell carried out pre-clearance ecological surveys for Origin Energy. These surveys involved surveying and reporting on a broad range of environmental constraints for the APLNG Project. Areas covered include identification and locations of Threatened Ecological Communities (TEC); Ecologically Sensitive Areas; Endangered, Vulnerable and Near Threatened flora species and

likely habitats; Essential Habitat features for flora and fauna; field verification of High Value Regrowth for TECs, waterways and wetlands; weeds and pests; wildlife corridors and regional ecosystems. All field information has been collected using Trimble GeoExplorers with corrected capabilities.

### **Surat Basin**

*QGC, Queensland, Australia, 2011 - Present*

Mitchell undertook various gas pipeline projects, extensive fauna surveys within the Surat and Bowen Basins gas fields. The fauna surveys included identification of species listed in both the Nature Conservation Act (NC Act) and Environmental Protection and Biodiversity Act 1999 (EPBC Act) (2011-2012).

### **Byerwen Coal Mine EIS**

*QCOAL, Queensland, Australia, April – November 2011*

Proposed open cut and underground coal mining activity located in the galilee basin south of Collinsville, Queensland. Mitchell conducted detailed fauna assessments utilizing a wide variety of trapping and habitat assessment techniques which provided field data for the EIS process as well as authoring the terrestrial fauna component of the report.

### **Curragh Coal Mine - Blackwater Creek Diversion Project**

*Westfarmers, Queensland, Australia, 2009*

Established open cut coal mine near Blackwater Queensland, 10 kilometer diversion of Blackwater Creek . Mitchell was responsible for assisting in background research and co-authoring the Blackwater Creek Diversion Rehabilitation Management Plan to allow the expansion of the current mining operations. He was involved in ongoing monitoring of the rehabilitation works and compliance with the approved Rehabilitation Management Plan.

### **Wandoan Coal Project EIS**

*Xstrata, Queensland, Australia, 2007*

Proposed open cut coal mining activity located in the area surround the township of Wandoan, Queensland. Mitchell conducted detailed fauna assessments utilizing a wide variety trapping and habitat assessment techniques which provided field data for the EIS process.

### **Selwyn Mining Leases Ecological Impact Assessments**

*Ivanhoe Cloncurry Mines, Queensland, Australia, 2010 - 2011*

Established and proposed underground/open cut gold and copper mining activities in the Selwyn Ranges, North Western Queensland (southern extent of the Mt Isa Inlier/Northern extent of Mitchell Grass Downs bioregions). Mitchell oversaw detailed flora and fauna surveys of all Ivanhoe Cloncurry Mines mining leases. These investigations provided the client with detailed mapping of all vegetation and habitat types present within each mining lease. Mitchell managed a number of ecological teams as well as leading the detailed fauna assessment and habitat mapping of 20 mining leases. This work provided Ivanhoe Cloncurry Mines with a detailed and geo-referenced constraint mapping tool to implement within their Environmental Management Plan going forward.

### **Selwyn Mining Lease Microbat Management**

*Ivanhoe Cloncurry Mines, Queensland, Australia, May 2011*

Proposed re-engagement of discontinued mining declines within the Selwyn mining lease. During previous surveys Mitchell identified that significant population of microbat species were inhabitation mining declines which are proposed for re-engagement works, including threatened species. Together with Ivanhoe Cloncurry Mines staff Mitchell co-authored a microbat management plan to allow the re-engagement works to be conducted after the passive relocation

of the microbat populations inhabiting the mining declines. This included the tracking of 12 individual microbats to observe the movement and confirm the re-location roost sites.

### **Snapper Mineral Sands Project**

*BEMAX Mineral Sands, New South Wales, Australia, 2009 - 2011*

Proposed open cut Paleozoic mineral sands extraction mine near Broken Hill, New South Wales. Mitchell conducted the implementation of the approval condition for threatened fauna for the Snapper Mine Expansion Project. This involved the survey and relocation of state threatened microbat species persisting within the designated mining lease as well as the translocation of habitat trees.

### **Ginko Mineral Sands Project**

*BEMAX Mineral Sands, New South Wales, Australia, 2009 - 2011*

Proposed open cut Paleozoic mineral sands extraction mine near Broken Hill, New South Wales. Mitchell conducted the initial fauna and flora surveys for the extension of power from Pooncarie to the mining lease to provide power for the mines expansion program.

### **Cowal Gold Mine Expansion Project**

*Barrack Gold, New South Wales, Australia, 2009*

Proposed expansion of the open cut and underground operations at the Cowal Gold Mine, Lake Cowal, New South Wales. Mitchell conducted the implementation of the approved fauna management program for the Cowal Gold Mine Expansion Project. This involved the utilization of fauna trapping and survey techniques prior to the engagement of habitat clearing. Mitchell supervised the clearing specific habitat features after identifying them in the field.

### **Cadia Gold Mine Expansion Project**

*Newcrest Mining Limited, New South Wales, Australia, 2007*

Drilling program for the proposed expansion of the Cadia Hill Copper/Gold project, New South Wales Australia. Mitchell prepared several eight part test and threatened species assessments for the exploratory drilling programs prior to mine expansion.

## **Main Roads**

### **Road Corridor Environmental Assessment for Metro Region District**

*Department of Transport and Main Roads, Queensland, Australia, 2009 - 2010*

DTMR sought an assessment of the ecological condition and relevant constraints within its designated road corridors within the Metro Region extending from Toowoomba to Point Lookout (North Stradbroke Island). Mitchell conducted field investigations to determine the quality of vegetation and koala habitat within these corridors and road reserves to provide DTMR with the ability to assess any future expansion works with ease.

### **Gateway Motorway Upgrade Old Cleveland Road to Miles Platting Road Vegetation and Koala Assessment**

*Gateway Alliance, Queensland, Australia, 2010*

Proposed expansion of the Gateway Motorway from four to six lanes. This expansion is to facilitate the construction of two extra lanes between Old Cleveland Road and Miles Platting Road. Mitchell conducted detailed koala habitat and presence surveys which included the location of all koala habitat trees via differential GPS. Mitchell conducted these surveys and authored the impact assessment report and offset requirements for the clearing of koala habitat under the South East Queensland State Planning Regulatory Provisions and State Planning Policy 2/10: Koala Conservation in South East Queensland.

### **Proposed Logan Motorway Upgrade Mt Lindsay highway to Gateway Motorway Interchange Vegetation and Koala Assessment**

*Department of Transport and Main Roads, Queensland, Australia, 2010*

Proposed expansion of the Logan Motorway Interchange at the western Gateway Motorway merge and Mt Lindsay Highway Merge. Mitchell conducted these surveys and authored the impact assessment report/offset requirements for the clearing of koala habitat under the South East Queensland State Planning Regulatory Provisions and State Planning Policy 2/10: Koala Conservation in South East Queensland.

### **Bribie Island Transit Centre Fauna Assessment**

*Department of Transport and Main Roads, Queensland, Australia, 2008*

DTMR proposed a number of locations to construct a bus transit centre on the western areas of Bribie Island. Mitchell conducted detailed fauna assessment of the proposed development sites for the Bribie Island Transit Centre and co-authored the impact assessment reporting as a part of the greater EIS process.

## **Land Development**

### **Minippi Parklands Cannon Hill Community Links Golf Course**

*BMD, Queensland, Australia, 2007 - 2010*

BMD proposed to develop portions of the Minippi Parklands (located in southern Brisbane) into an eco-friendly residential golf resort. Mitchell conducted numerous field surveys to identify ecological issues pertinent to the site as well as assisting with identifying areas where only low impacts would occur. Mitchell also provided assistance to the expert witness team for court preparations and legal appeal.

### **Thornlands Structure Plan Koala Offsets Strategy**

*Ausbuild/Heritage Pacific, Queensland, Australia, 2009*

A consortium of development companies proposed to develop large tracks of farming land in Thornlands State Urban Investigation Area. Mitchell conducted detailed fauna and flora assessments throughout the entire Urban Investigation Area and co-authored the ecological impact assessment report. Mitchell further investigated and co-authored subsequent Koala Management Plans and Koala Offset Plans to comply with the regulations at that time.

### **Bellmere Investigation Area Ecological Constraints Assessment**

*Heritage Pacific/Lend Lease, Queensland, Australia, 2009*

A consortium of development companies proposed to develop lands within the Bellmere State Urban Investigation Area. Mitchell conducted field investigations to define ecological constraints and co-authored the ecological constraints and opportunities analysis. This assessment assisted with the development proposal and state benefit analysis of the greater development.

### **Oonoona Urban Development Area Ross River Rehabilitation Plan**

*Urban Land Development Authority, Queensland, Australia, 2010*

The Urban Land Development Authority were required to rehabilitate the accreting banks of the Ross River within its Oonoona Urban Development Area as a part of their development approvals. Mitchell conducted detailed field investigation to map out physical management units that occurred within the defined rehabilitation area and authored the Rehabilitation Management Plan.

## **Professional training**

Venomous snake handling March 2012 and October 2012

Regional Ecosystem Assessment, Queensland Herbarium, December 2011



## Jason Richard

### Principal Ecologist

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#### Professional summary

Jason Richard is an ecologist with approximately 16 years of professional consulting experience. During this time, he has worked in technical leadership, team management and project management roles within both boutique ecological consultancies and multi-national corporations.

His industry experience spans surface and subsurface mining operations (metalliferous and coal), coal seam gas, electricity generation and distribution, communications infrastructure development, urban development and transport infrastructure projects. Jason has also worked on a range of strategic environmental planning projects, biodiversity monitoring studies and integrated pest and threat management plans for Government clients.

Jason's technical expertise is based on extensive field survey experience in New South Wales, Queensland, the Northern Territory and South-east Asia. He has a well-developed knowledge of policy and legislation pertaining to biodiversity management across Australia (and abroad) including the various State and Commonwealth nature conservation and vegetation management frameworks, associated offset policies and approval processes. He has contributed to a large number of Referrals under the Commonwealth EPBC Act (1999) and the review and negotiation of approval conditions for many Significant Projects in Queensland.

Jason is a Certified Environmental Practitioner and is a member of the peak Environmental and Ecological Societies of Australia. He formerly sat on the national review panel for both terrestrial flora and fauna for SKM and has been engaged as an independent peer reviewer for technical studies by a range of multi-national corporations for domestic and international projects, including mining projects in Vietnam, the Philippines and Papua New Guinea.

He has extensive remote area experience on large ecological survey projects including biodiversity studies for the Australian Government (Department of Defence) in the Northern Territory and the Queensland Government (Foreign Aid) in Sumatra.

Jason's core expertise relates to the ecosystems and species of Queensland, and particularly biodiversity values of South-east Queensland, Brigalow Belt, Gulf Plains and Mt Isa Inlier Bioregions.

#### Education

Master of Wildlife Management, Macquarie University, 2005

Bachelor of Applied Science, Conservation Biology, Southern Cross University, 1996

#### Employment history

AMEC Environment & Infrastructure Pty Ltd, Principal Ecologist, 2010 - present

Sinclair Knight Merz, Team Leader Ecology, Sustainability and Climate Change, 2007-2010

James Warren and Associates, Principal Ecologist/Operations Manager, 2005-2007

PLACE Environmental, Senior Ecologist, 2002-2005

AGC Woodward Clyde, Ecologist, 1995-2002

## Representative projects

### Coal Seam Gas

#### **QCLNG Project**

*Queensland Gas Company, Queensland, Australia (2011 – 2012)*

Jason was responsible for Field Environmental Clearance (ecological survey) of proposed Coal Seam Gas wells, Field Compression Stations, Processing Plants, Storage Ponds, Frac Ponds, roads, pipelines and gathering systems for the Queensland Curtis LNG Project. The role was essentially a full time position implementing the Field Assessment Protocols developed in response to Queensland and Federal Government Conditions.

#### **Spring Gully Expansion Project**

*Origin Energy, Queensland, Australia (2012)*

Jason was a field team leader for the baseline zoological surveys completed in May and September 2012 across the 250,000ha Spring Gully Expansion Area near Injune in the Surat Basin. Jason was also engaged by GHD as the independent Technical Reviewer (Zoology) for survey and Impact Assessment Report prepared for the project.

#### **SunWater Wolleebie Creek to Glebe Weir Pipeline Project**

*Origin Energy, Queensland, Australia (2012)*

Jason was field team leader and technical lead for the baseline vertebrate fauna surveys for the Wolleebie Creek to Glebe Weir Water Pipeline Project. A targeted fauna survey meeting current DSEWPaC guidelines was completed. Documentation prepared included an impact assessment report and Threatened species management plans to accompany Preliminary Documentation to the Commonwealth Department of Environment, Sustainability, Water and Communities.

#### **Arrow Bowen Pipeline**

*Arrow Energy, Queensland, Australia (2011 – 2012)*

Jason was the technical lead for the baseline vertebrate fauna surveys of the Arrow Bowen Pipeline between Moranbah and Gladstone. Project works included comprehensive fauna trapping surveys over four seasons, preparation of a number of technical reports, input to the EIS for project, review and response to submissions made on the EIS, contributions to EPBCA referral including the mapping of habitat for the Critically Endangered Yellow Chat (*Epthianura crocea macgregori*), Vulnerable Water Mouse (*Xeromys myoides*) and Vulnerable Ornamental Snake (*Denisonia maculata*), all of which were recorded during field surveys.

#### **APLNG**

*Australia Pacific LNG Project, Queensland, Australia (2011)*

Jason completed ecological scouting surveys of the proposed Condabri Lateral Pipeline between Miles and Wandoan in addition to a range of ecological scouting surveys of various properties within the Condabri Gas Field Development, north and south of Miles in the Surat Basin.

#### **Linc Energy Chinchilla**

*Linc Energy, Queensland, Australia (2009)*

Jason completed baseline flora and fauna surveys across Linc Energy Chinchilla Gas Field including regional ecosystem map verification, threatened flora surveys, systematic vertebrate fauna survey and production of biodiversity chapters for draft EIS. The surveys informed future exploratory drilling programme via the mapping of ecological constraints, and in particular, threatened regional ecosystem types.

## Electricity Generation and Distribution

### **Columboola-Condabri South 132KV Transmission Line Project**

*Parsons Brinkerhoff, on behalf of Powerlink Pty Ltd, Queensland, Australia (2012)*

Jason was involved in the pre-clearing surveys and spotter/catcher supervision on the Columboola-Condabri South 132KV Transmission Line. Site clearing supervision completed in accordance with Species Management Program for Endangered, Vulnerable, Near Threatened, Special Least Concern and Colonial Breeding Species.

### **Columboola-Wandoan 132KV Transmission Line Project**

*Parsons Brinkerhoff, on behalf of Powerlink Pty Ltd, Queensland, Australia (2012)*

Jason was the technical lead for targeted surveys, quantification, mapping and significance assessment for the Vulnerable Tree Species (EPBCA) Ooline (*Cadellia pentastylis*) on the proposed Columboola-Wandoan Transmission Line. The species has not been identified within the project area until the time of clearing works and required urgent survey and negotiation with the DSWEPaC.

### **Sunsouth Power Project**

*Parsons Brinkerhoff, on behalf of Energex Pty Ltd, Queensland, Australia (2011)*

Jason was responsible for baseline ecological field surveys, preparation of technical report and development of mitigation measures for proposed and upgraded transmission lines through National Park, Agricultural land and residential areas on Queensland Sunshine Coast near Mooloolah.

### **Woolooga to Eerwah Vale Transmission Line**

*Parsons Brinkerhoff, on behalf of Powerlink Pty Ltd, Queensland, Australia (2011)*

Jason was responsible for the comprehensive assessment and mapping of Koala Habitat Values on the Woolooga to Eerwah Vale Transmission line in the Sunshine Coast Hinterland. Assessment of State Planning Policy and State Planning Policy Regulatory Provisions. Preparation of offset strategy for Koala habitat.

### **Kogan Creek Power Station**

*IMEMS, on behalf of CS Energy Queensland, Australia (2011)*

Jason participated in baseline ecological field surveys for proposed augmentation of Kogan Creek power station. Included targeted fauna surveys for the near-threatened Golden-tailed Gecko (*Strophurus taenicauda*) and Little Pied Bat (*Chalinolobous picatus*).

### **Kogan Creek to Kumbarilla Park Transmission Line**

*Parsons Brinkerhoff, on behalf of Powerlink Pty Ltd (2011)*

Jason was responsible for baseline ecological field surveys, preparation of technical report and development of mitigation measures for proposed transmission line through Braemar State Forest, a distance of approximately 15km through remnant regional ecosystems.

### **Seulewah Agam Geothermal Power Project**

*State of Queensland/PT PLN Pasero, Aceh Province, Sumatra (2009)*

Jason was the technical and field lead for baseline flora and fauna surveys, targeted threatened fauna surveys, impact assessment and development of mitigation strategies. Jason also assisted with preparation of Environmental and Social Impact Assessment documentation in accordance with Indonesian and International (World Bank) standards.

### **Pooncarie to Dareton Transmission Line**

*Resource Strategies Ltd, New South Wales, Australia (2005)*

Jason was responsible for baseline ecological surveys including vegetation community mapping, targeted threatened fauna surveys, Section 5A Assessments (8 part tests of significance) and technical reporting under the New South Wales Environmental Planning Act. Assessment completed for the provision of power to proposed mineral sands project in remote south-west New South Wales.

### **Vinh Tan Coal Fired Power Station**

*Electricity of Vietnam, southern Binh Thuan province, Vietnam (2009)*

Jason was the technical lead for terrestrial ecology, ecological impact assessment and development of mitigation strategies. Jason also assisted with preparation of Environmental and Social Impact Assessment documentation in accordance with Indonesian and International (World Bank) standards.

## **Mining and Exploration**

### **Belvedere Coal Project**

*Hansen Bailey Pty Ltd on behalf of Vale Coal, Queensland, Australia (2012)*

Jason was responsible for a review of ecological surveys completed to date and development of survey methods to meet DSEWPaC and Queensland Government fauna survey guidelines. Targeted survey for the Vulnerable Ornamental Snake (*Denisonia maculata*) and threatened bat species across the proposed Belvedere Coal Mine Lease near Moura.

### **Hail Creek Expansion Project**

*Rio Tinto Coal Australia, Queensland, Australia (2012)*

Jason was responsible for completing a gap analysis for terrestrial ecological issues. This involved a review of all previous ecological survey work completed on project from 1993 - 2012 and preparation of field survey methodology to meet current DSEWPaC and DEHP survey guidelines.

### **Lake Elphinstone Coal Project**

*Rio Tinto Coal Australia, Queensland, Australia (2012)*

Jason was responsible for the completion of baseline vertebrate fauna surveys, pre and post wet season 2012. Field survey including regional ecosystem map verification, threatened flora surveys, systematic vertebrate fauna survey and production of biodiversity chapters for draft EIS.

### **Valeria Coal Project**

*Rio Tinto Coal Australia, Queensland, Australia (2012)*

Jason was responsible for baseline vertebrate fauna surveys of proposed Valeria project area between Capella and Rubyvale in the Bowen Basin. Seasonal surveys 2011 and 2012. Preparation of technical report in support of EIS for the project.

### **Hail Creek Mine, Threatened Fauna Monitoring**

*Rio Tinto Coal Australia, Queensland, Australia (2009, 2010, 2011, 2012)*

Jason was the technical lead and field team leader for Annual Threatened Fauna monitoring for Hail Creek Mine, including targeted surveys and population monitoring for Little Pied Bat (*Chalinolobus picatus*) and Ornamental Snake (*Denisonia maculata*) in particular.

### **Ward's Well Coal Project**

*SKM, on behalf of BMA, Queensland, Australia (2012)*

Jason was the technical lead and field team leader for baseline Vertebrate Fauna Surveys, post wet season, 2011. Systematic vertebrate fauna survey of the Wards Well MLA north of Moranbah in the Bowen Basin.

### **Curragh Coal Project**

*Wesfarmers Pty Ltd, Queensland, Australia (2010-2011)*

Jason was responsible for Pre-clearing fauna survey and translocation programme for the Vulnerable Brigalow Scaly-foot (*Paradelma orientalis*). Development of innovative trapping techniques and translocation of Scaly-foot population.

### **Minyango Coal Project**

*Hansen Bailey Pty Ltd (2010)*

Jason was responsible for field survey including regional ecosystem map verification, threatened flora surveys, systematic vertebrate fauna survey and production of biodiversity chapters for draft EIS.

### **Clermont Coal Mine**

*Rio Tinto Coal Australia, Queensland, Australia (2010)*

Jason was technical lead and project manager for the annual flora and rehabilitation condition monitoring of the Gowrie Creek Stream Diversion, development of an index of stream condition using ACARP guidelines and implementation of monitoring plans.

### **Jeebropilly Coal Project**

*New Hope Coal, Queensland, Australia (2009)*

Jason was responsible for the development of Vegetation Offset Strategy for the Jeebropilly and Oakleigh Coal Mine Projects including identification of offset sites and securing those sites using PMAV process (offset banking) for future developments.

### **Frieda River Copper Project**

*Xstrata Copper, Telefomin, Papua New Guinea (2009)*

Jason was a part of the technical review team for terrestrial ecological studies completed for Xstrata Copper. The review included an assessment of likelihood of occurrence of Threatened species, peer review of terrestrial biodiversity baseline surveys.

### **Blackwater Creek Diversion**

*Downer EDI Mining, Queensland, Australia (2009)*

Jason was responsible for environmental professional oversight for the Blackwater Creek Diversion revegetation program. Management revegetation contractors on the \$130 Million Blackwater Creek Diversion project, contract administration and development of indicators for rehabilitation success for project.

### **Daunia Coal Project**

*BMA, Queensland, Australia (2009)*

Jason was responsible for field survey including regional ecosystem map verification, threatened flora surveys, systematic vertebrate fauna survey and production of biodiversity chapters for draft EIS.

### **New Saraji Coal Project**

*BMA, Queensland, Australia (2009)*

Jason was responsible for field survey including regional ecosystem map verification, threatened flora surveys, systematic vertebrate fauna survey and production of biodiversity chapters for draft EIS.

### **New Acland Coal Mine Stage 3 Project**

*New Hope Coal, Queensland, Australia (2008)*

Jason was the technical and field team lead for the baseline Flora and Fauna Survey, Vegetation/Regional Ecosystem Mapping, technical report including impact assessment, and development of a preliminary Vegetation Offset Strategy.

### **Saraji East Coal Project**

*New Hope Coal, Queensland, Australia (2008)*

Jason prepared an ecological constraints report to inform the sale of the project to prospective purchasers. Involved regional ecosystem map verification and targeted threatened flora and fauna surveys across the area covered by the then Saraji EPC.

### **New Acland Coal Mine Stage 2 Project**

*New Hope Coal, Queensland, Australia (2008)*

Jason led targeted surveys for threatened Brigalow Belt Reptiles to meet DEWHA conditions of approval for the Stage 2 Project. He also facilitated negotiation of amended conditions for Stage 2 Project in relation to the monitoring of (the then) listed Bluegrass (*Dicanthium sericeum*) ecological community and developed a final land use rehabilitation plan for Stage 2 of New Acland Coal mine including rehabilitation indicators and targets for landform and revegetation.

### **Lady Annie Copper Project**

*CST Mining Group, Queensland, Australia (2005)*

Jason lead a field survey of the Lady Annie Project Area including regional ecosystem map verification, threatened flora surveys, systematic vertebrate fauna survey and production of biodiversity chapters for draft EIS.

### **Mt Clarke Copper Project**

*CST Mining Group, Queensland, Australia (2005)*

Jason was responsible for baseline Flora and Fauna Survey, Vegetation/Regional Ecosystem Mapping, technical report including impact assessment and production of biodiversity chapters for draft EIS.

### **Jellinbah Coal Project**

*Jellinbah Coal, Queensland, Australia (2005)*

Jason completed the field survey of the Jellinbah North MLA as part of the Jellinbah Plains Expansion Project including regional ecosystem map verification, threatened flora surveys, systematic vertebrate fauna survey and production of biodiversity chapters for draft EIS.

### **Timbarra Gold Mine**

*Resource Strategies on behalf of Timbarra Gold, Queensland, Australia (2005)*

Jason was responsible for Threatened Species Monitoring targeting the EPBC listed Endangered Hastings River Mouse (*Pseudomys oralis*), Vulnerable Spotted-tailed Quoll (*Dasyurus maculatus*) and other threatened species as part of mine closure programme.

### **Ginkgo Mineral Sands Project**

*Resource Strategies, on behalf of BeMaX Resources Group, New South Wales, Australia (2003)*  
Jason was responsible for implementation of the Threatened Species Survey and Translocation Programme. Pre-clearing survey protocol including mapping of habitat trees, inspection of tree hollows and night clearing of microchiropteran bat roosts.

### **Enterprise Mineral Sands, North Stradbroke Island**

*Resource Strategies, on behalf CRL, Queensland, Australia (2002 - 2003)*  
Jason was field team lead for multiple seasonal Flora and Fauna Surveys, Vegetation/Regional Ecosystem Mapping, technical report including impact assessment across the Enterprise Project area on North Stradbroke Island.

### **Duralie Coal Project**

*Resource Strategies, on behalf of Gloucester Coal, New South Wales, Australia (2002-2003)*  
Jason was field team lead for Threatened Species Survey and translocation programme. Trapping and relocation of two Vulnerable marsupial species, the Squirrel Glider (*Petuarus norfolcensis*) and Brush-tailed Phascogale (*Phascogale tapoatafa*).

### **Statford Coal Project**

*Resource Strategies, on behalf of Gloucester Coal, New South Wales, Australia (2002-2003)*  
Jason was field team lead for Threatened Species Survey and translocation programme. Trapping and relocation of two Vulnerable marsupial species, the Squirrel Glider (*Petuarus norfolcensis*) and Brush-tailed Phascogale (*Phascogale tapoatafa*). Threatened Species Survey and translocation, implementation of vegetation clearing protocols and pre-clearing fauna surveys.

### **Cadia Gold Mine**

*Resource Strategies, one behalf of Newcrest Mining, New South Wales, Australia (1998 - 2003)*  
Jason was responsible for baseline Flora and Fauna Survey, Vegetation community mapping, technical report including impact assessment under the EP&A Act for the Southern Tailings Dam expansion in 1998, southern pit extension in 2000 and annual rehabilitation monitoring of compensatory habitat areas for the project, incorporating annual monitoring for the Vulnerable Superb Parrot (*Polytelis swainsonii*) across the project area.

## **Defence**

### **RAAF Amberley Wildlife Management Strategy**

*RAAF Amberley, Queensland, Australia (2010)*  
Jason was responsible for the development of conservation significance mapping, pest management plan, ecological infrastructure strategy, revegetation strategy and ecological monitoring plan for RAAF base Amberley.

### **Biodiversity Monitoring, Bradshaw FTA**

*Australian Government, Department of Defence, Northern Territory, Australia (2008)*  
Jason was a part of a large survey team responsible for the completion of comprehensive vertebrate fauna sampling programme and habitat assessment across the 7000km<sup>2</sup> Bradshaw Field Training Area in the Bonaparte Gulf Region of the Northern Territory.

### **Threatened Species Management Plan, Mt. Bunday FTA**

*Australian Government, Department of Defence, Northern Territory, Australia (2008)*

Jason was responsible for technical review of proposed management plans for the Endangered Northern Quoll (*Dasyurus hallucatus*) and Gouldian Finch (*Erythrura gouldiae*). The 100,000 ha MBTA is located 120 km south-east of Darwin, south of the Arnhem Highway between the Mary River and Kakadu NP.

### **Threatened Species Management Plan, Delamere FTA**

*Australian Government, Department of Defence, Northern Territory, Australia (2008)*

Jason was responsible for technical review of proposed management plans for EPBC listed threatened species on the 750,000ha Delamere Air Weapons Range near Katherine in the Northern Territory.

## **Water infrastructure**

### **Nathan Dam and Pipelines**

*SunWater, Queensland, Australia (2008 - 2012)*

Jason was technical lead for targeted surveys to determine distribution, abundance, habitat requirements and population size of the Critically Endangered Boggomoss Snail (*Adclarkia dawsonensis*). Liaison with DSWEPaC appointed biometrician to development and refine population estimates and technical report in response to government submissions.

### **Connors River Sand Extraction Project**

*SunWater, Queensland, Australia (2012)*

Jason was technical lead for fauna Survey of Proposed Big Bend and Taipan Terrace Sand Extraction Areas downstream of the Connors River Dam Site. Technical report detailing occurrence of significant fauna species and proposed management strategies for sand extraction areas.

### **Connors River Dam and Pipelines**

*SunWater, Queensland, Australia (2010)*

Jason was technical lead for preparation of nature conservation (terrestrial flora and fauna) chapters of the EIS and SEIS, including impact assessment and development of mitigation strategies and management plans.

### **Chinchilla Weir Water Pipeline**

*SunWater, Queensland, Australia (2009)*

Jason was technical lead for field verification of regional ecosystems, targeted threatened flora and fauna surveys, preparation of technical report and approvals documentation for proposed 20km pipeline from Chinchilla Weir to QGC gasfields near Kogan – Included assessment of proposed alignment in the field and suggested amendments to alignment to reduce statutory approval requirements for the project.

### **Traveston Crossing Dam**

*Queensland Water Infrastructure, Queensland, Australia (2010)*

Jason was technical lead for field surveys (targeted threatened species surveys), preparation of nature conservation chapters, including impact assessment and development of mitigation strategies and management plans. Review and negotiation of some 1200 conditions relating to terrestrial ecology, presentations to Queensland Co-ordinator General and DSWEPaC.

### **Hinze Dam Stage 3**

*Gold Coast City Council, SEQ Water, Queensland, Australia (2007 – 2010)*

Jason was field team lead for terrestrial ecology, preparation of nature conservation chapter, including impact assessment and development of mitigation strategies and management plans.



Development of Compensatory Habitat Strategy, member of the Technical Advisory Panel appointed by Queensland Government to oversee project mitigation strategies.

### **Emu Swamp Dam**

*Stanthorpe Shire Council, Queensland, Australia (2007)*

Jason was responsible for the review of specialist reports, preparation of nature conservation chapters, including impact assessment and development of mitigation strategies and management plans. Development of a preliminary vegetation offset strategy for project.

### **Burnett River Dam**

*SunWater, Queensland, Australia (2007)*

Jason was responsible for development and implementation of population monitoring programme for the Vulnerable Black-breasted Button-Quail (*Turnix melanogaster*) within vegetation offset areas for the project.

## **Construction (Roads and Highways)**

### **Gateway Motorway North Duplication**

*Queensland Department of Main Roads, Queensland, Australia (2009)*

Jason was technical lead for baseline ecological surveys, REF supporting documents. Vegetation survey and mapping, threatened flora and fauna surveys, constraints analysis, impact assessment, development of mitigation and monitoring strategies.

### **Sunshine Coast Multi-Modal Transport Corridor**

*Queensland Department of Main Roads, Queensland, Australia (2007 – 2010)*

Jason was technical lead for baseline ecological surveys and EIA reports. Vegetation survey and mapping, threatened flora and fauna surveys, constraints analysis and EPBC Referral.

### **Bruce Highway Upgrade Projects**

*Queensland Department of Main Roads, Queensland, Australia (2002 - 2005)*

Jason was responsible for baseline ecological surveys, REF supporting documents. Vegetation survey and mapping, threatened flora and fauna surveys, constraints analysis, impact assessment, development of mitigation and monitoring strategies for a range of Bruce Highway Upgrade Projects.

### **Gwydir Highway Upgrade**

*New South Wales Roads and Traffic Authority, New South Wales, Australia (1999)*

Jason was responsible for baseline ecological surveys and Species Impact Statement, EIS supporting documents. Vegetation survey and mapping, threatened flora and fauna surveys, constraints analysis, impact assessment, development of mitigation and monitoring strategies.

### **Pacific Highway Upgrade, Billinudgel-Chinderah**

*New South Wales Roads and Traffic Authority, New South Wales, Australia (1997)*

Jason was responsible for baseline ecological surveys and Species Impact Statement, EIS supporting documents. Vegetation survey and mapping, threatened flora and fauna surveys, constraints analysis, impact assessment, development of mitigation and monitoring strategies.

## **Communications Infrastructure**

### **National Broadband Network**

*Visionstream, Queensland and Northern Territory, Australia (2011)*

Jason was a project ecologist on the Regional Backbone Blackspots Environmental Field Assessment, Jericho to Barcaldine and Emerald to Jericho – Field verification of regional

ecosystem mapping, surveys for threatened species and designation of appropriate Environmental Management Operating Procedures for construction contractors. Included assessment and amendment in the field of proposed Fibre Optic Cable Alignment. Alignment from Barcaldine to Emerald covered some 350km across two biogeographic regions. He was also involved in the Townsville to Tennant Creek rollout of the project in the same capacity.

## Strategic Environmental Planning

### **Ipswich Fauna Infrastructure Guideline**

*Ipswich City Council, Queensland, Australia (2009)*

Jason was Project Manager and Technical Lead for the development of a guideline for design of road-crossing fauna infrastructure across the City. Included all major road upgrades planned over a 10 year horizon. Each location was discussed with specific reference to future engineering or retrofitting requirements to permit fauna movement.

### **Ipswich City Pest Management Strategy**

*Ipswich City Council, Queensland, Australia (2009)*

Jason was Project Manager and technical lead for the preparation of an integrated Pest Management Strategy document for Ipswich City LGA, covering pest flora and fauna. The Strategy sought to integrate a range of existing initiatives and highlight high risk species in the context of future climate change.

### **Ipswich City Nature Conservation Strategy**

*Ipswich City Council, Queensland, Australia (2009)*

Jason participated in the facilitation of stakeholder workshops, was co-author of Strategy Document and Development of GIS model to determine conservation priorities based on multiple attribute analysis in GIS. The Strategy Maps underpin the Planning Scheme and set a direction for future rehabilitation projects and investment.

### **Gold Coast Nature Conservation Strategy**

*Gold Coast City Council, Queensland, Australia (2009)*

Jason facilitated stakeholder workshops and was a major contributor on technical (marine, freshwater and terrestrial ecological) elements of the Strategy and co-author of strategy document. Jason also developed a series of maps considering high value habitat areas, key connections and future opportunities for investment in revegetation.

### **Implications of Climate Change on Biodiversity, Gold Coast**

*Gold Coast City Council, Queensland, Australia (2009)*

Jason prepared a technical paper for Gold Coast City Council as a component of the Gold Coast Nature Conservation Strategy Review. The paper identified "at risk" species and ecosystems and made recommendation as to appropriate actions to minimise impacts of climate change on biodiversity values across the City.

## Appeals – Expert Witness Testimony

- Histpark Pty Ltd - ats - Maroochy Shire Council. Assessment of Ecological Issues relating to proposed tourist park and residential development, Maroochydore.
- David and Ors - ats - Brisbane City Council and Heilbronn & Partners Pty Ltd. Assessment of Ecological Issues in relation to proposed residential development at Bridgeman Downs.
- Bache - ats – Caloundra City Council and the Fraser Family Trust. Assessment of Ecological Issues in relation to proposed tourist cabin development at Reeseville.
- Noosa Chamber of Commerce and Industry and Noosa Parks Association - ats – Noosa Shire Council and Mirose Pty Ltd. Assessment of Fauna and Fauna Habitat issues in relation to the

proposed Noosa Shire Business Centre.

- Titanium Enterprises – ats – Caloundra City Council and the Queensland Environmental Protection Agency. Assessment of Ecological Issues in relation to proposed urban residential development at Caloundra.
- Gold Coast City Council – ats – Maurice DeBray. Retrospective Ecological Assessment of alleged site of illegal clearing. Heard in the Southport Magistrates Court.
- Sommerville Surveys ats Logan City Council. Proposed residential development at Beenleigh-Redland Bay Road Loganholme. Heard in the Planning and Environment Court, Brisbane.
- Queensland Department of Natural Resources and Mines – ats – H. Pham. Prosecution for illegal vegetation clearing at Toorbul, Caboolture Shire.

### Professional training

Queensland Regional Ecosystem Identification Training

New South Wales State Forests Threatened Species Survey Methods Training

### Publications

Richard, J (2001) A new locality for the rare Green-thighed frog (*Litoria brevipalmata*) in south-east Queensland. *Herpetofauna*, 31(2): 123-125.

Richard, J (2002) An Observation of Predation on A Metamorph Common Eastern Froglet (*Crinia signifera*) by the Eastern Mosquitofish (*Gambusia holbrooki*). *Herpetofauna*, 32(2).

Richard, J and Petzler, A. (2003) Results of a Survey of the Amphibian Fauna of Mooloolah River National Park. *Herpetofauna*, 33(2): 82-86.

Richard, J and Campbell, B. (2005). Observations of the Habitat of the Rare *Ophioscincus truncatus* on North Stradbroke Island. *Herpetofauna*, 34(2): 88-89.

Richard, J and Corden, C. (2005). Notes on Terrestrial Shelter Sites Selected by The Green-Striped Frog *Litoria alboguttata* On Curtis Island, Central Coastal Queensland. *Herpetofauna*, 35(2).

Richard, J. (2008) Observations of Road-kill of the Wallum Froglet on Queensland's Sunshine Coast. *Herpetofauna*, 38(2).

Fleming, D. and Richard, J. (2009). Observations of Possible Antipredator Defence Mechanism of *Cyclorana novaehollandiae* (Anura: Hylidae) At Taroom, Central Queensland. *Herpetofauna*, 39(4).

Richard, J. (2011). Diurnal Activity in the Tropical Australian Frog *Crinia bilingua*. *Herpetofauna*, 41(1).

## Andrew Dickinson

### Principal Ecologist

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#### Professional summary

Andrew is an Ecologist and Environmental Scientist with over 21 years consulting experience in Queensland, New South Wales, Victoria, Northern Territory and New Caledonia. He has worked on projects for a range of industry sectors including mining and extractive industries; road, rail, water and telecommunications infrastructure; manufacturing and processing; urban development and strategic planning for private, public and NGO clients. The scale of these has ranged from small single lot developments through to some of this country's most significant mining and industrial developments.

Andrew has broad experience in baseline terrestrial and aquatic resource assessment, weed and pest assessment, rehabilitation and revegetation, threatened species assessment, ecological planning, ecological monitoring, flora and fauna management (including spotter-catcher and vegetation removal), permits and approvals and impact assessment. Andrew has particular project experience in South Eastern and Central Queensland and northern New South Wales but has also conducted biodiversity assessments in a variety of Australian ecosystems and biogeographic regions.

He has regularly designed, managed and implemented a range of baseline ecological assessments, impact studies, strategic assessments and developed management and rehabilitation plans which address the regulatory requirements of Local, State and Commonwealth Governments. This experience has provided Andrew with an extensive understanding of relevant State and Commonwealth Legislation and equips Andrew with the knowledge to assist clients develop sustainable project solutions which respond to an increasingly complex legislative framework.

#### Education

Bachelor of Science (AES), Griffith University, Brisbane, Australia, 1990

Graduate Certificate of Environmental Management, Griffith University, Brisbane, Australia, 2002

#### Memberships/Affiliations

Association of Professional Wildlife Managers Queensland

Central Queensland Mining Rehabilitation Group

Ecological Society of Australia

Environment Institute of Australia and New Zealand

Queensland Environmental Law Association

#### Employment history

AMEC Environment and Infrastructure Pty Ltd, Principal Ecologist, Team Leader Ecology, February 2012 - present

PLACE Design Group Pty Ltd, Associate, Manager Environment, July 2006 - January 2012

Earth Tech, Queensland Manager, Natural Resources Group January 2004 - July 2006

URS Corporation, Senior Ecologist-Environmental Scientist, July 1999 - January 2004

Dames & Moore, Senior Ecologist-Environmental Scientist, October 1996 - July 1999

HLA Envirosciences, Environmental Scientist, May 1991 - October 1996

Self Employed, Ecologist, January 1991 - May 1991

Sinclair Knight and Partners, Environmental Scientist, January 1990 - January 1991

## Representative projects

Andrew is a Principal Ecologist and Team Leader – Terrestrial Ecology in AMEC's Brisbane Office. In this role he is responsible for the day-to-day management and professional development for a team of over 20 full-time and casual ecologists, as well as fulfilling and technical, peer and quality assurance roles. Andrew is also a qualified workplace health and safety officer and is an active member of AMECs Brisbane's Health, Safety and Environment Committee.

In addition to these roles, Andrew provides project direction and undertakes project management, as well as coordinating applied ecological studies servicing Commonwealth, State and Local Government Regulatory Approvals for the energy, mineral, infrastructure, industrial and urban development sectors.

### **Woleebee Lateral Draft Environmental Impact Statement (DEIS) Preclearance Surveys**

*Australia Pacific LNG, Queensland, Australia, May 2012-Present*

Preparation of Phase 1 reporting including development of field sampling protocol and coordination of flora and fauna field surveys for Australia Pacific LNG's 87km Woleebee Lateral to address Commonwealth and State Approvals.

### **Mainline Draft Environmental Impact Statement (DEIS) Reporting**

*Australia Pacific LNG, Queensland, Australia, January 2012 - Present*

Preparation of DEIS reporting for Australia Pacific LNGs Priority Areas 1, 2 and 3 to address Commonwealth and State Approvals for this 400km mainline extending from Miles to the LNG Processing Facility on Curtis Island, Gladstone.

### **Rockybar State Forest Access Track Pre-clearance Assessment**

*Australia Pacific LNG, Queensland, Australia, April 2012*

Field assessment and reporting for development of a proposed access track within Rockybar State Forest for the Australia Pacific LNG Mainline.

### **Condabri Lateral Weed Risk Assessment**

*Australia Pacific LNG, Queensland, Australia, March 2012*

Risk Assessment for Australia Pacific LNG's 73km-long Condabri Lateral. The plan is being used by construction contractors to identify weed management strategies.

### **Queensland Gas Pipeline (QGP) LNG Looping Pipeline**

*Jemena, Queensland, Australia, April 2012*

Jemena proposed to duplicate the Queensland Gas Pipeline, which extends from Wallumbilla east of Roma to Gladstone. Undertook a desktop analysis of Commonwealth and State constraints and developed a field sampling protocol to survey areas of high constraint identified during the desktop assessment.

### **Eastern High Pressure Gas Network Nature Conservation Act Approvals Gaps Analysis**

*Australia Pacific LNG, Queensland, Australia, February - March 2012*

Australia Pacific LNG: Preparation of a Gaps Analysis of the Eastern High Pressure Gas Network to determine data shortfalls requiring additional assessment.

### **Ironbark Environmental Impact Statement**

*Origin, Queensland, Australia, February 2012*

Technical review of the Ecological Assessment for the proposed Coal Seam Gas project near Tara, central Queensland.

### *PLACE Design Group, 2006-2012*

Applied ecological consulting services specialising in environmental planning and approvals, site planning (establishing developable footprint), development assessment, flora and fauna assessment, vegetation management, threatened species management (with a focus on koalas), rehabilitation and revegetation and pest management.

Andrew was the manager of environmental services based in Brisbane, responsible for Queensland operations. This role encompassed business development, financial management, recruitment, and project delivery. During his tenure, Andrew won and led a diverse range of project work, from one based principally upon urban development to also include industrial development, mining and infrastructure sectors.

### **Spotter Catcher and Fauna Management and Relocation**

*Various Clients, Eastern Australia, 1999-2012*

Provision of Spotter Catcher services and development of Fauna Management Plans at over 50 sites in Moreton Bay Regional, Sunshine Coast Regional, Townsville Regional, Logan City, Gold Coast City, Brisbane City, Redland City Local Government Areas and mines at Cloncurry north-west Queensland and south-west New South Wales. Clients have included BMD Construction, Dean Ash Constructions, Shield Contractors, LR&M, Barrick Gold, Ginko Mineral Sands, Barrick Osborne.

### **Cascade Gardens**

*Quarterback Group, Queensland, Australia July 2010 – January 2012*

Cascade Gardens is a 120 lot residential development on the emerging northern fringe of Rockhampton City. The site was encumbered by urban and non-urban zonings adjoined by National Park to the north. Originally site assessment was undertaken by other consultants and the project refused. Targeted, specific site-based investigations of remnant vegetation and of the state and nationally endangered cycad (*Cycas ophiolitica*) were undertaken and the development footprint established and validated. Through further target assessments and mapping of non-remnant vegetation and *Cycas ophiolitica*, and preparation of a bushfire plan, it was possible to demonstrate compliance under Department of Environment and Resource Managements Concurrence Agency policy *without* the need for an offset. Ultimately the project was approved by DERM in January 2012.

### **Botanica Residential Development**

*Securcorp, Woodwark, Queensland, November 2010 – December 2011*

Botanica is a 40 lot residential subdivision on a non-urban zoned elevated site to the north of Airlie Beach. The site had a number of constraints including vegetation management issues, bushfire and being situated in the coastal zone. By working proactively with the project planners, urban designers, Queensland Fire and Rescue Service and regulators, and through a responsive and strategic field based data gathering program it was possible to demonstrate compliance with Department of Environment and Resource Management vegetation and coastal policies, and local government requirements resulting in the approval of the development with a significantly reduced offset burden.

### **Botanica Vegetation Offset**

*Securcorp, Woodwark, Queensland, Australia, August 2011 – December 2011*

Botanica is a 40 lot residential subdivision on a non-urban zoned elevated site to the north of Airlie Beach. Whilst much of the development layout was developed outside of remnant vegetation, some proposed infrastructure affected *Of concern* vegetation and therefore an offset under the *Vegetation Management Act 1999* was required. Through accurate survey and identification of the extent of canopy trees, selection of an alignment which avoided canopy tree

loss, and BioCondition assessment of surrounding remnant vegetation, it was demonstrated that the *significantly exceed* offset burden identified by the *Material Change of Use Concurrence Agency Policy* could be adequately met by an on-site offset. A legally secured offset plan was developed and approved in December 2011. The project has proceeded to development.

### **Richlands Rail Alignment**

*Trackstar Alliance, Springfield, Queensland, July – September 2011*

Assessment of the extent and type of remnant and regrowth vegetation present within the development corridor to allow calculation of vegetation offsets under the *Vegetation Management Act 1999*. Project also involved assessment of the suitability of potential vegetation offset sites, and calculation of the number of potential Koala *Phascolarctos cinereus* habitat trees affected to determine offset burden under the Koala Offsets Policy. A significant deliverable was a preparation of a geospatially referenced GIS mapping layer to assist with Detailed Design.

### **Ebenezer Regional Industrial Development**

Department of Employment, Economic Development and Innovation and Ipswich City Council, *Ebenezer, Queensland, February 2010 – August 2011*

Environment technical team leader for the baseline assessment of environmental matters affecting potential development, assistance with development of structure plan and provision of justification elaborating upon decision rationale for this 6,000 ha urban footprint expansion, investigation area. Project involved significant client and stakeholder presentations and presentation to Enquiry Design workshop of community stakeholders. Liaison with Department of Environment and Resource Management and Department of Sustainability, Environment, Water, People and Communities on State Koala Policy and Strategic Assessment of impacts under matters of National Environmental Significance under the EPBC Act was undertaken.

### **Oonoonba Urban Development Area Ross River Rehabilitation Plan**

*Urban Land Development Authority, Townsville, Queensland, September 2010*

The Urban Land Development Authority was required to rehabilitate the accreting banks of the Ross River within its Oonoonba Urban Development Area for development approvals. Field investigations were carried out to identify management units and opportunities were developed with project Landscape Architects to develop an integrated, recreationally pleasing open space response that achieved good ecological outcomes.

### **UDIA EnviroDevelopment Review Panel**

*UDIA Qld, Queensland, Australia, August 2011*

The Urban Development Institute of Australia is the peak professional body representing urban development professionals and developers throughout Australia. Andrew participated on expert Ecosystems sub-group panel undertaking a national review of the UDIA's EnviroDevelopment standards, a benchmarked development standard for sustainable development.

### **UDIA Koala Forum**

*UDIA Gold Coast, Gold Coast, Queensland, March 2011*

Industry presentation for UDIA Gold Coast on technical matters of the State Koala Policy affecting consultants/developers/industry, from a consulting ecologist perspective.

### **286i Kenmore Road**

*Cassimatis Property, Belbowrie, Queensland, December 2009-December 2011*

Expert witness for Planning and Environment Court. Professional Report and liaison with Brisbane City Council for the subdivision of a site on the Brisbane River. Through site sensitive design responses to protect significant trees and provision of an offset necessary to achieve development outcomes, a mediated outcome was achieved.

### **Grantham Township Relocation Ecological Constraints Analysis**

*Queensland Reconstruction Authority, Grantham, Queensland, May 2011*

Following the Lockyer Valley flood in early 2011, the Queensland Reconstruction Authority and Lockyer Regional Council resolved to move the township of Grantham to higher ground. An assessment of the biodiversity values of the 200 ha relocation area was undertaken with identification of areas of significant regrowth and Glossy black cockatoo (*Calyptorhynchus latham*) forage habitat identified and retained in open space.

### **Mt Dore Microbat Management**

*Ivanhoe Cloncurry Mines, Selwyn Ranges, Queensland, Australia, April 2011*

Ivanhoe Cloncurry Mines: Proposed re-engagement of discontinued mining declines within the Selwyn Mining Lease Area. Previous surveys identified significant populations of microbat species within disused shafts that were proposed for re-establishment as active mines. Project involved the development and implementation of a Microbat Management Program and monitoring of the stage dispersal of the animals through radiotracking.

### **Houdini Mine Baseline Assessment**

*Ivanhoe Cloncurry Mines, Selwyn Ranges, Queensland, Australia, February 2011.*

The Houdini mining lease is situated between ICM Selwyn Leases and Osborne Mine. Project involved the baseline assessment of terrestrial ecological values of the mine lease area to assist firstly with assessing and minimizing the effects of exploratory, pre-mine drilling operations, and ultimately final mine layout.

### **Osborne Mine Baseline Assessment**

*Ivanhoe Cloncurry Mines, Selwyn Ranges, Queensland, Australia, February 2011.*

Osborne mine has been in operation since the late 1980s and ongoing mine operations were being based upon a terrestrial ecological dataset that was over 25 years old, and one collected at a time of extremely dry environmental conditions. Recognising the limitations and the fact that recent years had seen above average rainfall, ICM required a new assessment of the Osborne Operations that consolidated the existing data into a contemporary data set through commissioning a post wet assessment of terrestrial ecological values. A significant output of the project was a detailed GIS based geo-referenced constraint mapping tool to populate ICMs GIS to assist with managing current and future operations.

### **Curragh East Coal Mine Brigalow Offset**

*Wesfarmers Curragh, Blackwater, Queensland, Australia, March 2011*

BioCondition assessment of brigalow patch quality (to Department of Environment and Resource Management BioCondition Guidelines) and assessment of rehabilitation methods and targets for brigalow rehabilitation / revegetation to meet Commonwealth Approvals under the EPBC Act issued for the Blackwater Creek Diversion.

### **Blackwater Creek Diversion Rehabilitation**

*Wesfarmers Curragh, Blackwater, Queensland, Australia, November 2008-January 2011*

Development of a Revegetation Plan for a 10 km stream diversion on Blackwater Creek at Wesfarmer's Curragh East Open Cut coal mine, Blackwater. Project involved an extensive documentation package outlining the vegetation planting protocol (to achieve hydraulic and biodiversity performance objectives) species selection, monitoring and assisting the client superintend the construction of this the largest diversion attempted in the southern hemisphere.



### **Sleeman Centre High Performance Cycling Facility**

*Stadiums Queensland, Chandler, Queensland, Australia, March 2010*

Stadiums Queensland and Queensland Cycling identified the need for an off road high performance road cycling training facility. Project involved the development of an environmental constraints and opportunities analysis and footprint development to minimize disturbance by centring development of a 2.6 km criterium circuit on an existing informal track network within remnant and regrowth bushland south of the existing Sleeman Centre, Chandler.

### **Selwyn Mining Leases Targeted Ecological Assessments**

*Ivanhoe Cloncurry Mines, Selwyn Ranges, Queensland, September 2010-November 2010*

Andrew managed the established and proposed underground/open cut gold and copper mining activities in the Selwyn Ranges, 100 km south of Cloncurry. Project involved both dry and wet season terrestrial ecological assessment of seven lease groups (20 individual leases), proposed new decline, waste dump, mine infrastructure at Mt Dore and 15 km haul road to allow access to mineral processing at Osborne Mine.

### **Selwyn Mine Leases, Ecological Screening Analysis**

*Ivanhoe Cloncurry Mines, Selwyn Ranges, Queensland, February 2010-March 2010*

This project comprised a desktop analysis of publically available data sets and reporting held by ICM to determine if existing pool of knowledge assisted in addressing environmental conditions imposed by Department of Environment and Resource Management on ICM for the Selwyn Mine Area operations. The purpose of the assessment was to consolidate the knowledge and to clearly identify those conditions requiring further site based ecological assessment work.

### **Mt Dore Targeted Leases Ecological Impact Assessments**

*Ivanhoe Cloncurry Mines, Selwyn Ranges, Queensland, November – December 2010*

Ivanhoe Cloncurry Mines: Project management of established and proposed underground/open cut gold and copper mining activities in the Selwyn Ranges, North Western Queensland. Project involved both dry and wet season terrestrial ecological assessment of proposed new decline, waste dump, mine infrastructure and 15 km haul road.

### **Lucky Luke Mining Lease Ecological Assessment**

*Barrack Osborne, Selwyn Ranges, Queensland, Australia, February 2010.*

Barrack Osborne: Project manager and lead ecologist for baseline terrestrial botanical and faunal surveys, and assessment of development effects through development of a geo-referenced GIS based constraint mapping tool to implement within Barrick's Environmental Management Plan.

### **Wyaralong Dam Environmental Corridor Proposal (ECP) / Habitat Management Plan (HMP),**

*Queensland Water and Infrastructure, Wyaralong, Queensland, August-October 2009*

The ECP / HMP development of an integrated management plan addressing State and Commonwealth approval requirements (respectively) for the ongoing management and rehabilitation of over 1,700 ha of regional corridor to be set aside for fauna conservation purposes. Project involved the development of management plans for areas of passive regeneration and 800 ha of re-vegetation. Project also involved a habitat analysis, and development of strategic management principles and objectives for the 2,200 ha Mount Joyce recreation area, a mixed use open space recreation and habitat conservation area and integration into fauna crossing initiatives on Beaudesert – Boonah Road.

### **Traveston Crossing Dam Community Infrastructure**

*Queensland Water and Infrastructure, Traveston, Queensland Australia, May-September 2009*

Final route selection study assessing vegetation and habitat significance for the Garapine Mountain Bike Trail near Gympie. Project assessed areas of microhabitat significance and

threatened species within broad area of remnant and non-remnant vegetation habitat and recommended measures to avoid or mitigate impact.

### **Shute Harbour Marina Development EIS**

*Shute Harbour Marina Developments Pty Ltd, Shute Harbour, Queensland Australia 2008*

Project Manager for the terrestrial ecological impact assessment for the proposed Shute Harbour Marina EIS. Project investigated, Local Government, State and Commonwealth approvals.

### **Peachy Road Industrial Development Offset**

*Buildev Group, Ormeau, Queensland 2008*

Buildev proposed an industrial development on a greenfield site at Ormeau which contained *Endangered* vegetation. An off-site offset proposal was developed for land at Bromelton adjacent to Beaudesert and approved.

### **Coonarr Beach Residential Development**

*Walker Corporation, Coonarr Beach, Queensland, 2009*

Walker Corporation were proposing to develop a coastal residential at Coonarr Beach south of Bundaberg. The previous ecological consultants had failed to adequately demonstrate the extent of Regional Ecosystems and Essential Habitat present or address Concurrence Agency Policies under the *Vegetation Management Act*, and coastal wetlands under *Coastal Protection and Management Act*. This was affecting the ability of the client to accurately and reliably identify a developable footprint. An innovative program was developed to identify the true extent of each RE on site and map it using differential GPS technology. In doing so, the true extent wetlands and essential habitat could be mapped and this resulted in the establishment of a usable development footprint of greater area than previously understood, and also the identification of suitable pedestrian access tracks to achieve pedestrian circulation objectives and avoid clearing for them. Mapping was accepted by the Queensland Herbarium, largely unchanged and approval for the development was granted by Department of Natural Resources.

### **Snapper Mineral Sands Project**

*BEMAX Mineral Sands, Broken Hill, New South Wales 2008 - 2010*

Project management of the implementation of development approval conditions for a threatened species management plan for an open cut Paleozoic mineral sands extraction mine near Broken Hill, New South Wales. Project involved the survey and relocation of state threatened microbat species persisting within the designated mining lease as well as the translocation of habitat trees throughout various mine stages.

### **Ginkgo Mineral Sands Project**

*BEMAX Mineral Sands, Pooncarie, New South Wales 2008*

Project management of initial fauna and flora surveys for the extension of power from Pooncarie to the mining lease to provide power to the expanding Ginkgo Mineral Sands Extraction near Broken Hill, New South Wales.

### **Cowal Gold Mine Expansion Project**

*Barrack Gold, Lake Cowal, New South Wales, Australia 2006-2009*

Proposed expansion of the open cut and underground operations at the Cowal Gold Mine, Lake Cowal, New South Wales. Andrew supervised the implementation of the approved fauna management program for the Cowal Gold Mine Expansion Project. This involved the utilization of fauna trapping and survey techniques prior to the engagement of habitat clearing.

### **Moorvale Mine Camp Threatened Species Assessment**

*Macarthur Coal, Nebo, Queensland, Australia, November 2008*

Macarthur Coal proposed to construct a mine camp at its Moorvale Coal Mine. However appeals in the Planning and Environment Court required the company to conduct abundance and distribution surveys in the proposed development area for the state threatened Large-podded trefoil *Desmodium macrocarpum*. Employing detailed field transverses and differential GPS surveying, it was able to demonstrate the spatial relationship between the species and the mine camp location. An offset involving the translocation of a number of individuals to landscaped areas of the camp, including recommendations for the structure, companion planting, mulching levels and penetrating light requirements was provided.

### **Beaudesert Boonah Road Diversion**

*Queensland Water and Infrastructure, Wyaralong, Queensland, July-September 2009*

The construction Wyaralong Dam and subsequent inundation level behind the dam wall necessitated the construction of an 11km section of Beaudesert – Boonah Road to the south of the existing alignment. The diversion resulted in the loss of remnant and regrowth vegetation and significant earthworks within an identified important regional biodiversity corridor. Working closely with QWI engineers and environmental scientist, Department of Environment and Resource Management, Office of the Coordinator General and Department of Sustainability, Environment, Water, Population and Communities personnel, the need for fauna crossing infrastructure and furniture was further defined to account for current and future (post revegetation) fauna pathways. An extensive network of underpasses, exclusion fencing and furniture was specified. Project also involved assisting with onsite siting of exclusion fencing.

### **Forgan Bridge Targeted Species Assessment**

*Queensland Transport and Main Roads, Mackay, Queensland, September 2007*

Assessment of a proposed duplication of Forgan Bridge, Mackay for the State and Nationally threatened Water mouse *Xeromys myoides* and Northern quoll *Dasyurus hallucatus*.

### **BP Chinderah, Review of Environmental Factors**

*BP Australia, Chinderah, New South Wales, Australia, January 2008*

Project Manager for a review of environmental factors for a proposed a service centre on the Chinderah Bypass on the Pacific Highway, immediately north of Kingscliff, New South Wales. Field investigations identified the presence of threatened species and an endangered ecological communities necessitating preparation of a seven part test of significance under the *Environmental Planning and Assessment Act 1979*.

### **Road Corridor Environmental Assessment for Metro Region District**

*Department of Transport and Main Roads (DTMR), South-east Queensland, 2009*

DTMR sought an assessment of the ecological condition and relevant constraints within its designated road corridors within the Metro Region extending from Toowoomba to Point Lookout (North Stradbroke Island). Andrew conducted reviews of field investigations into presence and quality of vegetation and Koala *Phascolarctos cinereus* habitat within these corridors and road reserves to provide DTMR with the ability to assess any future expansion.

### **Gateway Motorway Upgrade Old Cleveland Road to Miles Platting Road Vegetation and Koala Assessment**

*Gateway Alliance, Mackenzie, Queensland, May 2008*

Project involved the expansion of the Gateway Motorway from four to six lanes. Within the corridor several areas of remnant and regrowth forest were shown to afford habitat for the threatened plant *Zieria furfuraceae* and Koala *Phascolarctos cinereus*. The two studies for which Andrew was Project Manager and report author accurately located all *Zieria furfuraceae* and

Koala habitat trees in the field through differential GPS, assessed development impacts and described offset requirements under relevant state legislation and State Planning Policy.

### **Logan Motorway Upgrade Mt Lindsay Highway to Gateway Motorway Interchange**

*Queensland Motorways, South-east Queensland, August 2009*

Project manager for the analysis of clearing Koala *Phascolarctos cinereus* habitat and offset provisions under the South East Queensland State Planning Regulatory Provisions and State Planning Policy 2/10: Koala Conservation in South East Queensland.

*Earth Tech Pty Ltd, 2004-2006*

Andrew was the Queensland Manager for the Natural Resources Group of Earth Tech based in Brisbane. This role encompassed business development, financial management, recruitment, and project delivery, reporting to the National Director. Andrew was also lead ecologist for Queensland during this time undertaking applied ecological assessments for urban development, extractive industries, mining, infrastructure and Department of Defence projects. Some representative projects are included.

### **Wetland Rehabilitation Projects**

*Various clients, South east Queensland*

Assessment of ecological biodiversity, wetland and waterway values and development of frog habitat restoration strategies, management plans, wetland planting plans and construction documentation for five residential development sites in Brisbane.

### **Phosphate Hill Mine Dewatering**

*WMC Resources Limited, Phosphate Hill, Queensland, 2005*

WMC proposed to discharge extracted pit water into Kolar Creek a tributary of the Burke River (Lake Eyre Catchment). Project involved long term analysis of effects on riparian vegetation and habitat arising from permanent discharge of water into an arid system through establishment of monitoring sites, development of a sampling protocol and implementation of the first round of monitoring.

### **Pine Mountain Quarry Ecological Assessment and Opportunities Analysis**

*Boral, Mount Gravatt East, Queensland, 2004-2006*

Quarrying had ceased at Boral's Pine Mountain Quarry at Mt Gravatt East on Brisbane's southern fringe, and Boral wished to explore opportunities for the sites post mine operations. This project extending over several years involved the initial analysis of site ecological values (including the identification of the presence of several plants and animals significant within Brisbane City including some state *Endangered*, *Vulnerable* and *Near Threatened* species) and working with planners to develop future land use options, including urban development within Environmentally sensitive areas which necessitate design responses which balanced inherent values, and rehabilitation.

### **Isaac River Monitoring Moranbah North Underground Mine**

*Anglo Coal, Moranbah, Queensland, 2006*

Riparian vegetation condition monitoring of subsidence rehabilitation works on the Isaac River (including the site of the first river diversion on the Isaac River) at Maroondah North Underground Mine.

### **Walker Creek Diversion Baseline Assessment**

*BHP Mitsui Coal South Walker Mine, Queensland, 2005*

Baseline terrestrial vegetation and soils assessment of the site of the proposed 100 ha mine expansion and diversion of Walker Creek at South Walker Mine. Project also involved the

development of rehabilitation plans for the 3km diversion of Walker Creek at the South Walker Mine.

### **Broadmeadow Vegetation Management Strategy**

*BMA Coal, Broadmeadow Mine, Queensland, 2006*

Assessment of vegetation communities, significance and development of a management and monitoring strategy to assess the effects of underground mining subsidence at Broadmeadow Underground Mine (adjacent to Goonyella Mine), Northern Bowen Basin.

### **Broadmeadow South and Grosvenor Mine Leases**

*Anglo Coal, Moranbah, Queensland, 2005*

Preliminary pre-EIS geomorphology and riparian vegetation assessment within both mine leases investigating likely effects of subsidence from underground mining.

### **Harrow and Cherwell Creek Diversion Monitoring**

*BMA Coal Queensland, Australia, 2004, 2005*

Annual riparian monitoring of the riparian condition of Harrow Creek and two diversions on Cherwell Creek at BMA's Peak Downs Mine. Diversion condition was assessed using the Index of Diversion Condition method, a modification of the Index of Stream Condition. Monitoring also focused on developing new monitoring sites, prior to re-engagement of a meander loop on the creek.

### **Saraji Mine Diversion**

*BMA Coal, Queensland, Australia, 2005*

Development of a rehabilitation and revegetation plan for a 3.5km stream diversion of Spring Creek on the southern perimeter of Saraji Mine.

### **Nikenbah Environmental Impact Statement**

*Ergon, Hervey Bay, Queensland, November 2005-June 2006*

Project manager for an impact assessment on the proposed Ninkenbah 66kV powerline, a 23km high voltage powerline and substation between Maryborough and Hervey Bay. Significant issues requiring comprehensive environmental assessment and risk management included threatened regional ecosystems, essential habitat for wallum froglet and salinity management.

### **Greenbank Training Area (GBTA) Exclusion Fencing Study**

*Department of Defence, Greenbank, Queensland, 2005*

With increasing residential development into the area around the GBTA, Defence was experiencing increased incursions by civilians into this active live ammunition training facility. Seeking to reduce potential interaction risks to a low as practical, Defence proposed the installation of a 1.8m barbed wire topped exclusion fence. As GBTA is positioned within the significant Flinders Peak-Greenbank-Karawatha regional ecological corridor, potential effects to regional movement of fauna needed to be assessment and mitigated. A review of fauna present within the corridor was assessed to determine those species most affected by a significant barrier and means of facilitating movement through the new barrier were developed in consultation with range staff and Defence environment personnel. The resulting report was reviewed by a cross government panel of Commonwealth, State and Local Government land managers from within the corridor and accepted. The exclusion fence has been accepted and the majority of the permeability treatments resulting in animal utilization and significant reduction in civilian incursions.

### **Larapinta Ecological Assessment**

*Queensland Rail, Larapinta, Queensland Australia 2005*

Impact analysis of a proposed rail siding and industrial development at Larapinta (Paradise Road) in Brisbane's south. Project involved assessment of the flora and fauna and conservation status of the communities present on site. The identified communities were compared to identify representatives of regional ecosystems (RE) present on site. Also involved major revision of RE mapping (property map of assessable vegetation (PMAV)) for the site under the *Vegetation Management Act 1999*.

### **Enoggera Close Training Area**

*Department of Defence, Enoggera, Queensland, 2005*

Defence recognised that very little information existed on the natural values of its 400 ha close training area adjacent to Gallipoli Barracks (Enoggera) to allow it to effectively manage the ecological values of the Enoggera Close Training Area (ECTA) adjacent to Gallipoli Barracks. This project was the first to comprehensively sample the terrestrial flora and fauna and contributed greatly to knowledge of the site allowing environment officers to develop plans of management for the site and areas of ecological significance. Values included the expansion of knowledge of Native jute *Corchorus cunninghamii* populations, identification of Powerful owl *Ninox strenua* breeding sites, and detection of the presence of Yellow bellied gliders *Petaurus australis* previously believed locally extinct within Brisbane City.

### **Enoggera Close Training Area Bushfire Management Plan**

*Department of Defence, Enoggera, Queensland Australia 2005*

Building upon data collected for the botanical assessment of ECTA, a comprehensive GIS based bushfire management plan which identified risks and hazards was developed with the purpose of identifying prescribed ecological and fuel reduction burns.

*Dames & Moore / URS Corporation 1996-2004*

Andrew was a Senior Ecologist – Environmental Scientist co-ordinating, leading and undertaking applied ecological assessments and assisting with the project management of environmental impact assessments for industrial and mining facilities in Queensland, New South Wales, Northern Territory and New Caledonia. Some representative projects are included:

- Telecommunications Facilities and Infrastructure roll-out, Telstra Corporation, Queensland Australia: Preparation of over 40 assessments of facility upgrades, cable roll out and new infrastructure with respect to Matters of National Environmental Significance.
- Telecommunications Facilities and Infrastructure roll-out, Telstra Corporation, Queensland Australia: Assessment of noxious and declared weed outbreaks post construction at six facilities within Queensland.
- Duaringa Weir IAS, Duaringa, central Queensland, 2001: Responsible for the conceptualisation, development, sampling design, implementation of ecological studies for a proposed Weir on the Dawson River. Team leader supervising all aspects of the project and was responsible for project write up. Conducted all terrestrial and aquatic fauna and habitat assessments including finfish and macroinvertebrate surveys, and background data collection, manipulation, synthesis and analysis and peer review of vegetation report. Project also involved assessment of river sites utilising the Anderson Method of river condition.
- Wet Tropics Management Plan, Telstra Corporation and Transfield Services, 2000: Development of an Environmental Management Plan for the 12 telecommunications sites Telstra maintains within the Wet Tropics World Heritage Area, Townsville to Cooktown.
- Goro Nickel Project, Goro INCO, New Caledonia, 2000: Assessment of power station emission effects upon vegetation.

- Australian Magnesium Project, Australian Magnesium Corporation, Stanwell Queensland: baseline terrestrial flora assessment and analysis of impacts arising from development of over 120km of services corridors.
- Evans Head Air Defence Weapons Range, Department of Defence, New South Wales 2000: Baseline fauna assessment and development of a management plan for range operations.
- Amberley Air Base, Department of Defence, Queensland Australia 1999: Baseline flora and fauna assessment and development of a management plan for operations at RAAF Base Amberley and Purga Small arms range.
- Glen Wilga and Sefton Park Coal Mines EIS, Queensland Australia 1998: Project Manager for baseline terrestrial and aquatic ecological assessments south of Chinchilla.
- LG Chem EIS, LG, Queensland Australia 2003: Assistant project manager, and team leader terrestrial ecological studies within the Aldoga Industrial Area, adjacent to the Narrows, Gladstone.
- Mt Arthur North Coal Mine EIS, COAL Operations of Australia Ltd, New South Wales, Australia, 1998: Baseline terrestrial ecological assessments on the 3,700ha MAN mine lease, upper Hunter Valley.
- Australian Magnesium Project, Australian Magnesium Corporation, Stanwell Queensland, 1998: Assistant Project Manager and team leader for baseline terrestrial flora assessment and analysis of impacts arising from development of the Australian Magnesium Project, Stanwell.
- Gove Alumina Refinery Stage 2 Expansion EIS, Alcan, Nhullunbuy Northern Territory, 2002: Team leader for terrestrial ecology assessments and ecologist undertaking baseline flora assessment.
- Marburg Highway Diversion Duplication, Department of Main Roads, Queensland Australia 1998: Review of Environmental Factors for upgrading of existing highway duplication.
- Bli Bli Quarry Rapid Ecological Assessment, Maunsell McIntyre, Queensland Australia, 1998: Ecological assessments for end use quarry planning and rehabilitation, including assessment of state threatened species presence (Richmond Birdwing Butterfly *Ornithoptera richmondia* habitat and distribution of larval host vine *Pararistolochia praevenosa*) and habitat protection.
- Maroochy Road Upgrade, Department of Main Roads, Queensland 1997: Assessment of the vulnerable Richmond Birdwing Butterfly *Ornithoptera richmondia* habitat and distribution of larval host vine *Pararistolochia praevenosa* within rainforest habitat areas subject to impact from proposed upgrades to Maroochy Road, Sunshine Coast, South-east Queensland.
- Linkfield Road Bridge, Department of Main Roads, Queensland 1998: Rapid terrestrial and aquatic ecological assessment, including construction, revegetation and maintenance plans for the proposed Linkfield Road Bridge across the South Pine River at Brendale, South-east Queensland, including development of fauna management plan for resident platypus (*Ornithorhynchus anatinus*).
- Redland Bay Road Upgrade, Department of Main Roads, Queensland 1997: Investigation of road duplication and median and design options at Redland Bay Road, Alexandra Hills South-east Queensland. Measures to minimise and ameliorate greater glider (*Petauroides volans*) habitat loss and measures to mitigate road kill and to assist in the dispersal of Koala (*Phascolarctos cinereus*) were reviewed.
- Ely Bauxite Mine EMOS, Weipa, Comalco Queensland 1997: Development of Environmental Management Overview Strategy including identification of commitments for rehabilitation requirements, flora and fauna conservation plans, exotic species and fire management and identification of standards for monitoring plans and mitigating measures.

- Hendra Industrial Estate Environmental Assessment Report, Brisbane, Queensland: Biological and Planning Assessments and recommendations for site management, landscape treatments incorporating a strategy for maintaining and enhancing the availability of wetland habitat on the site, and expert witness for Planning and Environment Court appeal investigating what reasonably constituted a wetland.
- Metroplex on Gateway EIS, Murrarie, Queensland 1997: Review of flora, fauna and conservation values of a 65 ha site located adjacent to the Brisbane River to determine any significant biological or conservation constraints or issues and to assess the impact resulting from the creation of a mixed industry and business area. Significant issues were impacts of locally significant squirrel gliders (*Petaurus norfolcensis*), retention of wetland and the provision of mitigation measures for raptor species and birds covered by international agreements.
- St. Vincents Road Frog Assessment, Nudgee, Queensland, 1998: Assessment of frog diversity, abundance and habitat utilisation with respect to a proposed residential village development, and recommendation for habitat retention and enhancement.
- Kedron-Wavell Services Club Frog Assessment, Kedron, Queensland 1998: Assessment of frog diversity, abundance and habitat utilisation with respect to a proposal to reclaim wetland for the creation of playing fields. Recommendations included strategies for creating new habitat for a range of species considered threatened within Brisbane City.
- Southern Gold Coast Tweed Transport Planning Corridor Study, Queensland Transport, 1996: Assessment of terrestrial and aquatic ecological factors for an integrated transport network analysis of the southern Gold Coast region. Screening studies involved assessing ecological constraints for the 30km<sup>2</sup> study area across three levels of government and five government jurisdictions (Commonwealth, Queensland, New South Wales, Gold Coast City and Tweed Shire).

#### *HLA-Envirosciences 1991-1996*

Andrew was a Senior Ecologist – Environmental Scientist coordinating, leading and undertaking applied ecological assessments, contaminated land assessments; occupational, para-occupational and environmental health monitoring, water quality assessments, environmental noise assessments, Asbestos containing materials auditing and removal plans. Some key projects are included:

- Warrego Highway Diversion EIS, Terrestrial and Aquatic Flora and Fauna Assessment
- Narangba Industrial Estate IAS, Biological and Water Quality Investigations
- Burdekin Hydro-electric Peak demand Scheme, Environmental Screening Study
- Dynamic Lifter EIS, Data Collection and Preparation
- Logan Motorway Duplication Environmental Monitoring
- Waste Transfer Station and Landfill Air, Water and Noise Construction Monitoring
- Environmental (air and water) Monitoring, Glasshouse Mountains Quarry
- Baseline Flora and Fauna Studies, Gladstone Harbour EIS.
- Stuart Oil Shale IAS, Terrestrial Flora and Fauna Investigations
- Newhope Open Cut Coal Pit Hydrological and Water Quality Assessment

#### *Sinclair Knight & Partners 1990-1991*

Andrew was an Ecologist – Environmental Scientist undertaking applied terrestrial and aquatic ecological assessments and contaminated land assessments for road and pipeline infrastructure,



industry and resort developments throughout Queensland and New South Wales. Some key projects are included:

- Weyba Creek Bridge Initial Advice Statement and Estuarine Resource Survey
- Twin Waters Mooloolaba EIS, Baseline Benthic Invertebrate Assessment
- Kings Forest Spine Road EIS, SEPP 14 Wetland Assessment
- BHP Blast Furnace (Port Kembla) EIS, Project Work
- Dorrigo Forest Management Area EIS, Project Work
- Russell Island 110Kv Duplicate Powerline EIS, Management and Project Work
- Koala Habitat Impact Assessment, Burbank.

## Appendix C: Habitat Results per Pipeline Section

The following table provides a quantification of the General Habitat, Essential Habitat and Core Habitat for each Threatened or Migratory fauna species that has been identified during the associated pre-clearance surveys and additional interpretation of the survey results to identify such habitat.

Results are presented as follows:

Pipeline Section	Table Reference
Condabri Lateral (approx. KP 22-Hub)	Table 10
Mainline - Hub to Midline Station (approx. KP 0-175)	Table 11
Mainline - Midline Station to MLV2 (approx. KP 175-255)	Table 12
Mainline - MLV2 to Dawson Highway Crossing (approx. KP 255-293)	Table 13
Mainline - Dawson Highway to MLV4 (approx. KP 293-355)	Table 14
Mainline - MLV4 to LNG Facility (approx. KP 255-366)	Table 15
Woleebee Lateral (approx. KP 43-Hub)	Table 16

Table 10: Description of General, Essential and Core Habitat for Threatened and Migratory Fauna Species, Condabri Lateral KP 22-Australia Pacific LNG Hub

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Birds</b>							
Caspian tern	<i>Hydroprogne caspia</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species within the ROW comprises larger riparian vegetation. No other vegetation identified within or adjacent the ROW contained suitable riparian values.	25.679	25.858	3.06
					44.563	44.564	
					44.567	44.885	
					61.332	61.428	
					66.666	66.957	
					68.522	68.548	
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. This species typically forages in coastal areas or less frequently in terrestrial wetlands, preferring large expanses of water and complex aquatic ecosystems. No aquatic habitat values of this type were identified within the ROW or have been noted as occurring in the broader region.  Breeding is known from coastal environments and islands off the Queensland coast as well as large inland lake or wetland habitats. No breeding habitat was identified within the ROW or other areas within the broader region.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
eastern osprey	<i>Pandion cristatus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises riparian vegetation proximate to permanent water. Transient individuals may be observed in these areas, most notably those larger river systems such as the Condamine River.</p> <p>No other vegetation identified within the ROW contained suitable riparian values with permanent water.</p>	25.679 44.563 44.567 61.332 66.666 68.522	25.858 44.564 44.885 61.428 66.957 68.548	3.06
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The occurrence of this species is strongly associated with large expanses of open water, which are essential for foraging and therefore successful breeding. Nest sites, which are utilised over many generations are strongly associated with extensive areas of open fresh, brackish or saline water. Such waterbodies are absent from the ROW. No nesting sites were observed within or in close proximity to the ROW.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The fork-tailed swift is a highly mobile aerial species that breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats. This species is potentially found in both remnant and disturbed habitats. General Habitat for this species comprises all remnant vegetation within the ROW.</p>	Entire ROW	Entire ROW	202.97
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for the fork-tailed swift within the ROW as it is a highly mobile, aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats including those found within the ROW. No habitat in Australia is critical to the maintenance of this species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<b>General Habitat</b> The rainbow bee-eater is a highly mobile species that is potentially found in remnant and non-remnant vegetation throughout the ROW and surrounding region. General Habitat for this species within the ROW comprises all remnant vegetation.	Entire ROW	Entire ROW	202.97
				<b>Essential Habitat</b> Essential Habitat for this species within the ROW comprises patches of suitable vegetation where suitable soil and burrows excavated by this species are present. These riparian areas including Bottle Tree Creek, L Tree Creek and the Condamine River provide both foraging and breeding opportunities for the species that are important in the local and regional context. Areas of General Habitat lacking suitable soils and burrows are not considered Essential Habitat as they are unlikely to provide breeding sites for these species.	25.679 47.524 50.186 61.332 62.851 63.158 64.055 66.666	25.858 49.774 50.354 61.428 63.170 64.059 66.185 72.097	45.39
				<b>Core Habitat</b> Through a consideration of the below factors, it is determined that no core habitat exists for the rainbow bee-eater within the ROW. <i>Australian Distribution</i> The rainbow bee-eater is distributed across much of mainland Australia. <i>Population Information</i> Lakefield National Park and Clemant Forest Reserve. <i>Recovery Plan</i> There is <i>no</i> recovery plan for this species. <i>Policy Statement and Guidelines</i> There are no policy statements or guidelines for this species.	0.0	0.0	0.0
red goshawk	<i>Erythrotriorchis radiatus</i>	V	E	<b>General Habitat</b> The red goshawk is a highly mobile species with a preference for tall vegetation proximate to riparian areas. This species has a very large home range and therefore it is considered that General Habitat for this species comprises all remnant vegetation within the ROW.	44.57 61.33 66.67 68.52	44.89 61.43 66.96 68.55	2.52

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises large areas of remnant vegetation with a high level of connectivity in proximity to permanent water. These areas provide both foraging and breeding opportunities for the species.</p> <p>The northern portions of the Condabri Lateral intercept a large area of remnant vegetation. The majority of this remnant vegetation remains connective with the Barakula State Forest and large areas of remnant vegetation to its west, east, north and south. These areas cover a significant portion of the greater region and provide Essential Habitat for red goshawk. Within the immediate locality of the Condabri Lateral a number of moderate and large waterways occur and provide permanent water. Further, vegetation found within and surrounding these areas provides suitable habitat diversity and structure to yield sufficient prey for this species.</p>	44.57 61.33 66.67 68.52	44.89 61.43 66.96 68.55	2.52
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the red goshawk within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The red goshawk is very sparsely dispersed across approximately 15% of coastal and sub-coastal Australia, from western Kimberley Division (north of 19°S) to north-eastern NSW (north of 33°S) and occasionally on continental islands (Aumann and Baker-Gabb 1991, Marchant and Higgins 1993).</p> <p><i>Population Information</i></p> <p>No relevant information provided.</p> <p><i>Recovery Plan</i></p> <p>The red goshawk probably occurred throughout the coastal lowlands of eastern Queensland; this segment of the population has largely disappeared (Czechura and Hobson 2000). Czechura (1996) concluded that red goshawks occur across southern Queensland to at least the western slopes of the Great Dividing Range. Marchant and Higgins (1993) suggested that the population in south-east Queensland was likely to be isolated, though</p>	0.0	0.0	0.0

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p>this was repudiated by Czechura (1996). Red goshawks in the south are mostly in areas of rugged terrain; though some spend the winter in fragmented habitat on the coastal plains. Most of the more recent locality records for both southern and northern Queensland birds are in existing national parks or state forests. Debus <i>et al.</i> (1993) considered north-east Queensland (north of 20° S) and eastern Cape York Peninsula to be the strongholds for the species in eastern Australia; this is corroborated by extensive field surveys (Czechura and Hobson 2000, Czechura 2001).</p> <p><i>Policy Statement and Guidelines</i></p> <p>No policy statement or guidelines exist for this species.</p>			
rufous fantail	<i>Rhipidura rufifrons</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises a highly-connected patch of RE 11.3.25 associated with L Tree Creek. Transient individuals may be observed in these areas during their migration.</p>	61.332	61.428	0.31
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. Specific breeding requirements for this species are not well known however, moist, dense forest is understood to be an important nesting requirement which was not present within the ROW. The General Habitat values identified in the patch of RE 11.3.25 associated with L Tree Creek are not suitable for breeding, due to lack of moist forest.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises a highly-connected patch of RE 11.3.25 associated with L Tree Creek. Transient individuals may be observed in these areas during their migration.</p>	61.332	61.428	0.31

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The General Habitat values identified in the patch of RE 11.3.25 associated with L Tree Creek are not suitable for breeding, due to lack of dense, moist gully vegetation. Foraging opportunities identified in this location are not considered essential to the maintenance of a population and do not constitute Essential Habitat.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises patches of remnant vegetation where moderate groundcover vegetation is present. The squatter pigeon is a highly mobile species that is found in the grassy understory of <i>Eucalyptus</i>, <i>Acacia</i>, <i>Angophora</i> and <i>Callitris</i> woodlands. This species forages terrestrially, typically close to water sources.</p>	Entire ROW	Entire ROW	202.97
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species comprises remnant vegetation which is proximate to permanent water and supports suitably dense groundcover that provides breeding habitat. Larger riparian habitats within the broader locality such as L Tree Creek, Bottle Tree Creek and Dogwood Creek have the potential to support permanent water however, farm dams and cattle watering points also provide suitable water sources for this species in the wider region.</p>	25.679 44.563 44.567 57.343 61.332 62.851 63.158 66.666 68.522	25.858 44.564 44.885 58.116 61.428 63.170 64.059 66.957 68.548	10.92



Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the squatter pigeon (southern) within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range. Its distribution extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone) and south to scattered sites throughout south-east Queensland (Frith 1982, Higgins and Davies 1996, Schodde and Mason 1997, Storr 1984). Overall, the distribution of the squatter pigeon (southern) is said to extend from 19° S to 29° S and from 141° E to 153° E (EPA 2006).</p> <p><i>Population Information</i></p> <p>The species is thought to occur as a single, contiguous (i.e. inter-breeding) population. The total population size of the species is likely to be stable at present (Garnett and Crowley 2000). Historically, many local or regional populations of the species declined markedly during the late 19<sup>th</sup> and early 20<sup>th</sup> centuries (Barnard 1927, Barnard and Barnard 1925, Campbell 1924, Frith 1982, Morris <i>et al.</i> 1981, North 1913-1914). However, the decline in numbers has slowed and the species remains locally abundant at some sites at the northern limits of its distribution (Garnett and Crowley 2000).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for the squatter pigeon (southern).</p> <p><i>Policy Statements and Guidelines</i></p> <p>Approved conservation advice states that the squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range, with a distribution that extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone) and south to scattered sites throughout south-east Queensland.</p>	0.0	0.0	0.0

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species within the ROW comprises large riparian vegetation that is highly connected to other vegetation communities and contains waterways or is adjacent to large bodies of water. Transient individuals may be observed in these habitats particularly where suitably large bodies of water occur and large farm dams which afford suitable foraging habitat occur in the vicinity.	25.679 44.563 44.567 61.332 66.666 68.522	25.858 44.564 44.885 61.428 66.957 68.548	3.06
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The occurrence of this species is strongly associated with large expanses of open water, which are essential for foraging and therefore successful breeding. Nest sites, which are utilised over many generations are strongly associated with extensive areas of open fresh, brackish or saline water. Such waterbodies are absent from the ROW. No nesting sites were observed within or in close proximity to the ROW.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species comprises the remnant vegetation where suitable foraging habitat is present including cleared areas. This species is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.	Entire ROW	Entire ROW	202.97
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The white-throated needletail is a highly mobile, non-breeding visitor to Australia which is primarily an aerial species which feeds and roosts on the wing. It overflies a wide variety of terrestrial habitats however none of these are considered essential the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Mammals</b>							
large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	V	<b>General Habitat</b> General Habitat for this species within the ROW comprises highly-connected patches of remnant vegetation in the northern sections of this alignment, particularly where rocky features are present. No other RE associated with the species were identified that contained suitable rocky feature microhabitat. This species may utilise hollows found in live hollow-bearing trees, however maternity sites are generally formed in suitable cave habitats.	50.186 52.129 66.666 68.522	50.353 52.191 66.957 68.548	1.92
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The species requires cave habitats for breeding and roosting purposes. These caves need to be situated within or proximate to suitable foraging habitat. These ecological values were absent from the ROW and adjacent areas.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
northern quoll	<i>Dasyurus hallucatus</i>	E	SLC	<b>General Habitat</b> General Habitat for this species within the ROW comprises highly-connected remnant vegetation within the northern sections of the ROW, generally associated with Barakula State Forest and the remnant vegetation surrounding it. REs with lesser connectivity to surrounding vegetation are not considered General Habitat.	25.679 61.332 62.851 66.666 68.543	25.858 61.428 64.059 68.528 72.097	27.23
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. This species typically inhabits higher relief environments which support rugged scarps and rocky habitat providing suitable denning sites and complex foraging habitats. Environments supporting rocky areas of suitable complexity supporting large diameter trees, termite mounds and hollow logs for foraging and denning are absent from vegetation within and surrounding the ROW. General Habitat identified in the ROW is therefore not considered essential to the maintenance of the species.	0.0	0.0	0.0

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW					
					KP In	KP Out	Area within ROW (ha)			
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0			
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	V	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises highly-connected patches of remnant vegetation where riparian vegetation and suitable vegetation structure is present which includes hollow bearing trees which are utilised for denning purposes.</p>	43.923	44.376	34.02			
				<p>50.186</p> <p>52.129</p> <p>60.945</p> <p>61.420</p> <p>62.154</p> <p>62.851</p> <p>66.159</p> <p>66.666</p> <p>66.954</p> <p>68.543</p>	50.353	52.191		61.338	61.708	62.615
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises highly connected parcels of remnant vegetation proximate to or within areas of riparian vegetation, where a variety of hollow bearing trees occur (particularly trees which develop hollow trunks which can support maternity sites e.g. ironbarks). This species is known to occur within the large tracts of remnant vegetation associated with Barakula State Forest and the surrounding remnant vegetation.</p>	43.923	44.376	34.02			
					50.186	50.353				
					52.129	52.191				
					60.945	61.338				
					61.420	61.708				
					62.154	62.615				
					62.851	64.059				
					66.159	66.400				
					66.666	66.957				
					66.954	68.528				
					68.543	72.097				

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the south-eastern long-eared bat within the ROW.</p> <p><i>Australian Distribution</i></p> <p>In Queensland, the species is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park. It has been recorded as far north as the Expedition Range and Dawson River areas.</p> <p><i>Population Information</i></p> <p>No information provided,, other than 7-9% capture rates in the Brigalow Belt South Bioregion and in northern NSW.</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statements and Guidelines</i></p> <p>No policy statements or guidelines exist for this species.</p>	0.0	0.0	0.0
<b>Reptiles</b>							
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	V	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises one patch of RE 11.3.14 which is proximate to a mapped watercourse. This area of remnant vegetation is connective with a large patch of remnant vegetation and contains suitable, logs, leaf litter and sticks, cracking clays and groundcover.</p>	50.186	50.353	0.60
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species occurs within the ROW. The area identified as General Habitat forms a small part of a much larger complex of remnant vegetation which encompasses Barakula State Forest. This area intersecting Bottle Tree Creek supports a high density of microhabitat features such as logs, leaf litter, appropriate shelter habitats and burrowing substrates which are important for this species to forage and breed.</p>	50.186	50.353	0.60

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that core habitat DOTES exist for the brigalow scaly-foot within the ROW. The ROW intersects remnant vegetation that is contiguous with Barakula State Forest. Barakula State Forest is considered to be an area of known presence and constitutes an important population for the species. In the absence of ground-truthed information to suggest otherwise, it is considered likely that some form of habitat for this species is present within the remnant vegetation that is located between this section of the alignment and Barakula State Forest.</p> <p><i>Australian Distribution</i></p> <p>Recorded localities of this species include Collinsville, north of Capella, Blackwater, Dysart, Moranbah, Copabella, Nebo, Emerald, Gladstone, Lilly Hills Reserve on Boyne Island, Wandoo Station near Moura, Moura, south-east of Theodore, Coomingleh, Salvator Rosa, Idalia National Park, Tambo, Cracow, Winderera, north of Murgon, west of Wallumbilla, Carnarvon National Park, Dunmore State Forest near Cecil Plains, Kolonia Station near Wandoan, Golden Plateau via Taroom, Eena State Forest, Inglewood, <b>Barakula State Forest</b>, the Chesterton Range near Charleville and Alpha (Agnew 2010 pers. Comm., Cogger <i>et al.</i> 1993, Covacevich <i>et al.</i> 1996, Matrixplus Consulting 2010, Schultz and Eyre 1997, Tremul 2000, Wilson and Knowles 1988).</p> <p><i>Population Information</i></p> <p>Important populations of this species occur in large contiguous areas of remnant vegetation that are suitable for the species, such as the Central Queensland sandstone rises, the Blackwater/Blackdown Tablelands region, the Moura/Theodore region and the Boyne Island area. Such areas of remnant vegetation are considered important strongholds for the species. Any populations found in such habitats are, therefore, important (Brigalow Belt Reptiles Workshop 2010).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p>	50.186	50.353	0.60

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><i>Policy Statements and Guidelines</i></p> <p>The Conservation Advice Statement for the species states that the brigalow scaly-foot is known from the Queensland Brigalow Belt, from Inglewood on the southern downs, north to Emerald and east to Gladstone and Boyne Island.</p> <p>The Draft Referral Guidelines for Nationally Listed Brigalow Belt Reptiles states that the species is found in open forests to woodlands in Queensland with RE Land Zones 3, 4, 5, 7, 8 (near the periphery of Land Zone 10), 9 and 10.</p>			
Dunmall's snake	<i>Furina dunmalli</i>	V	V	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises RE 11.3.25 in proximity to L Tree Creek where vegetation of a suitable patch size and connectivity occurring in riparian or wetland areas and containing abundant groundcovers and woody debris/logs.</p>	61.332	61.428	0.31
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species occurs within the ROW and is found on L Tree Creek. This parcel of vegetation forms part of a large complex area of remnant vegetation associated with Barakula State Forest. This connectivity provides movement opportunities through the broader landscape. This section of L Tree Creek supported abundant groundcovers, woody debris/logs, foraging (amphibian and reptilian) and shelter habitats required by this species.</p>	61.332	61.428	0.31

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the Dunmall's snake within the ROW.</p> <p><i>Australian Distribution</i></p> <p>This species occurs primarily in the Brigalow Belt region in the south-eastern interior of Queensland. Records indicate sites at elevations between 200 m and 500 m above sea level. The snake is very rare or secretive, with limited records existing. It has been recorded at Archokoora, Oakey, Miles, Glenmorgan, Wallaville, Gladstone, Lake Broadwater, Mount Archer, Exhibition Range National Park, roadside reserves between Inglewood and Texas, Rosedale, Yeppoon and Lake Broadwater Conservation Park (Cogger <i>et al.</i> 1993, Covacevich <i>et al.</i> 1988, Covacevich <i>et al.</i> 1996, McDonald <i>et al.</i> 1991). The species has also been recorded near the Bruxner Highway, approximately 5 km north-west of the Texas Road intersection, in October 2007 (Stephenson and Schmida 2008).</p> <p><i>Population Information</i></p> <p>Given the rarity and difficulty of detecting this declining species, all suitable habitats (remnant or non-remnant vegetation) that are coincident with the known locations of the species are considered important habitats.</p> <p>Whilst the species has been recorded in Expedition National Park and Lake Broadwater Conservation Park, the species is not actively managed in these reserves (Cogger <i>et al.</i> 1993, Covacevich <i>et al.</i> 1988, Covacevich <i>et al.</i> 1996, McDonald <i>et al.</i> 1991).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statements and Guidelines</i></p> <p>No policy statement exists for this species.</p> <p>The Draft Referral Guidelines for Nationally Listed Brigalow Belt Reptiles states that the species is found in forests to woodlands within the range of the species.</p>	0.0	0.0	0.0



Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
yakka skink	<i>Egernia rugosa</i>	V	V	<b>General Habitat</b> General Habitat for this species within the ROW comprises patches of RE 11.3.14 associated with Bottle Tree Creek and in proximity to another un-named riparian habitat. No other RE associated with the species was identified with appropriate patch size or connectivity values or sufficient groundcover or woody debris for the species to take refuge in.	66.666 68.522	66.957 68.548	1.20
				<b>Essential Habitat</b> The areas of General Habitat for this species within the ROW support suitable microhabitat features such as rocky outcrops, suitable soil types which allow for burrowing (to create suitable communal shelter sites), actual burrows (potentially supporting populations of this species) and an appropriate landscape context (within a large patch of remnant vegetation which is connected to Barakula State Forest) to provide Essential Habitat for this species.	66.666 68.522	66.957 68.548	1.20

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the yakka skink within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The known distribution of the yakka skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt (North and South), Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula Bioregions. Locations range from the Queensland/New South Wales border to Mungkan Kandju National Park on Cape York Peninsula and from Bundaberg and the region west of Gympie to Mariala National Park west of Charleville (Brigalow Belt Reptiles Workshop 2010, Cogger 2000, Wilson and Knowles 1988). Specimens in Queensland have been collected from areas including Culgoa Floodplain National Park, 50 km north of Goondiwindi, 20 km west of St George, Alton National Park, Thrushton National Park, Lynrock Station (Surat), 32 km south-west of Chinchilla, Mungallala, Chesterton Range National Park, Mariala National Park, Arcadia Valley (via Injune), Calladie Road (near Biloela), Banana, Miriam Vale, Bundaberg, 3 km west of Bogantungan, east of Comet, Rockhampton, Anakie, Mount Cooper Station, Cowley, 19 km south of Helenvale, Mount Croll and locations within 5 km of the confluence of the Archer and Coen Rivers on Cape York Peninsula (Covacevich <i>et al.</i> 1996, Mitchell 1950).</p> <p><i>Population Information</i></p> <p>Important yakka skink populations occur where colonies are identified or within 5 km of known records of the species. Any contiguous patch of vegetation which is suitable for the long-term persistence of a population, or for maintaining genetic diversity across the landscape, is important habitat for the species (Brigalow Belt Reptile Workshop 2010).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p>	0.0	0.0	0.0

Common Name	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat/Core Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><i>Policy Statements and Guidelines</i></p> <p>There is no policy statement for this species. The Draft Referral Guidelines for Nationally Listed Brigalow Belt Reptiles states that the yakka skink can be found in open forests to low woodlands and scrub in Queensland RE Land Zones 3, 4, 5, 7, 8, 9, 10 and 12. Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation and deeply eroded gullies, tunnels and sinkholes.</p>			

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).

**Table 11: Description of General, Essential and Core Habitat for Threatened and Migratory Fauna Species, Mainline South - Australia Pacific LNG Hub to Midline Station (KP 0-175)**

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Birds</b>							
eastern great egret	<i>Ardea modesta</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species comprises remnant vegetation in proximity to permanent or ephemeral waterways with abundant groundcover. The eastern great egret may occur within riparian vegetation throughout the ROW. General Habitat for this species within the ROW comprises RE 11.3.25.	33.045	33.156	2.13
					35.720	35.822	
					51.267	51.358	
				51.510	51.609		
				154.859	154.934		
				164.314	164.549		
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. This species forages in a variety of riparian and wetland habitats which are common across the broader landscape. Foraging opportunities identified in the ROW are minor and are not considered essential to the maintenance of the species. This species is reliant of suitable breeding habitat which comprises shallow lakes where trees stand in water. These are known as rookeries. Numerous wetland species congregate to breed at these sites (e.g. ibis and spoonbills) and they are easily detected. No rookeries have been identified within or adjacent to the ROW.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
eastern osprey	<i>Pandion cristatus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for the eastern osprey within the ROW comprises all riparian vegetation. No other vegetation identified within or adjacent the ROW contained suitable riparian values.</p> <p>This species was observed near the mainline at approximately KP 100 at the edge of remnant vegetation adjacent to a cleared borrow area/access track within Rockybar State Forrest. The RE at this location (RE 11.7.4) is not known to be associated with this species and incidental observation DOTEs not infer the presence of General Habitat. Large riparian systems occur within the broader region including the Dawson and Auburn Rivers. It is likely this species was moving through the region.</p>	33.045	33.182	4.08
				35.720	35.822		
				36.899	36.982		
				51.267	51.358		
				51.510	51.609		
				52.754	53.064		
				54.410	54.534		
				56.475	56.652		
				117.469	117.527		
				154.859	154.934		
				164.314	164.549		
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The occurrence of this species is strongly associated with large expanses of open water, which are essential for foraging and therefore successful breeding. Nest sites, which are utilised over many generations are strongly associated with extensive areas of open fresh, brackish or saline water. Such waterbodies are absent from the ROW. No nesting sites were observed within or in close proximity to the ROW.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The fork-tailed swift is a highly mobile species that is potentially found in both remnant and disturbed habitats. General Habitat for this species comprises the entire ROW including cleared areas.</p> <p>The fork-tailed Swift is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.</p>	Entire ROW	Entire ROW	698.05

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for the fork-tailed swift within the ROW as it is a highly mobile, aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats including those found within the ROW. No habitat in Australia is critical to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The rainbow bee-eater is a highly mobile species that is potentially found in remnant and non-remnant vegetation throughout the ROW and surrounding region. General Habitat for this species comprises both remnant vegetation and non-remnant areas throughout the ROW.</p>	Entire ROW	Entire ROW	698.05
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises patches of suitable vegetation where suitable soil is present. These areas provide both foraging and breeding opportunities for the species that are important in the local and regional context. Areas of General Habitat lacking suitable soils and burrows are not considered Essential Habitat as they are unlikely to provide breeding sites for these species.</p>	4.439 4.686 5.015 33.045 33.124 35.720 51.510 75.739 98.376 98.431 117.469 154.859	4.687 5.015 5.087 33.156 33.182 35.822 51.609 76.004 98.443 98.470 117.527 154.934	5.39

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the rainbow bee-eater within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The rainbow bee-eater is distributed across much of mainland Australia.</p> <p><i>Population Information</i></p> <p>Lakefield National Park and Clemant Forest Reserve.</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statement and Guidelines</i></p> <p>There are no policy statements or guidelines for this species.</p>	0.0	0.0	0.0
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises all patches of remnant and non-remnant vegetation where moderate groundcover vegetation is present. This species forages terrestrially, typically close to water sources.</p> <p>The squatter pigeon is a highly mobile species that is found in the grassy understory of <i>Eucalyptus</i>, <i>Acacia</i>, <i>Angophora</i> and <i>Callitris</i> woodlands. General Habitat for the squatter pigeon comprises the remnant vegetation throughout the ROW.</p>	Entire ROW	Entire ROW	698.05
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species comprises remnant vegetation which is proximate to permanent water and supports suitably dense groundcover that provides breeding habitat. Larger riparian habitats within the broader locality such as Cockatoo Creek, Roach Creek and the Auburn River have the potential to support permanent water however, farm dams and cattle watering points also provide suitable water sources for this species in the wider region.</p>	35.720 51.267 51.510 96.919 97.425 103.200 117.469 154.859	35.822 51.358 51.609 97.112 97.943 104.214 117.527 154.934	8.07

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the squatter pigeon (southern) within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range. Its distribution extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone) and south to scattered sites throughout south-east Queensland (Frith 1982, Higgins and Davies 1996, Schodde and Mason 1997, Storr 1984). Overall, the distribution of the squatter pigeon (southern) is said to extend from 19°S to 29°S and from 141°E to 153°E (EPA 2006).</p> <p><i>Population Information</i></p> <p>The species is thought to occur as a single, contiguous (i.e. inter-breeding) population. The total population size of the species is likely to be stable at present (Garnett and Crowley 2000). Historically, many local or regional populations of the species declined markedly during the late 19<sup>th</sup> and early 20<sup>th</sup> centuries (Barnard 1927, Barnard and Barnard 1925, Campbell 1924, Frith 1982, Morris <i>et al.</i> 1981, North 1913-1914). However, the decline in numbers has slowed and the species remains locally abundant at some sites at the northern limits of its distribution (Garnett and Crowley 2000).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for the squatter pigeon (southern).</p> <p><i>Policy Statements and Guidelines</i></p> <p>Approved conservation advice states that the squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range, with a distribution that extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone) and south to scattered sites throughout south-east Queensland.</p>	0.0	0.0	0.0



Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species comprises the remnant vegetation where suitable foraging habitat is present including cleared areas. This species is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.	Entire ROW	Entire ROW	698.05
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The white-throated needletail is a highly mobile, non-breeding visitor to Australia which is primarily an aerial species which feeds and roosts on the wing. It overflies a wide variety of terrestrial habitats however none of these are considered essential the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
<b>Mammals</b>							
large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	V	<b>General Habitat</b> General Habitat for this species within the ROW comprises highly-connected patches of remnant vegetation in the southern, central and northern sections of this alignment, particularly where rocky features are present. No other RE associated with the species was identified that contained suitable rocky features. This species may utilise hollows found in live hollow-bearing trees, however maternity sites are generally formed in suitable cave habitats.	5.420 7.364 97.930	6.244 8.233 98.443	8.74
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The species requires cave habitats for breeding and roosting purposes. These caves need to be situated within or proximate to suitable foraging habitat. These ecological values were absent from the ROW and adjacent areas.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
northern quoll	<i>Dasyurus hallucatus</i>	E	-	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises one highly-connected remnant patch of RE 11.9.7 south of the Rockybar State Forest. REs with lesser connectivity to surrounding vegetation or lack suitable rocky habitats are not considered General Habitat.</p>	75.739	76.004	0.86
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. This species typically inhabits higher relief environments which support rugged scarps and rocky habitat providing suitable denning sites and complex foraging habitats. Environments supporting rocky areas of suitable complexity supporting large diameter trees, termite mounds and hollow logs for foraging and denning were absent from this small area of vegetation. The area of General Habitat identified in the ROW is therefore not considered essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	V	<p><b>General Habitat</b></p> <p>This species was confirmed in proximity to KP 13 during the fauna surveys. Elsewhere along the alignment General Habitat for this species comprises highly-connected remnant patches of remnant vegetation where riparian vegetation and suitable vegetation structure is present which includes hollows hollow bearing trees which are utilised for denning purposes.</p>	12.344 13.336 75.739 96.919 97.930 103.200	13.343 13.948 76.004 97.113 98.443 104.214	14.04

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises highly connected parcels of remnant vegetation proximate to or within areas of riparian vegetation, where a variety of hollow bearing trees occur (particularly trees which develop hollow trunks which can support maternity sites e.g. ironbarks). This species is known to occur within the large tracts of remnant vegetation associated with Barakula State Forest and the surrounding remnant vegetation which occurs at the southern end of the ROW. This species was not detected in remnants bisected in the central and northern portions of the ROW however, its presence is likely and these highly connective remnants are considered to be Essential Habitat.</p>	12.344 13.336 96.919 97.930 103.200	13.343 13.948 97.113 98.443 104.214	13.18
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the south-eastern long-eared bat within the ROW.</p> <p><i>Australian Distribution</i></p> <p>In Queensland, the species is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park. It has been recorded as far north as the Expedition Range and Dawson River areas.</p> <p><i>Population Information</i></p> <p>No information provided,, other than 7-9% capture rates in the Brigalow Belt South Bioregion and in northern NSW.</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statements and Guidelines</i></p> <p>No policy statements or guidelines exist for this species.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Reptiles</b>							
yakka skink	<i>Egernia rugosa</i>	V	V	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises one patch of RE 11.9.7 south of the Rockybar State Forest.</p> <p>No other RE associated with the species was identified with appropriate patch size or connectivity values or sufficient groundcover or woody debris for the species to take refuge in.</p>	75.739	76.004	0.86
				<p><b>Essential Habitat</b></p> <p>The area of General Habitat found south of Rockybar State Forest supports suitable microhabitat features such as rocky outcrops, suitable soil types which allow for burrowing (to create suitable communal shelter sites), actual burrows (potentially supporting populations of this species) and an appropriate landscape context (within a large patch of remnant vegetation which is connected to Rockybar State Forest) to provide Essential Habitat for this species.</p>	75.739	76.004	0.86

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the yakka skink within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The known distribution of the yakka skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt (North and South), Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula Bioregions. Locations range from the Queensland/New South Wales border to Mungkan Kandju National Park on Cape York Peninsula and from Bundaberg and the region west of Gympie to Mariala National Park west of Charleville (Brigalow Belt Reptiles Workshop 2010, Cogger 2000, Wilson and Knowles 1988). Specimens in Queensland have been collected from areas including Culgoa Floodplain National Park, 50 km north of Goondiwindi, 20 km west of St George, Alton National Park, Thrushton National Park, Lynrock Station (Surat), 32 km south-west of Chinchilla, Mungallala, Chesterton Range National Park, Mariala National Park, Arcadia Valley (via Injune), Calladie Road (near Biloela), Banana, Miriam Vale, Bundaberg, 3 km west of Bogantungan, east of Comet, Rockhampton, Anakie, Mount Cooper Station, Cowley, 19 km south of Helenvale, Mount Croll and locations within 5 km of the confluence of the Archer and Coen Rivers on Cape York Peninsula (Covacevich <i>et al.</i> 1996, Mitchell 1950).</p> <p><i>Population Information</i></p> <p>Important yakka skink populations occur where colonies are identified or within 5 km of known records of the species. Any contiguous patch of vegetation which is suitable for the long-term persistence of a population, or for maintaining genetic diversity across the landscape, is important habitat for the species (Brigalow Belt Reptile Workshop 2010).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><i>Policy Statements and Guidelines</i></p> <p>There is no policy statement for this species. The Draft Referral Guidelines for Nationally Listed Brigalow Belt Reptiles states that the yakka skink can be found in open forests to low woodlands and scrub in Queensland RE Land Zones 3, 4, 5, 7, 8, 9, 10 and 12. Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation and deeply eroded gullies, tunnels and sinkholes.</p>			

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).

^ - RAR 423.

# - RAR 418.

**Table 12: Description of General, Essential and Core Habitat for Threatened and Migratory Fauna Species, Mainline North - Midline Station to Mainline Valve 2 (KP 175-254.8)**

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Birds</b>							
Australian painted snipe	<i>Rostratula australis</i>	V	V	<b>General Habitat</b> The Australian painted snipe requires freshwater wetland habitats, including gilgai, supporting permanent dense vegetation. General Habitat for this species within the ROW comprises REs 11.3.25 and 11.9.5.	190.167 239.285	190.259 239.322	0.43
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. Essential Habitat for the Australian painted snipe comprises well vegetated, shallow wetlands with areas of exposed mud. The small area of General Habitat associated with the crossing of Pump Creek did not support the micro habitat features (shallow wetland supporting permanent dense vegetation) required for foraging and breeding. The small area of General Habitat associated with endangered RE 11.9.5 was in proximity to a number of gilgai however, the gilgai were highly disturbed and lack suitable dense vegetation.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
black-breasted button-quail	<i>Turnix melanogaster</i>	V	V	<p><b>General Habitat</b></p> <p>The black-breasted button-quail is found in vine thickets and rainforests that are periodically water-stressed. Microhabitat requirements include dense leaf litter or woody debris, limited vegetative groundcover, and high ecological connectivity or large patch size. General Habitat for this species within the ROW comprises RE 11.9.5.</p> <p>No other RE was identified with a suitable combination of microhabitat features.</p>	239.285	239.322	0.11
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. No large or well-connected areas of vine thicket, microphyll vine forest, or large tracts of open forest with similar vegetation structure was identified. The single patch of RE 11.9.5 at approximately KP 239 was small and isolated and did not support the vegetation composition or structure required to support this species. Patches of habitat less than 5ha in area are generally considered suboptimal for this species and are not included within Essential Habitat.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0



Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
cattle egret	<i>Ardea ibis</i>	Mi	SLC	<b>General Habitat</b> The cattle egret is a highly mobile species that occurs in tropical and temperate grasslands, woodlands and terrestrial wetlands. This species has been recorded on earthen dam walls and ploughed fields. It uses predominately shallow and open freshwater wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. It is considered likely that this species occurs throughout the corridor, including cleared areas and riparian vegetation, though critical breeding habitat was not observed. Habitat for this species within the ROW comprises REs 11.3.4 and 11.3.25 supporting suitable wetland and riparian features.	190.167 212.564	190.259 212.777	1.12
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. No rookeries known to support the species have been identified within the ROW and breeding habitat consistent with that outlined in the species profile and threats database was absent. Foraging opportunities identified within the ROW are minor and are not considered essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC	<b>General Habitat</b> The fork-tailed swift is a highly mobile aerial species that breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats. This species is potentially found in both remnant and disturbed habitats. General Habitat for this species comprises all remnant vegetation within the ROW.	Entire ROW	Entire ROW	314.93

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for the fork-tailed swift within the ROW as it is a highly mobile, aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats including those found within the ROW. No habitat in Australia is critical to the maintenance of this species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
Latham's snipe	<i>Gallinago hardwickii</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>Latham's snipe inhabits the margins of swamps and marshes, wet pasture and freshwater wetlands on or near the coast. On migration the species will also utilise saltmarsh, creek edges and inundated crops. The species typically requires dense cover which may include sedges, grasses, lignum, reeds and rushes.</p> <p>This species was observed within a patch of non-remnant vegetation at KP 214. This incidental observation DOTEs not indicate the area constitutes General Habitat. The vegetation community was non-remnant and surrounded by dense pasture that did not contain the wetland and groundcover habitat features required to support this species. This species was therefore considered transient in this instance. General Habitat for this species within the ROW comprises a single patch of RE 11.3.25 with suitable waterway and groundcover attributes.</p> <p>No other RE associated with the species was identified with suitable waterway and groundcover attributes.</p>	190.167	190.259	0.32

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. No breeding sites matching the criteria outlined in the SEWPaC Significant Impact Guidelines for 36 migratory Shorebird Species, Policy Statement 3.21 were identified. Foraging opportunities identified in the ROW are not considered essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The rainbow bee-eater is a highly mobile species that is potentially found in remnant vegetation throughout the alignment. This species was observed at four locations along the ROW; KPs 177.7, 181.6, 214.1 and 221.4. General Habitat for this species is considered to comprise the entire ROW.</p>	Entire ROW	Entire ROW	314.93
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species was identified within the ROW. The ROW DOTEs not support an appropriate density of burrows nor a suitable soil profile capable of facilitating burrow excavation. These micro habitat features are required as breeding habitat for this species. While general habitat was present and individual were recorded, no suitable breeding habitat was present.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
rufous fantail	<i>Rhipidura rufifrons</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The rufous fantail is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. General Habitat for this species within the ROW comprises RE 11.3.25, associated with riparian vegetation along Pump Creek, and RE 11.9.5.</p>	190.167 239.285	190.259 239.322	0.43

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species was identified within the ROW. The specific breeding requirements of this species are not well known however, the moist, dense forest understood to be important to breeding was not present within either patch of General Habitat. The limited foraging opportunities identified within the ROW are not considered essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>Satin flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. General Habitat for this species within the ROW comprises RE 11.3.25, associated with riparian vegetation along Pump Creek, and RE 11.9.5.</p>	190.167 239.285	190.259 239.322	0.43
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species was identified within the ROW. The satin flycatcher is not known to breed specifically in Queensland and suitable moist, dense gullies of Eucalypt required to support breeding were not present within either patch of General Habitat. The limited foraging opportunities identified within the ROW are not considered essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<b>General Habitat</b> The squatter pigeon is a highly mobile species that is found in the grassy understory of <i>Eucalyptus</i> , <i>Acacia</i> , <i>Angophora</i> and <i>Callitris</i> woodlands. This species forages terrestrially, typically close to water sources. General Habitat for this species within the ROW comprises patches of remnant vegetation where moderate to dense groundcover vegetation is present.	Entire ROW	Entire ROW	314.93
				<b>Essential Habitat</b> No Essential Habitat for this species was identified within the ROW. The two small patches of remnant vegetation identified as General Habitat were relatively isolated within the broader landscape and lacked the requisite combination of dense groundcover and proximity permanent water required by this species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	Mi	SLC	<b>General Habitat</b> The white-bellied sea-eagle may be present in highly connected or large areas of riparian vegetation that support large permanent waterways or boarder large bodies of open water (swamps, lakes, sea). General Habitat for this species within the ROW comprises one well-connected patch of RE 11.3.25 along Pump Creek.	190.167	190.259	0.32
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The occurrence of this species is strongly associated with large expanses of open water, which are essential for foraging and therefore successful breeding. Nest sites, which are utilised over many generations are strongly associated with extensive areas of open fresh, brackish or saline water. Such water bodies are absent from the ROW. No nesting sites were observed within or in close proximity to the ROW.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species comprises the remnant vegetation where suitable foraging habitat is present including cleared areas. This species is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.</p>	Entire ROW	Entire ROW	314.93
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The white-throated needletail is a highly mobile, non-breeding visitor to Australia which is primarily an aerial species which feeds and roosts on the wing. It overflies a wide variety of terrestrial habitats however none of these are considered essential the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Mammals</b>							
northern quoll	<i>Dasyurus hallucatus</i>	E	-	<b>General Habitat</b> The northern quoll favours rocky areas and eucalypt forests, utilising rocky outcrops, caves and hollow logs for shelter. This species may occur within remnant vegetation on land zones 9, 11 and 12. General Habitat for this species within the ROW comprises REs 11.9.2, 11.9.5, 11.11.15, 11.12.1 and 11.12.2.	179.925	180.970	11.27
				183.717	183.827		
				183.940	184.180		
				184.418	184.974		
				185.212	185.369		
				186.082	186.945		
				190.247	190.678		
				195.492	195.593		
				222.146	222.550		
				239.285	239.322		
				<b>Essential Habitat</b> No Essential Habitat for this species was identified within the ROW. This species typically inhabits large, well-connected patches of remnant vegetation in high relief environments. These areas tend to support the rugged scarps and rocky habitat that providing suitable denning sites and complex foraging habitats required by this species. Areas identified as General Habitat within the ROW tended to be either small in size or lacked connectivity to larger expanses of vegetation. A number of areas also lacked the high relief and complex rocky habitat supporting large diameter trees, termite mounds and hollow logs required for foraging and denning. General Habitat identified in the ROW is therefore not considered essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	V	<b>General Habitat</b> This species favours large or well-connected patches of remnant vegetation proximate to water and requires hollow bearing trees for denning purposes. General Habitat for this species within the ROW comprises one highly connected patch of RE 11.9.5.	239.285	239.322	0.11
				<b>Essential Habitat</b> No Essential Habitat for this species was identified within the ROW. Large or well-connected areas of remnant brigalow ( <i>Acacia harpophylla</i> ) and belah ( <i>Casuarina cristata</i> ) woodland, and remnant eucalypt-dominated vegetation that support a moderate abundance of tree hollows in proximity to permanent water were absent. The General Habitat identified within the ROW may support limited habitat values for the species, but is not considered breeding habitat or essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
<b>Reptiles</b>							
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	V	<b>General Habitat</b> The brigalow scaly-foot may be found in a wide variety of open forest types on several different soils. General Habitat for this species within the ROW comprised one patch of RE 11.3.4 which was proximate to Prospect Creek. This area of remnant vegetation contained suitable, logs, leaf litter and groundcover.	212.564	212.777	0.80
				<b>Essential Habitat</b> No Essential Habitat for this species was identified within the ROW. The patch of General Habitat identified within the ROW supported some of the micro habitat features required by this species however, the patch's small size and isolation from other areas of suitable remnant vegetation mean the patch could not support a sustainable population of the species and could not be considered essential to the maintenance of the species.	0.0	0.0	0.0



Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
collared delma	<i>Delma torquata</i>	V	V	<p><b>General Habitat</b></p> <p>The collared delma favours open eucalypt forest with a shrub and tussock grass understory. The soils of these communities are usually deep cracking clays or stony. General Habitat occurs in REs that are either large or well-connected and have an abundance of debris or other ground litter for shelter.</p> <p>General Habitat for this species within the ROW comprises one patch of RE 11.9.5 with suitable connectivity and a moderate abundance of logs.</p>	239.285	239.322	0.11
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species was identified within the ROW. Essential Habitat for this species comprises moderate to large or well-connected areas of open-forest or woodland. The patch of General Habitat identified within the ROW was small and isolated. The patch did not support habitat features required for breeding or foraging essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
Dunmall's snake	<i>Furina dunmalli</i>	V	V	<p><b>General Habitat</b></p> <p>Dunmall's snake occurs in open forests and woodlands, particularly brigalow (<i>Acacia harpophylla</i>) forest and woodland, on cracking black clays and clay loam soils. General Habitat for this species within the ROW comprises a patch of RE 11.3.25 adjacent Pump Creek and a patch or RE 11.9.5.</p>	190.167 239.285	190.259 239.322	0.43

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species was identified within the ROW. The patch of RE 11.9.5 identified as General Habitat was small size and isolated. The patch RE 11.3.25 also identified as General Habitat within the ROW lacked the cracking clay substrate, logs and groundcover required by this species. Neither patch of General Habitat identified within the ROW was considered essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
yakka skink	<i>Egernia rugosa</i>	V	V	<p><b>General Habitat</b></p> <p>The yakka skink may be found amongst dense ground vegetation, fallen timber or rock outcrops in open dry sclerophyll forest (ironbark) or woodland, brigalow forest, open shrub land, and lancewood forests. General Habitat for this species within the ROW comprises one patch of RE 11.9.5.</p>	239.285	239.322	0.11
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species was identified within the ROW. The area of General Habitat identified within the ROW was small, isolated and did not support suitable amounts of fallen logs, leaf litter or groundcover required by this species. The General Habitat identified within the ROW is not considered to essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).

**Table 13: Description of General, Essential and Core Habitat for Threatened and Migratory Fauna Species, Mainline North - Mainline Valve 2 to Dawson Highway Crossing (KP 254.8-292.9)**

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Birds</b>							
eastern great egret	<i>Ardea modesta</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species comprises remnant vegetation in proximity to permanent or ephemeral waterways with abundant groundcover. The eastern great egret may occur within riparian vegetation throughout the ROW. General Habitat for this species within the ROW comprises RE 11.3.25.	271.111	271.225	4.34
					271.468	271.625	
					273.659	273.769	
				273.886	274.135		
				274.235	274.349		
				274.542	274.609		
				274.720	274.809		
				275.083	275.157		
				275.445	275.597		
				275.746	275.825		
				278.557	278.641		
				285.407	285.486		
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. This species forages in a variety of riparian and wetland habitats which are common across the broader landscape. Foraging opportunities identified in the ROW are minor and are not considered essential to the maintenance of the species. This species is reliant of suitable breeding habitat which comprises shallow lakes where trees stand in water (Rookeries). Numerous wetland species congregate to breed at these sites (e.g. ibis and spoonbills) and they are easily detected. No rookeries have been identified within or adjacent to the ROW.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC	<b>General Habitat</b> The fork-tailed swift is a highly mobile species that is potentially found in both remnant and disturbed habitats. General Habitat for this species comprises the entire ROW including cleared areas.  The fork-tailed Swift is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.	Entire ROW	Entire ROW	152.30
				<b>Essential Habitat</b> There is no Essential Habitat for the fork-tailed swift within the ROW as it is a highly mobile, aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats including those found within the ROW. No habitat in Australia is critical to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<b>General Habitat</b> The rainbow bee-eater is a highly mobile species that is potentially found in remnant and non-remnant vegetation throughout the ROW.	Entire ROW	Entire ROW	152.30
				<b>Essential Habitat</b> No Essential Habitat for this species was identified within the ROW. The areas identified as General Habitat within the ROW do not support an appropriate density of burrows and suitable soil profiles which are required as breeding habitat for this species. It is unlikely that these areas of General Habitat are integral to the maintenance of this species and are very common within the broader landscape.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
red goshawk	<i>Erythrotriorchis radiatus</i>	V	E	<b>General Habitat</b> REs considered representative of General Habitat for the red goshawk in the vicinity of the Main Pipeline include REs 11.3.25, 11.3.25a, 11.3.25b, 11.3.25c, 11.3.25d, 11.3.25e, 11.3.25f, 11.3.25g, 11.3.25h, 11.3.39, 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.26, 11.3.27b, and 12.3.11. Microhabitat requirements for this species include large patches of remnant vegetation (>100 ha) with high ecological connectivity (connectivity 50-100%) which are in close proximity to permanent waterways.	285.41	285.49	0.27
				<b>Essential Habitat</b> There is no Essential Habitat for this species within the ROW. No permanent water or suitable nesting sites were observed within or adjacent to the alignment. The habitat lacks the complex diversity required by this species to support suitable prey densities.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
rufous fantail	<i>Rhipidura rufifrons</i>	Mi	SLC	<b>General Habitat</b> This species may be found in highly-connected patches RE 11.3.25 associated with the Callide Range. The rufous fantail is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies (Serventy, 1982). General Habitat for this species within the ROW comprises RE 11.3.25.	271.111	271.225	4.34
				271.468	271.625		
				273.659	273.769		
				273.886	274.135		
				274.235	274.349		
				274.542	274.609		
				274.720	274.809		
				275.083	275.157		
				275.445	275.597		
				275.746	275.825		
				278.557	278.641		
				285.407	285.486		
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. Specific breeding requirements are not well known but the wet dense forest understood to be important to breeding was not present and the foraging opportunities identified in the ROW are not considered essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>This species was found at two survey sites within the Callide Range at KPs 273.5 and 275.5 during the pre-clearance surveys; satin flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. General Habitat for this species within the ROW comprises RE 11.3.25.</p>	271.111	271.225	4.34
				271.468	271.625		
				273.659	273.769		
				273.886	274.135		
				274.235	274.349		
				274.542	274.609		
				274.720	274.809		
				275.083	275.157		
				275.445	275.597		
				275.746	275.825		
				278.557	278.641		
				285.407	285.486		
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. Satin flycatcher is not known to breed specifically in Queensland and suitable dense gullies of Eucalypt required to support breeding are not present. The foraging opportunities identified in ROW are not considered essential to the maintenance of the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<p><b>General Habitat</b></p> <p>The squatter pigeon is a highly mobile species that is found in the grassy understory of Eucalyptus, Acacia, Angophora and Callitris woodlands. The squatter pigeon is potentially found in all remnant vegetation where a suitable groundcover layer is present. General Habitat for this species within the ROW comprises REs 11.3.25, 11.3.4, 11.9.9, 11.10.1 and 11.10.11 where a suitable groundcover layer is present.</p>	Entire ROW	Entire ROW	152.30

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species occurs within the ROW. The General Habitat identified in the ROW is not considered to provide breeding, roosting or foraging opportunities that are essential to the maintenance of the species. The majority of remnant habitats which support suitable foraging resources for this species occur on steep areas within the Callide Range and do not support permanent water sources proximate to the alignment that this species requires.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises large riparian vegetation that is highly connected to other vegetation communities and contains waterways or is adjacent to large bodies of water. Transient individuals may be observed in these habitats particularly where suitably large bodies of water occur such as Larcom Creek and Bell Creek and large farm dams which afford suitable foraging habitat.</p>	271.111 271.488 273.659 273.886 274.235 274.542 274.720 275.083 275.445 275.746 278.557 285.407	271.225 271.625 273.769 274.135 274.349 274.609 274.809 275.157 275.597 275.825 278.641 285.486	4.34
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The occurrence of this species is strongly associated with large expanses of open water, which are essential for foraging and therefore successful breeding. Nest sites, which are utilised over many generations are strongly associated with extensive areas of open fresh, brackish or saline water. Such waterbodies are absent from the ROW. No nesting sites were observed within or in close proximity to the ROW.</p>	0.0	0.0	0.0



Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species comprises the remnant vegetation where suitable foraging habitat is present including cleared areas. This species is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.</p>	Entire ROW	Entire ROW	152.30
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The white-throated needletail is a highly mobile, non-breeding visitor to Australia which is primarily an aerial species which feeds and roosts on the wing. It overflies a wide variety of terrestrial habitats however none of these are considered essential the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Mammals</b>							
large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	V	<b>General Habitat</b> The large-eared pied bat may be found in the highly-connected remnant vegetation in the Callide Range. This species utilises cave habitats and potentially hollows found in live hollow-bearing trees. General Habitat for this species within the ROW comprises REs 11.9.9b and 11.10.1.	261.499 262.239 262.517	261.772 262.520 264.676	10.67
				<b>Essential Habitat</b> Essential Habitat for this species within the ROW comprises areas of extensive remnant vegetation with suitable foraging habitat proximate to potential cave roosting sites. This habitat is common through the Callide Range as many large sandstone escarpments with the potential support caves occur proximate to the ROW. These cave habitats have the potential to be utilised as maternity sites and are essential for the maintenance of this species. It should be noted that the ROW DOTEs not immediately impact these cave features however, will result in the removal of suitable foraging habitat in proximity.	261.499 262.239 262.517	261.772 262.520 264.676	10.67

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the large-eared pied bat within the ROW.</p> <p><i>Australian Distribution</i></p> <p>In Queensland, records are known from sandstone escarpments in the Carnarvon and Expedition Ranges and Blackdown Tablelands National Park. It is likely that these areas support a high proportion of the Queensland populations of this species, although some estimates of the number of individuals present and their distribution in these areas has not been established. Additional records exist in the Scenic Rim near the border of New South Wales and Queensland. The populations in this area appear to be reliant on the presence of roosts in volcanic rock types (DERM 2011). No maternity roost sites are known in Queensland (TSSC 2010).</p> <p><i>Population Information</i></p> <p>The species is known from the Carnarvon Gorge National Park, Lamington National Park, Main Range National Park and Blackdown Tablelands National Park and State Forest, Gambubal State Forest, road reserves in the Wivenhoe Dam, Lake Moogerah area, west of Mount Barney and private land adjacent to Mount Mistake.</p> <p><i>Recovery Plan</i></p> <p>The large-eared pied bat is known from Shoalwater Bay south to the vicinity of Ulladulla in New South Wales. In Shoalwater Bay the species is known from a single individual and the size and number of populations in this area is unknown. Further records are known in Queensland from sandstone escarpments in the Carnarvon and Expedition Ranges and Blackdown Tablelands. It is likely that these areas support a high proportion of the Queensland populations of this species, although estimates of the number of individuals present and their distribution in these areas has not been established. Additional records exist in the Scenic Rim near the New South Wales and Queensland border. Given their location in the geological landscape, the populations in this area</p> <p><i>Policy Statement and Guidelines</i></p>	0.0	0.0	0.0
Doc Ref: Q-1801-15-RP-0045 Revision: 1				No policy statement or guidelines exist for this species.			Page 102 of 132

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p>appear to be reliant on the presence of roosts in volcanic rock types. The most recent record from this area was an adult female captured adjacent to rhyolite cliffs at Springbrook in August 2004 (M. Mathieson per. comm. 2011).</p> <p>This species is known to occur at Carnarvon National Park, Lamington National Park, Main Range National Park, Blackdown Tableland National Park, Cania Gorge National park, Taunton National Park (Scientific), Expedition (Limited Depth) National Park, Presho Forest Reserve, Blackdown Tableland State Forest, Gambubal State Forest, Belington Hut State Forest, Western Creek State Forest, road reserves in the Wivenhoe Dam, Lake Moogerah and west of Mount Barney.</p> <p><i>Policy Statement and Guidelines</i></p> <p>The Survey Guidelines for Australia's Threatened Bats states that in Queensland, records of the species exist from sandstone escarpments in the Carnarvon and Expedition Ranges and Blackdown Tablelands and from volcanic rock types at Scenic Rim near the New South Wales and Queensland border.</p>			
northern quoll	<i>Dasyurus hallucatus</i>	E	-	<p><b>General Habitat</b></p> <p>The northern quoll favours rocky areas and eucalypt forests, utilising rocky outcrops, caves and hollow logs for shelter. This species may occur within remnant vegetation within land zone 9, 10, 11 and 12 in the study area. General Habitat for this species within the ROW comprises one patch of RE 11.12.2.</p>	274.107	274.25	0.51
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. Areas identified as General Habitat did not support rocky areas of suitable complexity for denning and shelter, fringed by vegetated environments with large diameter trees, termite mounds and hollow logs for foraging. General Habitat opportunities identified in the ROW are not considered essential to the maintenance of the species.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).

**Table 14: Description of General, Essential and Core Habitat for Threatened and Migratory Fauna Species, Mainline North - Dawson Highway Crossing to Mainline Valve 4 (KP 292.9-355)**

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Birds</b>							
cattle egret	<i>Ardea ibis</i>	Mi	SLC	<b>General Habitat</b> The cattle egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. This species has been recorded on earthen dam walls and ploughed fields. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. It is considered likely that this species occurs throughout the corridor, including cleared areas and riparian vegetation. General Habitat for this species comprises RE 11.3.4. This species was observed at fauna survey sites 3E (KP 350.5) and 3H (KP 310.9), these observations were outside of remnant vegetation and therefore do not represent General Habitat for this species.	293.077	293.669	3.22
				310.898	311.002		
				328.769	328.918		
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. No rookeries known to support the species have been identified within the ROW and breeding habitat consistent with that outlined in the species profile and threats database was absent. Patches of General Habitat identified within the ROW were restricted to narrow riparian areas associated with waterway crossings (Harper and Larcom Creeks) and were not considered essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC	<b>General Habitat</b> The fork-tailed swift is a highly mobile aerial species that breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats. This species is potentially found in both remnant and disturbed habitats. General Habitat for this species comprises all remnant vegetation within the ROW.	Entire ROW	Entire ROW	245.22

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for the fork-tailed swift within the ROW as it is a highly mobile, aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats including those found within the ROW. No habitat in Australia is critical to the maintenance of this species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The rainbow bee-eater is a highly mobile species that is potentially found in remnant vegetation throughout the alignment. This species was observed at five locations at KP 303.3, 328.8, 333.7, 350.5 and 310.9. General Habitat for this species comprises all remnant vegetation within the ROW.</p>	Entire ROW	Entire ROW	245.22
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species was identified within the ROW. The areas identified as General Habitat within the ROW did not support an appropriate density of burrows, or soil profiles capable of facilitating burrow excavation, which are required by this species for breeding habitat. Whilst this species was observed at several locations along the ROW, no breeding habitat was present.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises patches of RE 11.3.4 with a dense understory.</p> <p>The satin flycatcher was observed at four survey sites (sites 3A (KP 303.3), 3D (KP 337.0), 3E (KP 350.5) and 3H (KP 310.9)); satin flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. The reasons why none of these locations are considered to be General Habitat for this species are as follows:</p> <p>Site 3A was found to be non-remnant vegetation.</p> <p>Site 3D was within a patch of RE 11.11.4c, which DOTE's do not support a dense understory which is a requirement of this species.</p> <p>Site 3E was within a patch of SEVT, which is not representative of a tall and open forest habitat which is a requirement for this species.</p> <p>Site 3H was within a patch of RE 11.3.4; however the vegetation community was found to lack a dense understory and was therefore not considered to reflect habitat characteristics that are required by this species.</p>	310.897	311.002	0.89
				328.769	328.918		
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The satin flycatcher is not known to breed specifically in Queensland and suitable moist, dense gullies of <i>Eucalypt</i> required to support breeding were not present within the either patch of General Habitat identified within the ROW. The foraging opportunities identified within in ROW are not considered essential to the maintenance of the species.</p>	0.0	0.0	0.0
<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0				



Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<b>General Habitat</b> The squatter pigeon is a highly mobile species that is found in the grassy understory of <i>Eucalyptus</i> , <i>Acacia</i> , <i>Angophora</i> and <i>Callitris</i> woodlands. This species was observed at fauna survey sites 3A at KP 302.3 and 3D at KP 337.0. General Habitat for this species within the ROW comprises one patch of RE 11.3.4 where a suitable groundcover density was present.	Entire ROW	Entire ROW	245.22
				<b>Essential Habitat</b> Essential Habitat for this species within the ROW comprised a patch of RE 11.3.4 associated with the crossing of Harper Creek. This patch supported the suitably dense groundcover and proximity to permanent water required by this species.	310.897	311.002	0.38

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the squatter pigeon (southern) within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range. Its distribution extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone) and south to scattered sites throughout south-east Queensland (Frith 1982, Higgins and Davies 1996, Schodde and Mason 1997, Storr 1984). Overall, the distribution of the squatter pigeon (southern) is said to extend from 19°S to 29°S and from 141°E to 153°E (EPA 2006).</p> <p><i>Population Information</i></p> <p>The species is thought to occur as a single, contiguous (i.e. inter-breeding) population. The total population size of the species is likely to be stable at present (Garnett and Crowley 2000). Historically, many local or regional populations of the species declined markedly during the late 19<sup>th</sup> and early 20<sup>th</sup> centuries (Barnard 1927, Barnard and Barnard 1925, Campbell 1924, Frith 1982, Morris <i>et al.</i> 1981, North 1913-1914). However, the decline in numbers has slowed and the species remains locally abundant at some sites at the northern limits of its distribution (Garnett and Crowley 2000).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for the squatter pigeon (southern).</p> <p><i>Policy Statements and Guidelines</i></p> <p>Approved conservation advice states that the squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range, with a distribution that extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone) and south to scattered sites throughout south-east Queensland.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species comprises the remnant vegetation where suitable foraging habitat is present including cleared areas. This species is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.	Entire ROW	Entire ROW	245.22
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The white-throated needletail is a highly mobile, non-breeding visitor to Australia which is primarily an aerial species which feeds and roosts on the wing. It overflies a wide variety of terrestrial habitats however none of these are considered essential the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Mammals</b>							
northern quoll	<i>Dasyurus hallucatus</i>	E	-	<b>General Habitat</b> The northern quoll favours rocky areas and eucalypt forests, utilising rocky outcrops, caves and hollow logs for shelter. This species may occur in remnant vegetation on land zone 11 within the ROW. General Habitat for this species identified within the ROW comprises REs 11.11.3, 11.11.4, 11.11.4c, 11.11.15 and 11.11.18.	325.257	325.325	8.77
				329.338	329.478		
				333.592	333.826		
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The areas of General Habitat identified within the ROW typically lacked rocky areas of suitable complexity for denning and shelter and were not in proximity to large, vegetated environments supporting large diameter trees, termite mounds and hollow logs required by this species for foraging. The areas of General Habitat identified within the ROW are not considered essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Reptiles</b>							
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	V	<b>General Habitat</b> The brigalow scaly-foot may be found in a wide variety of open forest types on several different soils. General Habitat for this species within the ROW comprised two patches of RE 11.3.4. The patches were associated with riparian vegetation along Harper and Larcom Creeks.	310.897 328.769	311.002 328.918	0.89
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The General Habitat identified within the ROW was small and lacked connectivity to larger areas of remnant vegetation. In addition, the patches lacked adequate groundcover, fallen timber, debris or cracking clay required to support breeding or significant populations of the species. The areas of General Habitat identified within the ROW are not considered essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).

**Table 15: Description of General, Essential and Core Habitat for Threatened and Migratory Fauna Species - Mainline North - Mainline Valve 4 to LNG Plant (KP 355-366.1)**

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Birds</b>							
Caspian tern	<i>Hydroprogne caspia</i>	Mi	SLC	<b>General Habitat</b> The Caspian tern is known to occur within in the vicinity of Curtis Island; where it has been observed along the shoreline of the island and the adjacent mainland. General Habitat for this species within the ROW comprises all patches of remnant vegetation.	355.005 355.511 363.789	355.163 358.012 365.943	18.74
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. This species typically forages in coastal areas or less frequently in terrestrial wetlands, preferring large expanses of water and complex aquatic ecosystems. No remnant vegetation within the ROW supported aquatic values of this type. The species is known to breed in coastal environments and islands off the Queensland coast however, no breeding habitat consistent with that outlined in the species profile and threats database was identified within remnant vegetation occurring within the ROW. Foraging opportunities across the ROW are minimal and are not considered essential for the long term maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
eastern osprey	<i>Pandion cristatus</i>	Mi	SLC	<b>General Habitat</b> The eastern osprey is a highly mobile species that occurs throughout coastal areas along the majority of the Queensland coast. General Habitat for this species within the ROW comprises all remnant vegetation.	355.005 355.511 363.789	355.163 358.012 365.943	18.74

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The occurrence of this species is strongly associated with large expanses of open water, which are essential for foraging and therefore successful breeding. Nest sites, which are utilised over many generations are strongly associated with extensive areas of open fresh, brackish or saline water. Such waterbodies are absent from the ROW. No nesting sites were observed within or in close proximity to the ROW.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The fork-tailed swift is a highly mobile aerial species that breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats. This species is potentially found in both remnant and disturbed habitats. General Habitat for this species comprises all remnant vegetation within the ROW.</p>	Entire ROW	Entire ROW	23.00
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for the fork-tailed swift within the ROW as it is a highly mobile, aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats including those found within the ROW. No habitat in Australia is essential to the maintenance of this species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<b>General Habitat</b> The rainbow bee-eater is a highly mobile species that is potentially found in all remnant vegetation within the ROW. This species was observed at fauna survey site 3G. General habitat for this species comprises all remnant vegetation within the ROW.	Entire ROW	Entire ROW	23.00
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. No REs within the ROW contained permanent waterways or supported suitable soil profiles capable of facilitating burrow excavation. These micro habitat features are required as breeding habitat for this species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
rufous fantail	<i>Rhipidura rufifrons</i>	Mi	SLC	<b>General Habitat</b> The rufous fantail may be found in found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. General Habitat for this species within the ROW comprises remnant vegetation within RE 12.3.11 on Curtis Island.	365.179	365.326	0.56
				<b>Essential Habitat</b> Essential Habitat for this species within the ROW was identified in a patch of RE 12.3.11 on Curtis Island. The patch supported dense gully vegetation required by this species for breeding.	365.179	365.326	0.56



Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the rufous fantail within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The rufous fantail occurs in coastal and near coastal districts of northern and eastern Australia (Lindsey 1992). One sub-species (<i>Rhipidura rufifrons rufifrons</i>) has breeding populations occurring from about the South Australia/Victoria border, through south and central Victoria, on and east of the Great Dividing Range in New South Wales and north to about the New South Wales and Queensland border; while the other sub-species (<i>R. r. intermedia</i>) has breeding populations occurring on and east of the Great Dividing Range, from about the New South Wales and Queensland border to the Cairns-Atherton region (Higgins <i>et al.</i> 2006). Both sub-species winter farther north from Cape York Peninsula to Torres Strait and southern Papua New Guinea. The two sub-species intergrade in a zone between the New South Wales and Queensland border and the Clarence-Orara Rivers in New South Wales (Scodde and Mason 1999).</p> <p><i>Population Information</i></p> <p>The rufous fantail is a common and secure species (Blakers <i>et al.</i> 1984).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statement and Guidelines</i></p> <p>There are no policy statements or guidelines for this species.</p>	0.0	0.0	0.0
satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The satin flycatchers typically inhabit eucalypt forests, often near wetlands or watercourses. General Habitat for this species within the ROW comprises remnant vegetation within RE 12.3.11 on Curtis Island.</p>	365.179	365.326	0.56

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises one patch of RE 12.3.11 on Curtis Island where dense gully vegetation suitable for breeding was present.</p>	365.179	365.326	0.56
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the satin flycatcher within the ROW.</p> <p><i>Australian Distribution</i></p> <p>In Queensland, this species is widespread but scattered in the east; recorded on passage on a few islands in the western Torres Strait. It is patchily recorded on Cape York Peninsula, from the Cape south to a line between Aurukun and Coen. The species is more widespread farther south, though still scattered, from Musgrave Station south to 24°S, mostly in coastal areas, but also on the Great Dividing Range and occasionally further west (Blakers <i>et al.</i> 1984). Satin flycatchers are widespread in SEQ, in the area from Fraser Island west to Goombi and south to the New South Wales border (Blakers <i>et al.</i> 1984).</p> <p><i>Population Information</i></p> <p>No information is available for Queensland.</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statement and Guidelines</i></p> <p>There are no policy statements or guidelines for this species.</p>	0.0	0.0	0.0
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>The white-bellied sea-eagle occurs along the Australian coastline, including offshore islands. General Habitat for this species within the ROW comprises all remnant vegetation.</p>	355.005 355.511 363.789	355.163 358.012 365.943	18.74

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The occurrence of this species is strongly associated with large expanses of open water, which are essential for foraging and therefore successful breeding. Nest sites, which are utilised over many generations are strongly associated with extensive areas of open fresh, brackish or saline water. Such waterbodies are absent from the ROW. No nesting sites were observed within or in close proximity to the ROW.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<p><b>General Habitat</b></p> <p>The squatter pigeon is a highly mobile species that is found in the grassy understory of Eucalyptus, Acacia, Angophora and Callitris woodlands. The squatter pigeon is potentially found in all remnant vegetation where a suitable groundcover layer is present. General Habitat for this species within the ROW comprises REs 11.3.25, 11.3.4, 11.9.9, 11.10.1 and 11.10.11 where a suitable groundcover layer is present.</p>	Entire ROW	Entire ROW	23.00
				<p><b>Essential Habitat</b></p> <p>No Essential Habitat for this species occurs within the ROW. The General Habitat identified in the ROW is not considered to provide breeding, roosting or foraging opportunities that are essential to the maintenance of the species. The majority of remnant habitats which support suitable foraging resources for this species occur on steep areas within the Callide Range and don not support permanent water sources proximate to the alignment that this species requires.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<b>General Habitat</b> General Habitat for this species comprises the remnant vegetation where suitable foraging habitat is present including cleared areas. This species is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.	Entire ROW	Entire ROW	23.00
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The white-throated needletail is a highly mobile, non-breeding visitor to Australia which is primarily an aerial species which feeds and roosts on the wing. It overflies a wide variety of terrestrial habitats however none of these are considered essential the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Mammals</b>							
koala	<i>Phascolarctos cinereus</i>	V	SLC	<p><b>General Habitat</b></p> <p>Koalas utilise open eucalypt forest and woodland habitat with multiple strata layers containing <i>Eucalyptus</i>, <i>Corymbia</i>, <i>Angophora</i>, <i>Lophostemon</i> or <i>Melaleuca</i> trees (at a height of 1.3 m above ground) and with at least one of the following species: Queensland blue gum (<i>Eucalyptus tereticornis</i>), broad-leaved red ironbark (<i>E. fibrosa</i>), grey gum (<i>E. propinqua</i>); white mahogany (<i>E. umbra</i>), flooded gum (<i>E. grandis</i>), tallowwood (<i>E. microcorys</i>), Tindale's stringy bark (<i>E. tindaliae</i>), red mahogany (<i>E. resinifera</i>), poplar box (<i>E. populnea</i>), swamp mahogany (<i>E. robusta</i>), stringybark (<i>E. nigra</i>), scribbly gum (<i>E. racemosa</i>), narrow-leaved ironbark (<i>E. crebra</i>), Queensland peppermint (<i>E. exserta</i>), narrow-leaved red gum (<i>E. seeana</i>), brush box (<i>Lophostemon confertus</i>), swamp box (<i>L. suaveolens</i>), paperbark (<i>Melaleuca quinquenervia</i>). Important microhabitat features are patch size or connectivity.</p> <p>Within the ROW General Habitat for this species comprises one patch of RE 12.3.11 on Curtis Island. No other remnant vegetation community within the ROW supported suitable tree species composition.</p>	365.179	365.326	0.56
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises one patch of RE 12.3.11 on Curtis Island. This patch supported suitable high quality foraging habitat for the koala and was also well connected to adjoining vegetation communities.</p>	365.179	365.326	0.56

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the koala within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The koala has scattered populations throughout Queensland (EPA 2006), in moist forests along the coast, sub-humid woodlands in southern and central Queensland and in some eucalypt woodlands along watercourses in the semi-arid environments of the western part of the State (Melzer <i>et al.</i> 2000). The koala has also been found to occur in non-riverine communities in semi-arid areas (Sullivan <i>et al.</i> 2003) and on islands off the Queensland coast (populations on St Bees and Magnetic Islands were introduced, whereas the populations on North Stradbroke, Newry an Rabbit Islands may be natural) (Lee 2010, Ellis pers. comm. 2010, Melzer <i>et al.</i> 2000).</p> <p>Bioregions of Queensland where the koala has been recorded include the Einasleigh Uplands, Wet Tropics, Desert Uplands, Central Mackay Coast, Mitchell Grass Downs, Mulga Lands, Brigalow Belt, South-east Queensland and Channel Country (Patterson 1996). In addition, the species is present in the northern parts of several bioregions that extend into New South Wales (TSSC 2012).</p> <p>The greatest density of the koala in Queensland occurs in SEQ, and lower densities occur through central and eastern areas (EPA 2006). For example, population densities range from moderately high in SEQ and some parts of central Queensland (i.e. 1-3 koalas per hectare) to low in other parts of central Queensland (i.e. 0.01 koalas per hectare) (Melzer <i>et al.</i> 2000).</p> <p><i>Population Information</i></p> <p>Koalas have been studied at Tambo (Mitchell Grass Downs Bioregion), Springsure and Blair Athol (both in Brigalow Belt North Bioregion). Koalas in this region typically occur in low densities and have large home ranges (Ellis <i>et al.</i> 2002). The most recent estimates were provided to the National Koala Abundance Workshop (2009) for Tambo and</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p>Springsure. At Tambo, in extensive searches of approximately 10 km of creek lines, densities were very low, with only two and three koalas (one of which was dead) found in 2008 and 2009 respectively (TSSC 2012). Data are available for four sites at Springsure in 1992 and 2009. The koala density was estimated via intensive searches of 1km<sup>2</sup> plots and declined from an average of 0.155 to 0.01 koalas per hectare with time (a decline of approximately 90%) (TSSC 2012).</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for the koala.</p> <p><i>Policy Statements and Guidelines</i></p> <p>The National Koala Conservation and Management Strategy states that the koala occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range. Historically, koalas had a largely continuous distribution throughout much of coastal and inland Queensland and New South Wales, throughout the majority of Victoria and in the south-eastern portion of South Australia. However, as a result of habitat loss, drought, hunting and disease, koala populations rapidly declined and by the 1930s koalas were present in less than 50% of their previous distribution.</p>			
large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	V	<p><b>General Habitat</b></p> <p>The large-eared pied bat may be found in the highly-connected remnant vegetation such as tall open Eucalypt forests and utilises cave habitats and potentially hollows found in live hollow-bearing trees. General Habitat for this species within the ROW comprises RE 11.11.3 and RE 12.3.11.</p>	355.005 355.511 365.179	355.163 356.255 365.326	3.75
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The species requires cave habitats for breeding and roosting purposes. These caves need to be situated within or proximate to suitable foraging habitat. These ecological values were absent from the ROW and adjacent areas.</p>	0.0	0.0	0.0

Species	Common Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
northern quoll	<i>Dasyurus hallucatus</i>	E	-	<b>General Habitat</b> The northern quoll may occur within remnant vegetation and corridors within land zone 11 of the ROW.	355.005 355.511 356.773 363.789 365.179 365.284	355.163 356.255 357.734 365.180 365.326 365.943	15.48
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. Habitat with rocky areas of suitable complexity for denning and shelter, fringed by vegetated environments with large diameter trees, termite mounds and hollow logs for foraging was absent. General Habitat opportunities identified in the ROW are not considered essential to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).



Table 16: Description of General, Essential and Core Habitat for Threatened and Migratory Fauna Species - Woleebee Lateral East (KP 43.025-Hub)

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Birds</b>							
fork-tailed swift	<i>Apus pacificus</i>	Mi	SLC	<b>General Habitat</b> The fork-tailed swift is a highly mobile species that is potentially found in both remnant and disturbed habitats. General Habitat for this species comprises the entire ROW including cleared areas.  The fork-tailed swift is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.	Entire ROW	Entire ROW	180.75
				<b>Essential Habitat</b> There is no Essential Habitat for the fork-tailed swift within the ROW as it is a highly mobile, aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats including those found within the ROW. No habitat in Australia is critical to the maintenance of the species.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0
rainbow bee-eater	<i>Merops ornatus</i>	Mi	SLC	<b>General Habitat</b> The rainbow bee-eater primarily resides in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins, 1999). This species is typically observed in open, cleared or lightly timbered areas that are often, but not always, located in proximity to permanent water (SEWPaC, 2012u).  General Habitat for this species comprises all remnant vegetation within the ROW.	Entire ROW	Entire ROW	180.75

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises patches of suitable vegetation where suitable soil and burrows are present. These areas within the ROW provide both foraging and breeding opportunities for the species that are important in the local and regional context. Areas of General Habitat lacking suitable soils and burrows are not considered Essential Habitat as they are unlikely to provide breeding sites for these species.</p>	56.715	57.225	2.00
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the rainbow bee-eater within the ROW.</p> <p><i>Australian Distribution</i></p> <p>The rainbow bee-eater is distributed across much of mainland Australia.</p> <p><i>Population Information</i></p> <p>Lakefield National Park and Clemant Forest Reserve.</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statement and Guidelines</i></p> <p>There are no policy statements or guidelines for this species.</p>	0.0	0.0	0.0
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	<p><b>General Habitat</b></p> <p>General Habitat for this species within the ROW comprises all patches of remnant and non-remnant vegetation where moderate groundcover vegetation is present. This species forages terrestrially, typically close to water sources.</p> <p>The squatter pigeon is a highly mobile species that is found in the grassy understory of <i>Eucalyptus</i>, <i>Acacia</i>, <i>Angophora</i> and <i>Callitris</i> woodlands. General Habitat for the squatter pigeon comprises the remnant vegetation throughout the ROW.</p>	Entire ROW	Entire ROW	180.75

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Essential Habitat</b></p> <p>Areas of General Habitat within the ROW do not support sources of permanent water, nor are they it proximate to permanent water. As no remnant vegetation with the requisite combination of dense groundcover, sandy substrate (or permanent water) is present, there is no Essential Habitat for the squatter pigeon within ROW.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0
white-throated needletail	<i>Hirundapus caudacutus</i>	Mi	SLC	<p><b>General Habitat</b></p> <p>General Habitat for this species comprises the remnant vegetation where suitable foraging habitat is present including cleared areas. This species is a highly mobile aerial species which breeds in Asia, feeds and roosts on the wing and overflies a wide variety of habitats.</p>	Entire ROW	Entire ROW	180.75
				<p><b>Essential Habitat</b></p> <p>There is no Essential Habitat for this species present within the ROW. The white-throated needletail is a highly mobile, non-breeding visitor to Australia which is primarily an aerial species which feeds and roosts on the wing. It overflies a wide variety of terrestrial habitats however none of these are considered essential the species.</p>	0.0	0.0	0.0
				<p><b>Core Habitat</b></p> <p>There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.</p>	0.0	0.0	0.0

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
<b>Mammals</b>							
large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	V	<b>General Habitat</b> Large-eared pied bats are found within a variety of vegetation types including canopied dry and wet sclerophyll forest and forests dominated by white cypress pine ( <i>Callitris glaucophylla</i> ) provided they are in close proximity to sandstone cliffs and scarps supporting roosting habitat (SEWPaC, 2012j). The species also favours tall open eucalypt forest with and understorey of scattered small trees and palms (Churchill, 2008). The large-eared pied bat is thought to be largely restricted to caves and sandstone escarpments for roosting (Churchill, 2008) however the species may potentially roost in tree hollows (Duncan <i>et al.</i> , 1999). Microhabitat features utilised by this species include moderately abundant medium sized hollows in large or moderately well connected patches of associated REs. General Habitat present within the ROW occurs within RE 11.10.1 at the KPs outlined in the following columns.	57.424	57.692	1.03
				<b>Essential Habitat</b> There is no Essential Habitat for this species present within the ROW. The species requires cave habitats for breeding and roosting purposes. These caves need to be situated within or proximate to suitable foraging habitat. These ecological values were absent from the ROW and adjacent areas.	0.0	0.0	0.0
				<b>Core Habitat</b> There is no Core Habitat for this species within the ROW, as no Essential Habitat is present.	0.0	0.0	0.0

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	V	<p><b>General Habitat</b></p> <p>The south-eastern long-eared bat utilises a wide variety of inland woodland habitat including box, ironbark and cypress pine woodlands (SEWPaC, 2012y). In Queensland the species is also associated with brigalow woodland, belah woodland or habitat dominated by various eucalypt and bloodwood species (SEWPaC, 2012y). The south-eastern long-eared bat is thought to be most abundant in vegetation communities supporting a distinct canopy and dense shrub layer (SEWPaC, 2012y) This species utilises hollows found in live hollow-bearing trees, in fissures in branches and under sheets of decorticating bark still attached to the trunk (Churchill, 2008).</p> <p>Microhabitat features important for the this species include areas of moderate to large well-connected associated REs that support a moderate abundance of tree hollows and are in proximity to water.</p> <p>General Habitat present within the ROW occurs within REs 11.5.1, 11.7.4, 11.7.6 and 11.7.7 at the KPs outlined in the following columns.</p>	54.951 56.088 57.424 58.219 81.499	55.235 56.589 57.962 59.183 82.532	13.02
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for this species within the ROW comprises highly-connected remnant vegetation of suitable REs supporting an abundance of hollow-bearing features.</p>	54.951 56.088 58.219 81.499	55.235 57.962 59.183 82.532	13.02

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that no core habitat exists for the south-eastern long-eared bat within the ROW.</p> <p><i>Australian Distribution</i></p> <p>In Queensland, the species is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park. It has been recorded as far north as the Expedition Range and Dawson River areas.</p> <p><i>Population Information</i></p> <p>No information provided, other than 7-9% capture rates in the Brigalow Belt South Bioregion and in northern NSW.</p> <p><i>Recovery Plan</i></p> <p>There is <i>no</i> recovery plan for this species.</p> <p><i>Policy Statements and Guidelines</i></p> <p>No policy statements or guidelines exist for this species.</p>	0.0	0.0	0.0
<b>Mammals</b>							

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	V	<p><b>General Habitat</b></p> <p>The brigalow scaly-foot is found in a wide variety of open forest habitats on several soil types (Schultz and Eyre, 1997; Tremul, 2000). In some areas brigalow scaly-foot are found in remnant brigalow woodlands with sparse tussock grasses on grey cracking clay soils (Cogger et al., 1993). In Eena State Forest the species occurs in narrow-leaved red ironbark (<i>Eucalyptus crebra</i>) and grey box (<i>Eucalyptus microcarpa</i>) open forest with a dense sub-canopy of white cypress pine (<i>Callitris glaucophylla</i>) and bulloak (<i>Allocasuarina luehmannii</i>) on loose sandy clay substrate, and in bulloak (<i>Allocasuarina luehmannii</i>) closed forest with widely scattered narrow-leaved red ironbark (<i>Eucalyptus crebra</i>) emergent on a similar substrate (Schultz and Eyre, 1997). This species is also known to occur in non-remnant areas that contain suitable microhabitat for this species.</p> <p>Important microhabitat features for the brigalow scaly-foot include moderate to large or well-connected areas of associated REs on deep cracking clays that support moderate to high levels of groundcover or leaf litter and sticks or large logs. General Habitat present within the ROW occurs within REs 11.5.1, 11.7.2, 11.7.4, 11.7.6, 11.7.7 and 11.10.1 at the KPs outlined in the following columns.</p>	44.593 52.798 53.180 56.088 79.740 81.499 83.320	45.263 52.897 55.235 61.076 79.992 83.014 84.107	38.67
				<p><b>Essential Habitat</b></p> <p>Essential Habitat for the brigalow scaly-foot within the ROW comprises areas that support good connectivity, are of a large size, and support suitable microhabitat features, such as fallen timber and leaf litter. As such, these areas are considered Essential Habitat for the brigalow scaly-foot.</p>	44.593 52.798 53.180 56.088 79.740 81.499 83.320	45.263 52.897 55.235 61.076 79.992 83.014 84.107	38.67

Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<p><b>Core Habitat</b></p> <p>Through a consideration of the below factors, it is determined that core habitat DOTEs exist for the brigalow scaly-foot within the ROW. The ROW DOTEs not intersect Barakula State Forest; however it DOTEs intersect remnant vegetation contiguous with this area. Barakula State Forest is considered to be an area of known presence and constitutes an important population for the species. In the absence of ground-truthed information to suggest otherwise, it is considered likely that some form of habitat for this species is present within the remnant vegetation that is located between this section of the alignment and Barakula State Forest.</p> <p><i>Australian Distribution</i></p> <p>Recorded localities of this species include Collinsville, north of Capella, Blackwater, Dysart, Moranbah, Copabella, Nebo, Emerald, Gladstone, Lilly Hills Reserve on Boyne Island, Wandoo Station near Moura, Moura, south-east of Theodore, Coomingleah, Salvator Rosa, Idalia National Park, Tambo, Cracow, Winderera, north of Murgon, west of Wallumbilla, Carnarvon National Park, Dunmore State Forest near Cecil Plains, Kolonia Station near Wandoan, Golden Plateau via Taroom, Eena State Forest, Inglewood, <b>Barakula State Forest</b>, the Chesterton Range near Charleville and Alpha (Agnew 2010 pers. Comm., Cogger <i>et al.</i> 1993, Covacevich <i>et al.</i> 1996, Matrixplus Consulting 2010, Schultz and Eyre 1997, Tremul 2000, Wilson and Knowles 1988).</p> <p><i>Population Information</i></p> <p>Important populations of this species occur in large contiguous areas of remnant vegetation that are suitable for the species, such as the Central Queensland sandstone rises, the Blackwater/Blackdown Tablelands region, the Moura/Theodore region and the Boyne Island area. Such areas of remnant vegetation are considered important strongholds for the species. Any populations found in such habitats are, therefore, important (Brigalow Belt Reptiles Workshop 2010).</p>	79.740 81.499 83.320	79.992 83.014 84.107	10.01



Species	Scientific Name	EPBC Act Listing	NC Act Listing	General Habitat/Essential Habitat	Location of Habitat within ROW		
					KP In	KP Out	Area within ROW (ha)
				<i>Recovery Plan</i> There is <i>no</i> recovery plan for this species.			

Note: The codes are: *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999*, Critically Endangered (CE), Endangered (E), Vulnerable (V), Migratory (Mi); *Nature Conservation Act (Qld) 1992*, Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SLC).