

**A LEVEL 1 VERTEBRATE FAUNA ASSESSMENT  
OF THE  
PROPOSED FORTESCUE RIVER GAS PIPELINE,  
WESTERN AUSTRALIA**

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## 1 EXECUTIVE SUMMARY

This document describes a vertebrate fauna assessment of the proposed Fortescue River Gas Pipeline (FRGP) route which is 266 km in length. The study consisted of a detailed literature review and searches of the vertebrate fauna databases held by various authorities, followed by a brief but intensive field assessment. This FRGP route is situated in the Pilbara region of Western Australia and lies primarily within the Hamersley subregion.

This study is based on two phases: Phase 1 – a literature and data review; and Phase 2 – a Level 1 Reconnaissance Survey which was undertaken by two highly experienced zoologists between 7<sup>th</sup> and 14<sup>th</sup> October 2013. The area assessed was approximately 100 metres either side of a centreline along the route. Birds are readily observed and intensive bird observations were carried out by both personnel. Amphibians, reptiles and mammals are infrequently recorded opportunistically; however, these animals were noted when active, or by identifiable signs such as scats, tracks and diggings. While access in the western portion of the route was unconstrained, access in the eastern portion was extremely limited. The use of a helicopter allowed for a broad appreciation of the major fauna habitats present along this section of the route but few observations of fauna could be made.

There are many similarities between the plant communities, and the majority of vertebrate animals are unlikely to distinguish between them. Thirty plant communities have been identified within the FRGP route. These have been summarised and grouped into 11 major fauna habitats. Even within these various fauna habitats there will be a wide range of vertebrate fauna species that will occur in more than one habitat.

The data and literature review showed that up to 152 species of bird could occur in the vicinity of the FRGP route. There is a range of species, which could be present when exceptionally wet conditions are experienced; their appearance would be ephemeral and dependent on the presence of areas of deep water within the major creeklines. In addition, many of the bird species listed are migratory or nomadic, appearing seasonally, or when environmental conditions are suitable. Some of the smaller bird species such as fairy-wrens and thornbills are more likely to be resident within specific habitats along the proposed FRGP route. Field surveys for various projects in the general area recorded between 56 and 79 species of bird. During an extensive survey by the then Department of Environment and Conservation (DEC), 132 species with an average of 19.1 species per site were recorded, ranging from 3 to 49 species. This discrepancy in the number of species demonstrates both the patchy distribution and mobility of birds in the region. Although the current field assessment was brief, 51 species of bird were recorded. One of these species is of conservation significance, the Rainbow Bee-eater, which is listed on the Japan-Australia Migratory Bird Agreement.

Forty-one species of native mammal could be present in the habitats along the FRGP route. The list consists of one monotreme, 11 marsupial carnivores, one bandicoot, one possum, three kangaroos/wallabies, 16 bats, seven rodents and one placental carnivore. Between 12 and 16 species have been recorded in the various surveys conducted in the general area, totalling 26 species overall. The disparity between the number of species shown in the data review and the actual recording of mammals indicates the difficulty of adequately sampling this group of animals, generally due to their natural low abundance. Small ground-dwelling mammals were targeted during the DEC survey of the Pilbara Bioregion, in which 17 species of native mammal were recorded within the entire Pilbara Bioregion; 10 of these were marsupial carnivores and seven were rodents. Typically for a Level 1 field assessment, only larger native mammal species were recorded during the current field assessment; these were the Euro (*Macropus robustus*) and Red Kangaroo (*Macropus rufus*).

Eleven species of frog could occur in the habitats of the FRGP route. All 11 were recorded during the DEC Pilbara survey. None was recorded during the field assessment. This is a particularly hard group of animals to sample effectively, with many species only being observed following rainfall when access into many areas of the Pilbara by vehicle is extremely difficult.

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One hundred and nineteen reptiles comprised of one freshwater tortoise, 24 geckos, eight legless lizards, 42 skinks, 10 dragons, 10 monitors, five blind snakes, five pythons and 14 elapid (front-fanged) venomous snakes, could potentially occur in the habitats along the FRGP route. Between 32 and 76 species have been recorded in the various surveys in the general area and, while 134 species were recorded by DEC, 95 species were represented in less than 10% of the 297 locations, indicating the patchy distribution, general scarcity and difficulty of sampling many reptile species. Eight reptile species were recorded during the field assessment; these included one gecko, one skink, five dragon lizards and one monitor lizard. The presence of the majority of small reptile species would only be confirmed following intensive trapping within all major fauna habitats along the proposed route.

Of the 10 introduced species resulting from the data and literature review, three were observed during the field assessment: the feral cat (*Felis catus*), feral horse (*Equus caballus*) and cattle (*Bos taurus*). Some areas of cracking clay grasslands had been heavily grazed by cattle.

The following list shows the species of conservation significance (Environment and Biodiversity Conservation Act [EPBC], Wildlife Conservation Act [WC] and Department of Parks and Wildlife [DPaW] Priority Fauna) that resulted from the literature and data review, with their potential to occur within the FRGP route shown. A definition of the Probability of Occurrence is provided in the report.

Species		EPBC Act	WC Act	DPaW Priority	Probability of Occurrence
<i>Merops ornatus</i>	Rainbow Bee-eater	X	X		Recorded
<i>Ardea alba</i>	Eastern Great Egret	X	X		High
<i>Dasyurus hallucatus</i>	Northern Quoll	X	X		High
<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	X	X		High
<i>Falco peregrinus</i>	Peregrine Falcon		X		High
<i>Ardeotis australis</i>	Australian Bustard			X	High
<i>Burhinus grallarius</i>	Bush Stone-curlew			X	High
<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart			X	High
<i>Macroderma gigas</i>	Ghost Bat			X	High
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse			X	High
<i>Ctenopus uber johnstonei</i>	A skink			X	High
<i>Notoscincus butleri</i>	A skink			X	High
<i>Ramphotyphlops ganei</i>	A blind snake			X	High
<i>Apus pacificus</i>	Fork-tailed Swift	X	X		Seasonally High
<i>Leggadina lakedownensis</i>	Lakeland Downs Mouse			X	Moderate to High
<i>Glareola maldivarum</i>	Oriental Pratincole	X	X		Moderate
<i>Phaps histrionica</i>	Flock Bronzewing			X	Moderate
<i>Aspidites ramsayi</i>	Woma		X		Low to Moderate
<i>Macrotis lagotis</i>	Greater Bilby	X	X		Low
<i>Ardea ibis</i>	Cattle Egret	X	X		Unlikely to Low
<i>Hirundo rustica</i>	Barn Swallow	X	X		Unlikely to Low
<i>Charadrius veredus</i>	Oriental Plover (Dotterel)	X	X		Unlikely to Low
<i>Ardea ibis</i>	Cattle Egret	X	X		Unlikely to Low
<i>Rhinonictis aurantia</i>	Orange (Pilbara) Leaf-nosed Bat	X	X		Unlikely to Low
<i>Notoryctes caurinus</i>	Northern Marsupial Mole	X	X		Unlikely
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	X	X		Unlikely
<i>Pandion haliaetus</i>	Eastern Osprey	X	X		Unlikely
<i>Rostratula australis</i>	Australian Painted Snipe	X	X		Unlikely

There are three habitats of some conservation significance that occur along the proposed route: major creeklines with large *Eucalyptus* trees, rocky gullies and gorges and cracking clay grasslands. Each of these could potentially support a range of species either not found elsewhere or, in the case of large *Eucalyptus* trees, provide nesting and shelter in any hollow limbs that are present.

A range of recommendations for pipeline construction are provided in the report.

## **2 INTRODUCTION**

This document has been prepared for Matiske Consulting Pty Ltd (MCPL) on behalf of DDG by Ninox Wildlife Consulting (Ninox). It describes a vertebrate fauna assessment of the proposed Fortescue River Gas Pipeline (FRGP) route (hereafter called the Study Area) which is 266 km in length. The proposed route is shown in Figure 1. This FRGP route is situated in the Pilbara region of Western Australia and lies primarily within the Hamersley subregion.

## **3 STUDY OBJECTIVES**

This study is based on two phases: Phase 1 – a literature and data review; and Phase 2 – a Level 1 Reconnaissance Survey.

### **Phase 1.**

The study objectives of Phase 1 were to:

- prepare a list of species that could potentially occur within the Study Area; and
- review species considered to be rare, threatened, vulnerable or geographically restricted that could be present in the Study Area.

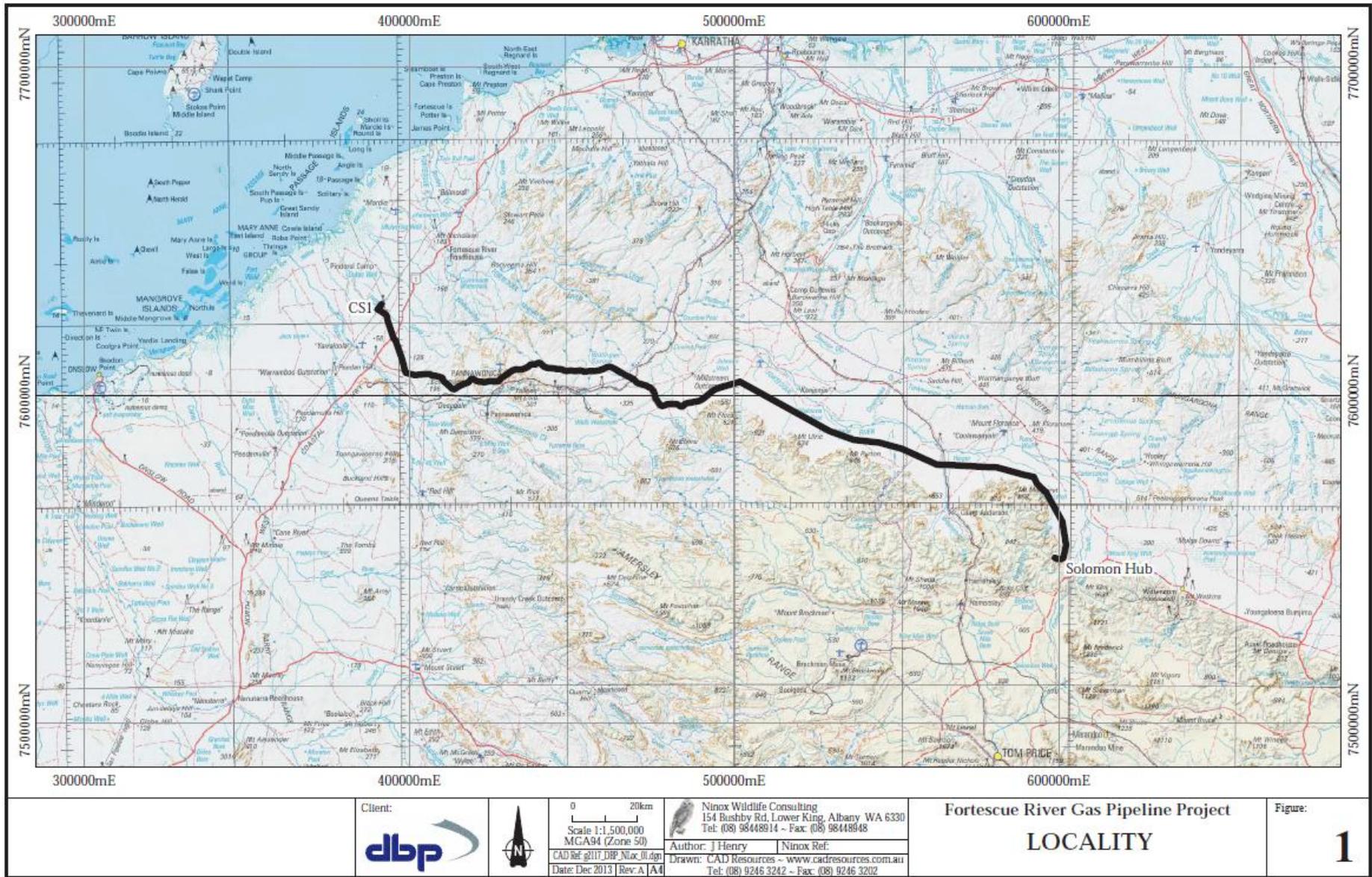
### **Phase 2.**

A field assessment was undertaken to provide more detailed information on vertebrate fauna species and their habitats within the Study Area. The purpose of this assessment was to ‘ground-truth’ some of the information gathered during Phase 1 and provide information to satisfy a Level 1 Reconnaissance survey as defined in the Environmental Protection Authority’s Guidance Statement No. 56 (Environmental Protection Authority 2004).

Therefore, as far as possible given the limitations of a Level 1 Reconnaissance Survey, the study objectives for the FRGP project were to provide:

- an inventory of the vertebrate fauna species recorded during the Reconnaissance Survey;
- a list of those species not recorded but considered to be likely to occur based on habitat preferences and geographical distribution;
- an assessment of the significance of the fauna habitats that occur within the Study Area;
- an assessment of the potential for rare, threatened or vulnerable species to occur;
- recommendations for vertebrate fauna management and/or further work to undertake impact assessment; and
- a comprehensive report on the findings of both phases of the study suitable for integration with the flora and vegetation document.

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**Figure 1** Location of the proposed FRGP route.

## 4 NOMENCLATURE, TAXONOMY AND DISTRIBUTION PATTERNS

The following literature sources have been employed to discuss fauna distribution patterns, habitat preferences and ecology in the preparation of this report:

- Birds:** Barrett *et al.* (2003); Johnstone & Storr (1998, 2004); Morcombe (2003); Pizzey & Knight (2012).  
**Mammals:** Van Dyck & Strahan (2008); Van Dyck *et al.* (2013); **Bats:** Churchill (2008)  
**Amphibians:** Tyler and Doughty (2009).  
**Reptiles:** Wilson & Swann (2013).

The nomenclature in this report follows the references listed above except where other, more recent, taxonomic revisions have been accepted and are in current use.

## 5 METHODS

### 5.1 Phase 1

This phase was conducted as a Level 1 Background research or ‘desktop’ study as defined by the Environmental Protection Authority (2004). The purpose of these ‘desktop’ studies is to gather background information on the target area and involves searching a range of literature sources, data and map-based information.

As described above, the study objectives were fulfilled by means of a detailed literature review of both published and unpublished data, and searches of the vertebrate fauna databases held by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) and the Department of Parks and Wildlife (DPaW). Appendix 1 shows the results of a search of the DSEWPaC’s database ([www.environment.gov.au](http://www.environment.gov.au)) and Appendix 2 shows the results of the search of the DPaW’s NatureMap database ([www.dpaw.wa.gov.au/faunabase](http://www.dpaw.wa.gov.au/faunabase)). The results of the data and literature search provided the basis for a list of vertebrate fauna that could potentially occur within the Study Area. From this list the rare, threatened or vulnerable species were identified, and any additional species of special conservation interest highlighted.

### 5.2 Phase 2

The data and literature review was followed by a brief but intensive field investigation (Level 1 Reconnaissance Survey) which was undertaken by two highly experienced zoologists between 7<sup>th</sup> and 14<sup>th</sup> October 2013 within the area as shown on Figure 1. The field work was conducted in conjunction with the flora and vegetation team to allow for accurate identification of plant communities along the route. The area assessed was approximately 100 metres either side of a centreline along the route. This provided a buffer should there be minor deviations from the proposed alignment.

Where access allowed, plant communities identified by MCPL personnel were visited by the fauna team and all active fauna was recorded; particular attention was paid to habitats that had the potential to support rare species that could occur.

Birds are readily observed and intensive bird observations were carried out by both personnel. Amphibians, reptiles and mammals are mainly recorded through trapping and are infrequently recorded opportunistically. However, these animals were noted when active, or by identifiable signs such as scats, tracks and diggings.

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Where possible, the location of significant fauna habitats and observations of any species considered rare, threatened or vulnerable were recorded by a hand-held GPS unit; this included identifiable signs such as scats and/or tracks.

### 5.3 Study Team

This vertebrate fauna data and literature review was conducted by Ninox Principal Jan Henry who, since 1973, has worked on vertebrate fauna throughout Western Australia. Field work was conducted by Maureen Francesconi and Greg Harold, who have assisted Ninox in many surveys between 1984 and 2013 and who have wide experience throughout Western Australia. Both personnel provided assistance with the predicted fauna lists prior to the field assessment. All personnel involved in this study have had considerable experience in the Pilbara Region and are familiar with the major fauna habitats present in the region.

- Ninox Principal** - Jan Henry - database searches; literature review; data collation and tabulation; reporting.
- Ornithologist** - Maureen Francesconi - field investigations; assistance with predicted bird species list.
- Zoologist** - Greg Harold - field investigations; assistance with frog and reptile predicted species list.

### 5.4 Study Limitations

The vertebrate fauna survey described in this report was based on an intensive field investigation by highly experienced personnel. Table 1 lists the potential constraints to the adequacy of fauna survey work as detailed by DSEWPaC and provides details on whether these constraints were applicable to the current study.

**Table 1** *Statement of study limitations.*

Possible Limitations	Constraints (Yes/No): Significant, Moderate or Negligible	Comment
Competency/experience of the consultant conducting the survey	No Constraint	All Ninox personnel have extensive experience in fauna surveys and species identification over all fauna assemblages.
Resources (e.g. degree of expertise available for animal identification)	No Constraint	A very high level of competence and expertise was available for species identification.
Proportion of fauna identified, recorded and/or collected	No Constraint	All vertebrate fauna species observed were identified, as were signs of their presence such as scats and tracks. No vertebrate fauna was collected.
Scope	No Constraint	Previous detailed surveys in the general area, database searches and a literature review provided adequate information for habitat assessment.
Sources of information	No Constraint	Vertebrate fauna information was available using the DPaW NatureMap database and the Atlas of Living Australia. Detailed information was available from surveys conducted within the general area.

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Possible Limitations	Constraints (Yes/No): Significant, Moderate or Negligible	Comment
Availability of contextual (e.g. bioregional) information for the survey area	No Constraint	NatureMap results, distribution maps for most fauna species and extensive level of field experience by all personnel were available for bioregional context of the survey area. Detailed information on fauna surveys within the region was available. These are noted in text and listed in References.
Timing/weather/season/cycle	Moderate	Conditions during the field work were suitable for opportunistic sampling of some vertebrate groups, although temperatures were hot, restricting the activity of some terrestrial species. Hot windy conditions on occasions restricted bird activity.
Completeness (e.g. Was relevant area fully surveyed?)	Moderate	The high level of familiarity of Ninox personnel with the Pilbara Region and the provision of maps by MCPL ensured that the area surveyed was relevant to the aims of the survey. However, access was not possible for much of the eastern section of the Study Area (see below).
Remoteness and/or access problems	Significant	While access in the western portion of the route was unconstrained, access in the eastern portion was extremely limited. The use of a helicopter allowed for a broad appreciation of the major fauna habitats present along this section of the route but few observations of fauna could be recorded.
Intensity of survey (e.g. in retrospect was the intensity adequate?)	No Constraint	Survey intensity was adequate to define major fauna habitats and the potential for these habitats to support faunal assemblages.
Proportion of the task achieved and further work that may need to be undertaken	No Constraint	The western portion of the study area was sufficiently sampled to satisfy a Level 1 Reconnaissance Survey, obtain habitat values and to assess the potential for fauna of conservation significance to be present. While access was extremely limited in the eastern portion, no habitats that were unfamiliar to the Ninox team were identified from the helicopter.
Disturbances which affected results of the survey	No constraint	There was no disturbance to the survey area that affected the results of the survey.

## 6 CLIMATE

Gibson and McKenzie (2009) state that monthly average maximum temperatures in the Pilbara Region range from 25.3°C in July to 37.8°C in January. Inland areas experience a hot, dry summer and a mild winter. Most rainfall occurs in summer, with occasional cyclonic activity. Average annual rainfall is 290 mm, ranging from a monthly average of 1.7 mm in September to 66.1 mm in February. There is substantial year-to-year variation in rainfall, both locally and regionally.

## 7 BIOREGIONAL DESCRIPTION

The Australian Nature Conservation Agency has established an Interim Biogeographical Regionalisation of Australia (IBRA Ver 6.1; Thackway and Cresswell 1995) in which 89 large, geographically distinct, Bioregions were classified by common climate, geology, landform, native vegetation and species information.

The Solomon Hub to CS 1 Gas Pipeline Study Area falls within the Pilbara Bioregion (PIL) and, more specifically, within the Hamersley Subregion known as PIL3 (Kendrick 2001). This Subregion is described as:

‘PIL3 is the Southern section of the Pilbara Craton. Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges. The climate is Semi-desert tropical, average 300mm rainfall, usually in summer cyclonic or thunderstorm events. Winter rain is not uncommon. Drainage into either the Fortescue (to the north), the Ashburton to the south, or the Robe to the west. Subregional area is 6,215,092ha.’

The most common and dominant land uses have been described as grazing, conservation and mining.

## 7.1 Sub-regional Description

As defined in Kendrick (2001), the major fauna habitats that occur in the Hamersley Subregion are:

- Major creeklines with large eucalypts;
- *Acacia* woodlands in major and minor creeklines in sandy soils lacking eucalypts;
- Minor vegetated gullies in undulating hills;
- *Acacia* shrublands over spinifex on extensive flats;
- *Acacia* woodlands over perennial herbs on broad flats with clay and loam soils;
- *Acacia* woodlands and shrublands with grasses on low undulating hills;
- Chenopod shrublands with mixed grasses and herbs on lower slopes;
- Mixed *Acacia* woodlands and shrublands over spinifex, herbs and grasses on sandy-gravel soils on lower slopes and hills;
- Spinifex grasslands with patches of mixed shrubs over low grasses and herbs on the mid-slopes of low undulating hills;
- Low mixed shrublands over herbs on rocky low hills lacking spinifex;
- *Acacia* woodlands over mixed shrubs and spinifex on rocky hills;
- Spinifex grasslands with emergent eucalypts and shrubs, herbs and grasses on upper slopes of banded iron ranges; and,
- *Acacia* woodlands over mixed shrubs and spinifex on major slopes and breakaways in the banded iron ranges.

There are many similarities between these fauna habitats, and the majority of vertebrate animals are unlikely to distinguish between the sometimes subtle distinctions that characterise them. Most animals are influenced by the structure of the vegetation and the soil types rather than the plant species present. The main exception to this in arid Australia is the presence or absence of spinifex (*Triodia* species) or large eucalypt trees, both of which provide habitat for a large range of vertebrate fauna species.

Many of these fauna habitats are present within the current Study Area and these are described in more detail in the following section.

## 7.2 Study Area Description

There are many similarities between the plant communities, and the majority of vertebrate animals are unlikely to distinguish between the sometimes subtle distinctions that characterise these. Most animals are influenced by the structure of the vegetation and the soil types rather than the plant species present. The main exception to this in arid Australia is the presence or absence of spinifex (*Triodia* species) or large eucalypt trees, both of which provide habitat for a wide range of vertebrate fauna species.

MCPL (this document) describes 30 plant communities within the proposed gas pipeline route. In Table 2, these have been summarised and grouped into 11 major fauna habitats that range from open woodlands over spinifex *Acacia* shrublands over spinifex on flats, slopes and ridges, to open grassy plains, and major and minor gullies.

**Table 2 Plant Communities and corresponding fauna habitats in the Study Area. (Appendix 3 expands on these descriptions and has been modified from information provided by MCPL 2013.)**

Vegetation Codes and Descriptions		Fauna Habitats
	<b>Spinifex with Bloodwoods</b>	
<b>FL10</b>	<i>Corymbia hamersleyana</i> low open woodland over <i>Acacia trachycarpa</i> , <i>Acacia ancistrocarpa</i> , <i>Acacia dictyophleba</i> tall open shrubland and <i>Gossypium australe</i> , <i>Grevillea wickhamii</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> mid sparse shrubland over <i>Triodia pungens</i> , <i>Triodia wiseana</i> low open hummock grassland and <i>Eulalia aurea</i> , <i>Aristida latifolia</i> , <i>Themeda triandra</i> low sparse tussock grassland. Red/brown clay loam with ironstone pebbles on flats.	<b>Habitat 1</b>
	<b>Spinifex grasslands with <i>Acacia xiphophylla</i></b>	
<b>FL1</b>	<i>Acacia xiphophylla</i> , <i>Acacia synchronicia</i> , <i>Acacia bivenosa</i> tall sparse shrubland and <i>Senna notabilis</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> mid isolated shrubs over <i>Salsola australis</i> , <i>Enchylaena tomentosa</i> , <i>Maireana planifolia</i> low isolated chenopod shrubs with <i>Triodia pungens</i> , <i>Triodia wiseana</i> low open hummock grassland and <i>Eragrostis xerophila</i> , <i>Sporobolus australasicus</i> low isolated tussock grasses. Red/brown clay loam with sparse pebbles on flats.	<b>Habitat 2</b>
<b>FL3</b>	<i>Acacia xiphophylla</i> , <i>Acacia synchronicia</i> , <i>Acacia bivenosa</i> tall sparse shrubland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Sarcostemma viminale</i> , <i>Hibiscus sturtii</i> var. <i>platyklamys</i> mid isolated shrubs over <i>Triodia wiseana</i> low sparse hummock grassland. Red sandy loam with compact pebbles and rock fragments on flats to lower slopes.	
<b>FL14</b>	<i>Acacia xiphophylla</i> , <i>Acacia atkinsiana</i> tall sparse shrubland and <i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Senna notabilis</i> , <i>Hibiscus sturtii</i> mid sparse shrubland over <i>Triodia pungens</i> low open hummock grassland and <i>Eulalia aurea</i> , <i>Sporobolus australasicus</i> , <i>Chrysopogon fallax</i> low sparse tussock grassland. Red clay loam on flats.	
	<b><i>Acacia</i> shrublands over spinifex on flats</b>	
<b>FL2</b>	<i>Corymbia hamersleyana</i> low isolated clumps of trees over <i>Acacia inaequilatera</i> , <i>Acacia bivenosa</i> , <i>Acacia tumida</i> var. <i>pilbarensis</i> tall sparse shrubland and <i>Cullen martini</i> , <i>Senna notabilis</i> , <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> mid isolated shrubs over <i>Tephrosia uniovulata</i> , <i>Isotropis atropurpurea</i> , <i>Corchorus tectus</i> low sparse shrubs and <i>Triodia wiseana</i> low sparse hummock grassland. Red/brown sandy loam with occasional red clayey loam on flats to lower slopes.	<b>Habitat 3</b>
<b>FL6</b>	<i>Acacia inaequilatera</i> tall open shrubland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Senna glutinosa</i> subsp. <i>pruinosa</i> , * <i>Vachellia farnesiana</i> mid sparse shrubland over <i>Triodia brizoides</i> low open hummock grassland and <i>Eriachne aristidea</i> , <i>Enneapogon caeruleus</i> , <i>Aristida anthoxanthoides</i> low sparse tussock grassland. Red loamy clay with compact ironstone and quartz pebbles on flats and lower slopes.	
<b>FL7</b>	<i>Acacia ancistrocarpa</i> , <i>Acacia colei</i> var. <i>colei</i> , <i>Acacia dictyophleba</i> tall sparse shrubland over <i>Ptilotus astrolasius</i> , <i>Pterocaulon sphacelatum</i> , <i>Indigofera boviperda</i> subsp. <i>boviperda</i> low sparse shrubland over <i>Triodia pungens</i> , <i>Triodia wiseana</i> low open hummock grassland. Red/brown clayey loam with occasionally cracking clay or scattered pebbles on flats.	
<b>FL8</b>	<i>Acacia ancistrocarpa</i> , <i>Acacia bivenosa</i> , <i>Acacia synchronicia</i> tall sparse shrubland over <i>Gossypium australe</i> , <i>Eremophila longifolia</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> mid sparse shrubland over <i>Triodia pungens</i> low sparse hummock grassland and <i>Eulalia aurea</i> , <i>Chrysopogon fallax</i> , <i>Bothriochloa ewartiana</i> low open tussock grassland. Red/Brown clayey loam on flats.	
<b>FL9</b>	<i>Acacia atkinsiana</i> , <i>Acacia ancistrocarpa</i> , <i>Acacia bivenosa</i> tall sparse shrubland over <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Scaevola spinescens</i> mid sparse shrubland over <i>Triodia wiseana</i> , <i>Triodia longiceps</i> low open hummock grassland. Red/brown clayey loam to red clay with pebbles on flats.	

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Vegetation Codes and Descriptions		Fauna Habitats
	<b>Acacia shrublands over spinifex on slopes with rocky outcropping</b>	
MR2	<i>Acacia monticola</i> , <i>Acacia pyrifolia</i> , <i>Acacia trachycarpa</i> tall sparse shrubland over <i>Petalostylis cassioides</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> mid isolated shrubs over <i>Triodia wiseana</i> low hummock grassland. Brown sandy loam with quarts pebbles on slopes.	Habitat 4
MR3	<i>Acacia inaequilatera</i> , <i>Acacia ancistrocarpa</i> , <i>Acacia bivenosa</i> tall sparse shrubland and <i>Senna glutinosa</i> subsp. <i>pruinosa</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> mid sparse shrubland over <i>Ptilotus nobilis</i> , <i>Ptilotus calostachyus</i> , <i>Corchorus tectus</i> low isolated shrubs and <i>Triodia wiseana</i> low open hummock grassland. Red/brown clay loam with ironstone pebbles on slopes.	
MR5	<i>Acacia inaequilatera</i> , <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> , <i>Hakea lorea</i> tall sparse shrubland over <i>Senna glutinosa</i> subsp. <i>pruinosa</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> mid sparse shrubland over <i>Triodia wiseana</i> low open hummock grassland and <i>Aristida holathera</i> var. <i>holathera</i> , <i>Enneapogon caerulescens</i> , <i>Eriachne flaccida</i> low isolated tussock grasses. Red/brown sandy loam with ironstone and quartz pebbles on slopes.	
MR6	<i>Acacia bivenosa</i> , <i>Hakea lorea</i> tall isolated shrubs over <i>Triodia wiseana</i> low sparse hummock grassland. Red/brown sandy loam with loose ironstone gravel on slopes and breakaways.	
	<b>Spinifex grassland</b>	
FL13	<i>Acacia bivenosa</i> , <i>Acacia synchronicia</i> tall isolated shrubs over <i>Triodia longiceps</i> , <i>Triodia pungens</i> low sparse hummock grassland. Red clay loam with gravel on flats.	Habitat 5
	<b>Acacia shrublands with occasional Eucalyptus species over spinifex on upper slopes &amp; ridges</b>	
MR1	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , <i>Corymbia hamersleyana</i> low isolated trees over <i>Acacia bivenosa</i> , <i>Acacia ancistrocarpa</i> , <i>Acacia inaequilatera</i> tall sparse shrubland and <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Senna glutinosa</i> subsp. <i>pruinosa</i> , <i>Acacia maitlandii</i> mid isolated shrubs over <i>Triodia wiseana</i> low open hummock grassland. Red/brown sandy loam with numerous ironstone pebbles on slopes and ridges.	Habitat 6
MR7	<i>Eremophila longifolia</i> , <i>Acacia maitlandii</i> , <i>Acacia atkinsiana</i> mid sparse shrubland over <i>Abutilon lepidum</i> , <i>Gomphrena cunninghamii</i> , <i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186) low sparse shrubland and <i>Triodia wiseana</i> low hummock grassland. Red/brown sandy loam with loose ironstone gravel on ridges.	
MR4	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> , <i>Acacia inaequilatera</i> , <i>Acacia colei</i> var. <i>ileocarpa</i> tall isolated shrubs and <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> , <i>Cajanus cinereus</i> , <i>Abutilon lepidum</i> mid sparse shrubland over <i>Corchorus tectus</i> , <i>Triumfetta clementii</i> , <i>Tribulus platypterus</i> low sparse shrubland and <i>Triodia wiseana</i> low open hummock grassland. Red sandy loam with ironstone pebbles on slopes.	
	<b>Acacia shrublands or Eucalyptus woodlands dominated by Acacias over spinifex on flowlines &amp; small gullies</b>	
CD5	<i>Corymbia hamersleyana</i> low open woodland over <i>Acacia tumida</i> var. <i>pilbarensis</i> , <i>Acacia atkinsiana</i> , <i>Acacia inaequilatera</i> tall sparse shrubland over <i>Bonamia erecta</i> , <i>Goodenia stobbsiana</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> low isolated shrubs and <i>Triodia wiseana</i> low open hummock grassland. Red/brown clay with ironstone pebbles on gullies.	Habitat 7
CD6	<i>Acacia bivenosa</i> , <i>Jasminum didymium</i> subsp. <i>lineare</i> , <i>Acacia ampliceps</i> tall sparse shrubland over <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Indigofera monophylla</i> mid sparse shrubland over <i>Triodia wiseana</i> isolated hummock grasses and <i>Cymbopogon obtectus</i> , <i>Aristida contorta</i> , <i>Eriachne aristidea</i> low isolated tussock grasses. Red/brown sandy loam on minor channels and gullies.	
CD1	<i>Acacia tumida</i> var. <i>pilbarensis</i> , <i>Acacia ancistrocarpa</i> , <i>Acacia trachycarpa</i> tall open shrubland and <i>Gossypium robinsonii</i> , <i>Acacia pyrifolia</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> mid sparse shrubland over <i>Hybanthus aurantiacus</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Ptilotus nobilis</i> low isolated shrubs with <i>Triodia pungens</i> low open hummock grassland and <i>Themeda triandra</i> , <i>Cymbopogon obtectus</i> low sparse tussock grassland. Red/brown sandy loam on minor channels and gullies.	
FL12	<i>Corymbia hamersleyana</i> low open woodland over <i>Grevillea wickhamii</i> , <i>Acacia ancistrocarpa</i> , <i>Acacia bivenosa</i> tall sparse shrubland and <i>Gossypium australe</i> , <i>Hakea chordophylla</i> , <i>Acacia dictyophleba</i> mid sparse shrubland over <i>Bonamia erecta</i> , <i>Corchorus tectus</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> low sparse shrubland and <i>Triodia pungens</i> , <i>Triodia wiseana</i> low open hummock grassland. Red/brown clay loam on flats.	
FL11	<i>Corymbia hamersleyana</i> low open woodland over <i>Acacia trachycarpa</i> , <i>Cullen lachnostachys</i> , <i>Grevillea wickhamii</i> mid sparse shrubland over <i>Themeda triandra</i> , <i>Eulalia aurea</i> , <i>Paraneurachne muelleri</i> low sparse tussock grassland. Red/brown sandy clay loam on flats.	

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Vegetation Codes and Descriptions		Fauna Habitats
<b>Major drainage lines with large <i>Eucalyptus</i> species</b>		
CD4	<i>Eucalyptus victrix</i> , <i>Eucalyptus camaldulensis</i> mid open woodland over <i>Acacia pyrifolia</i> , <i>Grevillea wickhamii</i> , <i>Acacia trachycarpa</i> tall open shrubland over <i>Pterocaulon sphacelatum</i> , <i>Phyllanthus maderaspatensis</i> , <i>Hybanthus aurantiacus</i> mid sparse shrubland with <i>Cyperus vaginatus</i> mid sparse sedgeland and <i>Sporobolus australasicus</i> , <i>Chrysopogon fallax</i> , <i>Enteropogon ramosus</i> low sparse tussock grassland. Red/brown sandy ironstone gravel on major channels.	Habitat 8
CD8	<i>Eucalyptus victrix</i> low open woodland over <i>Grevillea wickhamii</i> , <i>Acacia tumida</i> var. <i>pilbarensis</i> , <i>Acacia pyrifolia</i> tall open shrubland and <i>Tephrosia rosea</i> , <i>Corchorus lasiocarpus</i> , <i>Indigofera monophylla</i> mid sparse shrubland over <i>Triodia pungens</i> low open hummock grassland and <i>Eriachne aristidea</i> , <i>Eriachne pulchella</i> , * <i>Cenchrus ciliaris</i> low open tussock grassland. Red/brown clay loam with scattered ironstone on major channels.	
CD3	<i>Eucalyptus victrix</i> mid open woodland over <i>Acacia ampliceps</i> , <i>Acacia trachycarpa</i> , <i>Sesbania cannabina</i> tall sparse shrubland over <i>Cyperus vaginatus</i> mid sparse sedgeland and <i>Eriachne benthamii</i> , <i>Enneapogon caerulescens</i> , <i>Cymbopogon obtectus</i> low sparse tussock grassland. Red/brown clay on minor channels.	
<b>Floodplains</b>		
CD2	<i>Corymbia candida</i> , <i>Corymbia hamersleyana</i> , <i>Eucalyptus camaldulensis</i> low open woodland over <i>Acacia tumida</i> var. <i>pilbarensis</i> , <i>Gossypium robinsonii</i> , <i>Acacia ancistrocarpa</i> tall sparse shrubland over <i>Eragrostis tenellula</i> , <i>Sporobolus australasicus</i> , <i>Eragrostis cumingii</i> low sparse tussock grassland and <i>Alternanthera nodiflora</i> , <i>Ipomoea muelleri</i> , <i>Waltheria indica</i> low sparse forbland. Red clay and sandy loam on open channels and floodplains.	Habitat 9
CD7	<i>Corymbia hamersleyana</i> low open woodland over <i>Acacia ancistrocarpa</i> , <i>Acacia trachycarpa</i> , <i>Acacia dictyophleba</i> tall sparse shrubland and <i>Cullen lachnostachys</i> , <i>Gossypium australe</i> , <i>Grevillea wickhamii</i> mid sparse shrubland over <i>Pterocaulon sphacelatum</i> , <i>Pluchea dunlopii</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> low open shrubland with <i>Triodia pungens</i> low open hummock grassland and <i>Eulalia aurea</i> , <i>Chrysopogon fallax</i> , <i>Eriachne pulchella</i> low sparse tussock grassland. Red/brown clay loam on floodplains.	
<b>Cracking clay grasslands</b>		
FL15	<i>Astrebola lappacea</i> (P3), <i>Aristida latifolia</i> , <i>Panicum decompositum</i> low tussock grassland. Red/brown clayey loam with cracking clay on flats.	Habitat 10
<b>Open plains</b>		
FL4	<i>Streptoglossa bubakii</i> , <i>Phyllanthus maderaspatensis</i> , <i>Sida trichopoda</i> low sparse forbland with <i>Triodia wiseana</i> low open hummock grassland and <i>Aristida latifolia</i> , <i>Brachyachne convergens</i> , <i>Eragrostis xerophila</i> low sparse tussock grassland. Deep, red clayey loam with compact rock fragments on flats.	Habitat 11
FL5	<i>Sida spinosa</i> , <i>Phyllanthus maderaspatensis</i> , <i>Cullen cinereum</i> low sparse shrubland with <i>Panicum decompositum</i> , <i>Enneapogon caerulescens</i> low sparse tussock grassland and <i>Stemodia kingii</i> , <i>Heliotropium crispatum</i> , <i>Desmodium muelleri</i> low sparse forbland. Red clayey loam with scattered ironstone rocks on flats.	

Even within these various fauna habitats there will be a wide range of vertebrate fauna species that will occur in more than one habitat. For example, some reptiles and small mammals that prefer spinifex (*Triodia*) will be found in most habitats where this plant is present; other species that require larger trees for nesting or refuge will be found in those habitats that support *Eucalyptus victrix* and/or *Eucalyptus camaldulensis*. Some species will only occur in some habitats when seasonal conditions dictate the presence or absence of water.

## 8 RESULTS

In the following sections data have been extracted from the DPaW's NatureMap database ([www.dpaw.wa.gov.au/faunabase](http://www.dpaw.wa.gov.au/faunabase)), Birds Australia database ([www.birddata.com.au](http://www.birddata.com.au)), and several recent fauna surveys in the general area; these include the Solomon Project (Coffey Environments [Coffey] 2008 and *ecologia* Environmental [ecologia] 2010), and the Brockman Syncline 4 Project (Biota Environmental Sciences [Biota] 2005). While there are other relevant historical reports that were produced during the 1980's and 1990's, they have not been considered in this review as there has been a considerable amount of taxonomic work conducted over the last 10 years in which many new species have been described; therefore, it may not be possible to accurately determine which species are shown in these historical reports. The results of the data and literature review have been supplemented with the results of the field assessment conducted in October 2013.

The results of the data and literature review for each faunal group are discussed separately in the following sections as are the field assessment results.

### 8.1 Bird Species

#### 8.1.1 Data and Literature Review Results

The data and literature review showed that up to 152 species of bird could occur in the vicinity of the FRGP route (Appendix 4). There is a range of species, mainly shorebirds, which could be present when exceptionally wet conditions are experienced following major cyclonic events; these species have not been listed in Appendix 4 as their appearance would be ephemeral and dependent on the presence of areas of deep water within the major creeklines. In addition, many of the bird species listed are migratory or nomadic, appearing seasonally, or when environmental conditions are suitable. For example, many honeyeater species are highly nomadic, responding to the flowering of shrubs and trees. Some of the smaller bird species such as fairy-wrens and thornbills are more likely to be resident within specific habitats along the proposed FRGP route.

The search of DPaW's NatureMap revealed a total of 133 bird species that are known from the vicinity of the current Study Area, with 121 resulting from a search of the Birds Australia database. A field survey conducted by Coffey for the Solomon Project in 2008 resulted in 65 species of bird being recorded; 79 species were recorded by *ecologia* (2010) in the Solomon Project (Kings area), with 56 species recorded by Biota during their survey of the Brockman Syncline 4 survey in 2005 (Biota 2005).

Between 2004 and 2006, DPaW (previously the Department of Environment and Conservation) conducted a regional survey of the Pilbara where the presence/absence of bird species was recorded over 297 sites, each of 16 ha, and chosen to represent the geographical extent and diversity of terrestrial environments across the Pilbara biogeographic region. During this survey, 132 species with an average of 19.1 species per site were recorded, ranging from 3 to 49 species (Burbidge *et al.* 2010). This discrepancy in the number of species demonstrates both the patchy distribution and mobility of birds in the region.

Riverine areas that include large trees such as *Eucalyptus camaldulensis* and *Eucalyptus victrix* would support a wide range of species, particularly those within the cockatoo and parrot groups, pigeons, doves, and birds of prey that rely on these groups for food. The large trees would also provide the nesting and shelter hollows that many of these species, and others such as owls, rely on.

The list of species resulting from the data and literature review also includes a number of species that, while present nearby, their preferred habitats are not present and, as a result, these species are shown in red as being unlikely to be present in the current Study Area. There are also a number of species that have not as yet been recorded in the general area but whose geographic distributions cover the

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current Study Area and preferred habitat is present; these bird species have been included in the predicted species list.

While the list of birds that could occur is extensive, without intensive surveys over a number of seasons and years, it is not possible to state with confidence which of these species is most likely to be present. However, many are common and widespread with little habitat specificity and could occur in a range of habitats throughout the Study Area.

### **8.1.2 Field Assessment Results**

The data and literature review showed that up to 152 species of bird could occur in the general area in the vicinity of the pipeline route. Following the field assessment, several species have been removed from this predicted list as no suitable habitat for them was present; these birds were mainly associated with major wetlands which do not feature within the current Study Area. A small number of bird species were added to the predicted list as suitable habitat was identified during the field assessment. Appendix 4 lists all of the species predicted to occur and those recorded during the field assessment.

Fifty-one species of bird were recorded during the field assessment. Due to the limited access along the eastern section of the route, the majority of these were recorded within the western section.

The 51 species of bird recorded included all five of the pigeon and dove species expected to occur, seven of the 17 bird of prey species, five of the eight cockatoos and parrots, and six of the 11 honeyeater species. The remaining species included a wide range of insectivorous birds.

#### **8.1.2.1 Bird Species of Conservation Significance**

One bird species of conservation significance was recorded: the Rainbow Bee-eater (*Merops ornatus*) which is listed on the Japan-Australia Migratory Bird Agreement. This bird is considered a breeding resident in northern Australia but a summer breeding visitor to the south. It occurs throughout mainland Australia with the exception of the central desert areas and is absent from Tasmania (Pizzey and Knight 2012).

The following additional bird species of conservation significance resulted from the DSEWPaC and DPaW search and some could potentially occur within the Study Area.

- *Phaps histrionica* Flock Bronzewing
- *Apus pacificus* Fork-tailed Swift
- *Ardea modesta* Eastern Great Egret
- *Ardea ibis* Cattle Egret
- *Haliaeetus leucogaster* White-bellied Sea-eagle
- *Pandion haliaetus* Eastern Osprey
- *Falco peregrinus* Peregrine Falcon
- *Ardeotis australis* Australian Bustard
- *Burhinus grallarius* Bush Stone-curlew
- *Charadrius veredus* Oriental Plover (Dotterel)
- *Glareola maldivarum* Oriental Pratincole
- *Hirundo rustica* Barn Swallow

These birds are discussed in detail in Section 10.5.1 which provides notes on distribution, ecology, habitat preferences and the likelihood of their occurrence within the Study Area.

## 8.2 Native Mammal Species

### 8.2.1 Data and Literature Review Results

Forty-one species of native mammal, including 16 species of bat, could be present in the habitats along the proposed gas pipeline route (Appendix 5). The list of native mammals shown in Appendix 5 as potentially occurring consists of one monotreme, 11 marsupial carnivores, one bandicoot, one possum, three kangaroos/wallabies, 16 bats, seven rodents and one placental carnivore.

Thirty-three species resulted from the search of DPaW's NatureMap (Appendix 2). Twenty-six species were recorded within the Solomon Project area: Coffey (2008) recorded 16 species; and *ecologia* (2010) recorded 24 species. However, some species were not confidently identified during these latter two studies (*Pseudantechinus* sp., *Planigale* sp. and *Pseudomys chapmani*). Biota recorded 12 species during their survey of the Brockman Syncline 4 project in 2005 (Biota 2005). The disparity between the number of species shown in the data review and the actual recording of mammals indicates the difficulty of adequately sampling this group of animals, generally due to their natural low abundance.

Small ground-dwelling mammals were targeted during the DEC (now DPaW) survey of the Pilbara Bioregion, in which 17 species of native mammal were recorded within the entire Pilbara Bioregion; 10 of these species were small marsupial carnivores and seven were native rodents. Microbats were also targeted in this Pilbara survey and 14 species were recorded from inland environments, in particular, the richest microbat assemblages were recorded in well-developed riparian environments with complex vegetation structures and permanent pools that were set in cavernous landscapes (McKenzie and Bullen (2009).

The results from survey of small ground-dwelling mammals in the Pilbara Bioregion (Gibson and McKenzie 2009) indicated that small mammals partition their habitat on substrate type at the local scale in the Pilbara Bioregion: sandy; clayey and rocky substrates. However, the experience of Ninox in the Pilbara region shows that a number of small native mammals are also dependent upon some vegetation elements of the landscape, mainly the presence of spinifex (*Triodia* species).

As for birds, this list of potential species occurrence is extensive. However, unlike birds, all of the small mammals would be resident with only some bats, large kangaroos and the dingo being more mobile and less habitat-specific. However, many small native mammals are in low abundance through the habitats that support them and it would take an extensive trapping effort to confirm their presence.

### 8.2.2 Field Assessment Results

The data and literature review indicated that up to 41 species of native mammal could be present in the habitats of the proposed FRGP route. Typically for a Level 1 field assessment, only larger native mammal species were recorded during the field assessment; these were the Euro (*Macropus robustus*) and Red Kangaroo (*Macropus rufus*); Appendix 5 lists all the native mammal species predicted to occur and these two recorded species. Without extensive trapping over several seasons it is not possible to ascertain the actual presence of the majority of native mammals that are present in any given area.

#### 8.2.2.1 Native Mammal Species of Conservation Significance

The following native mammal species of conservation significance resulted from the DSEWPaC and DEC search and some could potentially occur within the Study Area.

- *Dasyurus hallucatus* Northern Quoll
- *Sminthopsis longicaudata* – Long-tailed Dunnart

- *Macrotis lagotis* Greater Bilby
- *Notoryctes caurinus* Northern Marsupial Mole
- *Macroderman gigas* Ghost Bat
- *Rhinonictoris aurantia* Pilbara Leaf-nosed Bat (unnamed Pilbara form)
- *Leggadina lakedownensis* Lakeland Downs Mouse
- *Pseudomys chapmani* Western Pebble-mound Mouse

These mammals are discussed in detail in Section 10.5.2 which provides notes on distribution, ecology, habitat preferences and the likelihood of their occurrence within the Study Area.

### **8.3 Amphibian Species**

#### **8.3.1 Data and Literature Results**

Eleven species of frog in three Families along the proposed gas pipeline route (Appendix 6). Of these only two species resulted from the search of DPaW's NatureMap and four species were recorded in the Solomon Project study (Coffey 2008 and *ecologia* 2010). No frogs were recorded by Biota (2005) in their survey of Brockman Syncline 4 project area.

This is a particularly hard group of animals to sample effectively, with many species only being observed following rainfall when access into many areas of the Pilbara by vehicle is extremely difficult. However, during the extensive DEC survey of the Pilbara Bioregion, 11 species of frog were recorded between 2004 and 2006 although heavy rainfall prevented sampling in some areas (Doughty *et al.* 2011).

None of the frogs expected to occur along the proposed pipeline route are considered of particular conservation significance.

#### **8.3.2 Field Assessment Results**

Given the dry, hot conditions experienced during the field assessment, no amphibians were recorded although nine species resulted from the data and literature review. This group of animals is particularly difficult to sample effectively in the dry arid parts of Australia unless sampling coincides with suitable breeding weather conditions.

### **8.4 Reptile Species**

#### **8.4.1 Data and Literature Review Results**

One hundred and nineteen reptiles comprised of one freshwater tortoise, 24 geckos, eight legless lizards, 42 skinks, 10 dragons, 10 monitors, five blind snakes, five pythons and 14 elapid (front-fanged) venomous snakes, could potentially occur in the habitats along the proposed pipeline route (Appendix 7). While this is an extremely high number of reptiles that are known from the general area, not all will be present along the proposed pipeline route due either to the lack of suitable microhabitat or as a result of the general patchiness of animal distributions through their preferred habitat.

Ninety-two species of reptile resulted from the search of DPaW's NatureMap, 58 were recorded by Coffey within the Solomon Project area (Coffey 2008) and 73 from the later survey by *ecologia* (2010); in total, 76 species were recorded during these two surveys within the Solomon Project area. Biota (2005) recorded 32 species during the Brockman Syncline 4 survey.

Doughty *et al.* (2011) reported a total of 134 reptiles comprised of 28 geckos, 10 legless lizards, 56 skinks, 15 dragons, eight monitors, six blind snakes, two pythons and nine elapid snakes resulting from the study of the Pilbara Bioregional survey in 297 sampling locations between 2004 and 2006. However, 95 species were represented in less than 10% of the 297 locations, indicating the patchy distribution, general scarcity and difficulty of sampling many reptile species.

#### **8.4.2 Field Assessment Results**

While 120 species of reptile resulted from the data and literature review, only eight species were recorded during the field assessment; these included one gecko, one skink, five dragon lizards and one monitor lizard (Appendix 7). The presence of the majority of small reptile species would only be confirmed following intensive trapping within all major fauna habitats along the proposed route.

One small dragon in the genus *Tympanocryptis* recorded during the site assessment within the cracking clay grasslands will be described as a new species in the near future. This species is unlikely to be declared as of particular conservation significance in the near future as it is relatively common within its preferred habitat.

##### **8.4.2.1 Reptile Species of Conservation Significance**

The following reptile species of conservation significance resulted from the DSEWPac and DPaw search and some could potentially occur within the Study Area.

- *Ctenotus uber johnstonei* – a skink
- *Notoscincus butleri* – a skink
- *Ramphotyphlops ganei* – a blind snake
- *Aspidites ramsayi* - Woma
- *Liasis olivaceus barroni* - Pilbara Olive Python

These reptiles are discussed in detail in Section 10.5.3 which provides notes on distribution, ecology, habitat preferences and the likelihood of their occurrence within the Study Area.

## **8.5 Introduced Species**

### **8.5.1 Data and Literature Results**

Ten introduced and/or stock mammals could be present along the proposed gas pipeline route (Appendix 8). These are comprised of one rodent, three carnivores and six herbivores. Of these species, the carnivores have a major impact on native animals, although the herbivores have a much greater and wider impact on the habitats that support native animals. The pressure from grazing, increased spread of weeds, and soil compaction/erosion all contribute to serious habitat modification and deterioration of condition. This aspect is particularly noticeable in the vicinity of riparian vegetation, especially where river pools are present and cattle tend to congregate.

### **8.5.2 Field Assessment Results**

Of the 10 introduced species resulting from the data and literature review, three were observed during the field assessment: the feral cat (*Felis catus*), feral horse (*Equus caballus*) and cattle (*Bos taurus*). Some areas of cracking clay grasslands had been heavily grazed by cattle. Appendix 8 lists all of the species predicted to occur and those recorded during the field assessment.

## **9 SPECIES OF CONSERVATION SIGNIFICANCE**

### **9.1 Statutory and other Requirements**

This section describes the various Australian Government and Western Australian Government Acts that cover rare, threatened and vulnerable vertebrate fauna species and was correct at the time of the preparation of this document. However, as changes are made to both State and Australian Government legislation and new treaties are entered into, all current documentation regarding rare, threatened and vulnerable fauna should be periodically reviewed for any changes to the status of fauna in a given area.

Additionally, in any discussion of rare, threatened or vulnerable species, several aspects require clarification before the significance of these species can be considered in context of the development and operation of any project.

- Resident, habitat-specific rare fauna are much more susceptible to the influences of disturbance than nomadic or migratory species.
- Not all rare species are equally susceptible to disturbance. Some rare species such as the Peregrine Falcon can accommodate the high levels of disturbance present in urban and rural environments.
- The concept of species rarity is a dynamic process considerably influenced by the level of survey work carried out in a particular location.

### **9.2 Protected Species – Australian Government**

A number of fauna species are covered by *The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* as Matters of National Environmental Significance either as Nationally Threatened Species or Migratory Species. Nationally Threatened Species classifications are broken down as follows under the *EPBC Act*:

1. extinct;
2. extinct in the wild;
3. critically endangered;
4. endangered;
5. vulnerable; and
6. conservation dependent.

This Act is administered by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) which also administers international treaties described below ([www.environment.gov.au](http://www.environment.gov.au)).

A range of birds are listed under the Japan-Australia (JAMBA), China-Australia (CAMBA) and Republic of Korea/Australia (ROKAMBA) Migratory Bird Agreements. The main aim of these international agreements is to protect migratory birds and their breeding and/or feeding habitats. Most of the species listed on these agreements are shorebirds associated with coastal shores or inland saline wetlands and most are not relevant to the current Study Area. However, there are a small number of birds listed on these international treaties that could occur and these are discussed in this report.

### 9.3 Protected Species - Western Australia

Currently in Western Australia, rare or endangered species are protected by the *Wildlife Conservation Act 1950 (WC Act)*. The various schedules defined under this Act are:

- Schedule 1, being fauna that is rare or likely to become extinct;
- Schedule 2, being fauna that is presumed to be extinct;
- Schedule 3, being birds that are subject to an agreement between the government of Australia and the governments of Japan, China and the Republic of Korea relating to the protection of migratory birds; and
- Schedule 4, are declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned above.

This Act administered by the Department of Environment and Conservation (DEC) and is periodically reviewed. The current list of protected fauna can be viewed on DPaW's website ([www.dec.wa.gov.au](http://www.dec.wa.gov.au)). However, Burbidge (2004) acknowledges however, that the *WC Act* is now outdated and a Biodiversity Conservation Bill is currently being prepared for introduction to Western Australia's Parliament. A recent change to the *WC Act* shows that Schedule 3 now follows the *EPBC Act* for trans-equatorial migratory birds covered under international treaties.

### 9.4 Priority Species - Western Australia

There are a number of species not listed under the *WC Act* that, for various reasons, require attention and these are listed on DPaW's Priority Fauna List which classifies species as:

- Priority 1 - taxa with few, poorly known populations on threatened lands.  
*Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.*
- Priority 2 - taxa with few, poorly known populations on conservation lands.  
*Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.*
- Priority 3 - taxa with several, poorly known populations, some on conservation lands.  
*Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.*
- Priority 4 - taxa in need of monitoring.  
*Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if*

*present circumstances change. These taxa are usually represented on conservation lands.*

- Priority 5 - taxa in need of monitoring.

*Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.*

The Priority Fauna List does not confer any additional legal protection to the species listed apart from the normal protection afforded to most native animals. It does, however, indicate the need for vigilance during the construction and commissioning of development projects to manage native vegetation and rehabilitation so that Priority species, should they occur, do not meet the criteria for listing on the Threatened Species List as a result of that development.

### **9.5 Species of Conservation Significance Potentially Occurring in the Study Area**

The following species resulted from a search of DSEWPaC's rare species database, DPaW's NatureMap and other literature sources as potentially occurring in the Solomon Hub to CS 1 gas pipeline route. They have been assessed in the following sections as to whether their habitat is present and whether there are actual records of their occurrence in nearby areas in recent years. This assessment of potential to occur is made using the criteria listed below:

Unlikely	- Not recorded in the general area and preferred habitat does not appear to be present;
Low	- has not been recorded in the general area in the recent past but suitable habitat is present;
Moderate	- has been recorded in the general area in the past and/or preferred habitat is present;
High	- has been recorded in close proximity to the Study Area and preferred habitat is present;
Seasonally High	- a seasonal migrant or nomadic species that has a widespread,
“ Moderate	sometimes worldwide, distribution and little or no specific
“ Low	habitat requirements.

These categories are necessarily broad and the high mobility of many species of fauna (particularly migratory and nomadic bird species) has, for some species, required a combination of two categories.

Information on the species discussed below has been extracted from a number of sources including all those listed in Section 4, and includes anecdotal information from the highly experienced Ninox team. Other details have been extracted from The Atlas of Living Australia ([www.ala.org.au](http://www.ala.org.au)).

### 9.5.1 *Birds*

#### 9.5.1.1 *Flock Bronzewing (*Phaps histrionica*)*

<u>Status</u>	The Flock Bronzewing is listed as P4 on DPaW's Priority Fauna listing.
<u>Distribution</u>	Mainly known from Queensland and the Northern Territory, this pigeon is also known to occur in the Kimberley Region of Western Australia. Occasional records from the Pilbara Region.
<u>Ecology</u>	A highly nomadic bird, the Flock Bronzewing nests on the ground generally in the cover of low vegetation. It feeds on seeds, mainly grasses but also some herbaceous plants.
<u>Habitat Preferences</u>	Prefers open grassy plains, generally treeless; also known from spinifex and open mulga habitats.
<u>Potential Occurrence</u>	<b>Moderate:</b> listed in the results of the search of DPaW's NatureMap (Appendix 2) with two records dated 1958 on the extreme south-west corner of what is now the Millstream Chichester National Park. Suitable habitat is present along the FRGP route.

#### 9.5.1.2 *Fork-tailed Swift (*Apus pacificus*)*

<u>Status</u>	The Fork-tailed Swift is listed as migratory under the <i>EPBC Act</i> on JAMBA, CAMBA and ROKAMBA. It is also listed on Schedule 3 of the <i>WC Act</i> .
<u>Distribution</u>	The Fork-tailed Swift is a non-breeding visitor to all States and Territories of Australia ( <a href="http://www.environment.gov.au">www.environment.gov.au</a> ). It is often observed in the forefront of storms in northern Australia, and very occasionally much further south in locations such as Dryandra National Park and the Darling Range (personal observations). They breed in the northern hemisphere.
<u>Ecology</u>	Nevill (2008) states that the Fork-tailed Swift is a gregarious bird which generally flies at heights between 50m and 200m foraging for aerial invertebrates. They are most often seen at the head of storm fronts between November and April. They breed in Siberia in the north, Japan in the east and Thailand in the south. Generally arrives in northern Australia in October and leaves by April (Pizzey and Knight 2012).
<u>Habitat Preferences</u>	While spending the summer and most of the autumn in Australia, Fork-tailed Swifts are almost entirely aerial. They sometimes occur in extremely large flocks of up to 2,000 individuals. Rarely seen to land, these birds are thought to feed, drink, rest and sleep on the wing (Nevill 2008). On the rare occasions they have been seen to land between 1900 and 1990, they have been seen on bare branches above the foliage on trees, fences and on the ground (DSEWPaC Threatened Species Profile). However, these observations are extremely infrequent and no inference can be made as to whether these birds have any landing preference.
<u>Potential Occurrence</u>	<b>Seasonally High:</b> listed in the results of the search of DSEWPaC's Protected Matters Report and DPaW's NatureMap (Appendices 1, 2) and recorded in the Solomon Project area ( <i>ecologia</i> 2010). Could be observed flying over all habitats within the Study Area.

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### 9.5.1.3 Eastern Great Egret (*Ardea alba*)

<u>Status</u>	Previously known as the Great Egret ( <i>Ardea alba</i> ), this bird is listed under the <i>EPBC Act</i> on the Japan/Australia and China/Australia Migratory Bird Agreements. It is also listed on Schedule 3 of the <i>WC Act</i> .
<u>Distribution</u>	Kimberley and wetter western half of Western Australia.
<u>Ecology</u>	Feeds on aquatic vertebrates and invertebrates in estuarine and other large fresh or brackish waterbodies.
<u>Habitat Preferences</u>	Prefers large river pools, estuaries, tidal mudflats and sewage ponds.
<u>Potential Occurrence</u>	<b>Moderate:</b> listed on DSEWPaC's, DPaW's and Birds Australia databases for the area (Appendices 1 and 2) and suitable habitat may be present following summer cyclonic activity.

### 9.5.1.4 Cattle Egret (*Ardea ibis*)

<u>Status</u>	The Cattle Egret is listed as Migratory under the <i>EPBC Act</i> on the Japan/Australia Migratory Bird Agreement (Appendix 1). It is also listed on Schedule 3 of the <i>WC Act</i> .
<u>Distribution</u>	Wetter northern portion of the Kimberley and south-western Western Australia.
<u>Ecology</u>	The Cattle Egret is a recent coloniser into Australia. Most commonly observed in the company of cattle in pastures where it feeds on invertebrates disturbed by these grazing animals.
<u>Habitat Preferences</u>	Prefers pastures and paddocks but may be seen in crops.
<u>Potential Occurrence</u>	<b>Low:</b> while listed as Migratory on DSEWPaC's Protected Matters Report (Appendix 1) there are no records of this bird in the vicinity of the proposed FRGP route although suitable habitat and cattle are present.

### 9.5.1.5 White-bellied Sea-eagle (*Haliaeetus leucogaster*)

<u>Status</u>	Listed under the <i>EPBC Act</i> (CAMBA), this large bird of prey is also listed under Schedule 3 of the <i>WC Act</i> .
<u>Distribution</u>	Mainly coastal and on offshore islands in all States of Australia although it may also be observed along major river systems inland.
<u>Ecology</u>	Considered a breeding resident throughout its range, with home ranges of up to 100km <sup>2</sup> . Nesting areas usually occur near bodies of water.
<u>Habitat Preferences</u>	The White-bellied Sea-eagle is not often seen far from the coast and may be observed hunting over water or patrolling beaches where it may take carrion (Nevill 2008).
<u>Potential Occurrence</u>	<b>Unlikely:</b> while listed as Migratory on DSEWPaC's Protected Matters Report (Appendix 1) there are no records of this bird in the vicinity of the proposed FRGP route and no suitable habitat is present along the route.

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#### 9.5.1.6 Eastern Osprey (*Pandion haliaetus*)

<u>Status</u>	Listed as Marine under the <i>EPBC Act</i> .
<u>Distribution</u>	Coasts and islands of Australia but now rare in Victoria, southern NSW, SA, absent from Tasmania and Bass Strait (Pizzey and Knight 2012).
<u>Ecology</u>	Generally solitary, the Eastern Osprey feeds mainly on fish but may occasionally take other birds, mammals and reptiles. Usually takes its prey to a prominent perch to be consumed.
<u>Habitat Preferences</u>	This bird of prey lives mainly near the coast and on offshore islands although in wet years, it may frequent large inland river systems (Debus 2001).
<u>Potential Occurrence</u>	<b>Unlikely:</b> listed as Marine on DSEWPac's Protected Matters Report (Appendix 1) there are no records of this bird in the vicinity of the proposed gas pipeline route.

#### 9.5.1.7 Peregrine Falcon (*Falco peregrinus*)

<u>Status</u>	Listed on Schedule 4 of the Western Australian <i>WC Act</i> .
<u>Distribution</u>	An Australia-wide species including some offshore islands, but could be absent from most deserts and the Nullabor Plain (Johnstone and Storr 1998).
<u>Ecology</u>	This striking falcon is sedentary; it roosts and nests on inaccessible cliffs; also known to nest on ledges on tall city buildings and abandoned mine pits (personal observations). An extremely agile and fast hunter it feeds on a wide range of birds including pigeons and ducks.
<u>Habitat Preferences</u>	Most frequently observed near cliffs along the coast and ranges of the interior; also along wooded watercourses and lakes.
<u>Potential Occurrence</u>	<b>High:</b> listed on both DPaw and Birds Australia databases for the area (Appendices 2 and 3), and suitable habitat is present in the vicinity of the FRGP route.

#### 9.5.1.8 Australian Bustard (*Ardeotis australis*)

<u>Status</u>	The Australian Bustard is listed as P4 on DPaw's Priority Fauna listing.
<u>Distribution</u>	This large bird is widespread throughout Australia with the exception of densely forested areas and inhabits a range of habitats.
<u>Ecology</u>	A highly nomadic species which may be more commonly observed when grasshoppers are abundant (Johnstone and Storr 1998). It lays its eggs on bare, stony ground generally in autumn and winter in areas south of the Kimberley.
<u>Habitat Preferences</u>	This large bird prefers open or lightly wooded country, mainly grasslands including spinifex.
<u>Potential Occurrence</u>	<b>High:</b> listed on DPaw and Birds Australia databases for the area (Appendices 2 and 3) and recorded in the Solomon Project area by <i>ecologia</i> (2010). Suitable habitat is present within the Study Area.

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**9.5.1.9 Bush Stone-curlew (*Burhinus grallarius*)**

<u>Status</u>	The Bush Stone-curlew is listed as P4 on DPaW's Priority Fauna listing.
<u>Distribution</u>	This unusual bird occurs in the Kimberley, Pilbara and the western half of the rest of the State.
<u>Ecology</u>	Generally most active at dusk and dawn, these birds are mainly nocturnal, roosting during the day. They feed on insects, small reptiles and seeds (Nevill 2008) and nest on bare stony ground with both eggs and nestlings being highly camouflaged.
<u>Habitat Preferences</u>	This bird appears to prefer lightly wooded country, often with a ground surface of stones or pebbles. Eggs are laid directly onto the ground in a shallow depression.
<u>Potential Occurrence</u>	<b>High:</b> listed in the results of the search of DPaW's NatureMap (Appendix 2), within the Solomon Project Area (Coffey 2008), and within the Brockman Syncline by Biota (2005). Suitable habitat is present within the Study Area.

**9.5.1.10 Australian Painted Snipe (*Rostratula australis*)**

<u>Status</u>	The Australian Painted Snipe is listed under the <i>EPBC Act</i> as Vulnerable and is also listed on the CAMBA and Schedule 3 of the <i>WC Act</i> . However, under the migratory species legislation, this species is nominated as <i>Rostratula benghalensis</i> or <i>Rostratula benghalensis australis</i> . It is now considered to be a full species rather than a sub-species.
<u>Distribution</u>	Known Australia wide but more common in the eastern portions of the continent. In Western Australia, this bird is more likely to be observed in the Kimberley and Swan Coastal Plain although there are very few recent records (Johnstone and Storr 1998).
<u>Ecology</u>	This species nests on the ground, generally amongst tall reed-like vegetation near water. It feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds (EPBC Fact Sheet).
<u>Habitat Preferences</u>	Known to prefer shallow freshwater habitats, inundated and/or waterlogged grasslands including rice fields and sewage ponds.
<u>Potential Occurrence</u>	<b>Unlikely:</b> listed as Endangered on DSEWPaC's Protected Matters Report (Appendix 1) there are no records of this bird in the vicinity of the proposed gas pipeline route and no suitable habitat is present.

**9.5.1.11 Oriental Plover (*Charadrius veredus*)**

<u>Status</u>	The Oriental Plover (Dotterel) is listed under the <i>EPBC Act</i> on the JAMBA and ROKAMBA. It is also listed on Schedule 3 of the <i>WC Act</i> .
<u>Distribution</u>	Northern portion of Western Australia.
<u>Ecology</u>	The Oriental Plover is a summer, non-breeding, migrant to Australia.
<u>Habitat</u>	Prefers open plains, ploughed land, grassy sportfields, lawns, muddy or

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<u>Preferences</u>	sandy wastes near inland swamps or tidal mudflats; often far from water.
<u>Potential Occurrence</u>	<b>Unlikely to Low:</b> while listed as Migratory on DSEWPaC's Protected Matters Report (Appendix 1) there are no records of this bird in the vicinity of the proposed gas pipeline route but suitable habitat is present.

9.5.1.12 Oriental Pratincole (*Glareola maldivarum*)

<u>Status</u>	The Oriental Pratincole is listed under the <i>EPBC Act</i> on JAMBA, CAMBA and ROKAMBA. It is also listed on Schedule 3 of the <i>WC Act</i> .
<u>Distribution</u>	Mainly coastal in Western Australia but with scattered records inland. Does not breed in the southern hemisphere.
<u>Ecology</u>	This bird usually feeds on insects during flight, sometimes as high as 300m but will also forage on the ground for invertebrate prey.
<u>Habitat Preferences</u>	Open plains and grasslands, including farmland. May be observed in the vicinity of wetlands such as billabongs, lakes, creeks and artificial wetlands such as salt works and sewage farms.
<u>Potential Occurrence</u>	<b>Moderate:</b> listed on DPaW's database for the area (Appendix 2) at the western extremity of the search area, and also shown as Migratory on DSEWPaC's Protected Matters Report (Appendix 1). Suitable habitat within the Study Area would include grasslands and river pools.

9.5.1.13 Rainbow Bee-eater (*Merops ornatus*)

<u>Status</u>	The Rainbow Bee-eater is listed under the <i>EPBC Act</i> on the Japan/Australia Migratory Bird Agreement. It is also listed on Schedule 3 of the <i>WC Act</i> .
<u>Distribution</u>	The Rainbow Bee-eater occurs in the Kimberley, Pilbara, Gascoyne and southwest of Western Australia; it appears to be absent from the driest parts of the State. This species usually arrives in the south in September and leave by April following breeding.
<u>Ecology</u>	These birds are summer migrants to southern Australia but may be resident all year in the north. They feed on a wide variety of aerial invertebrates, often hunting from perches on dead trees, telephone wires and fences. They breed between September and February, digging burrows into sandy soil either on flat ground or in sandy banks.
<u>Habitat Preferences</u>	They prefer lightly wooded country, near water and preferably with sandy soils suitable for their breeding burrows, i.e. soils that are easy to excavate but firm enough to support burrows.
<u>Potential Occurrence</u>	<b>High:</b> recorded in all databases and literature reviewed for this study and observed during the field assessment. Two individuals were observed at approximately 552 750 mE and 7 583 250 mN within the FRGP route.

9.5.1.14 Barn Swallow (*Hirundo rustica*)

<u>Status</u>	The Barn Swallow is listed as migratory under the <i>EPBC Act</i> on JAMBA, CAMBA and ROKAMBA. It is also listed on Schedule 3 of the <i>WC Act</i> .
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<u>Distribution</u>	A spring/summer visitor, this bird occurs mainly in coastal areas between the Pilbara and Fraser Island in Queensland as well as on some offshore islands.
<u>Ecology</u>	The Barn Swallow breeds throughout the temperate and subtropical northern hemisphere, south to the Tropic of Cancer, and then migrates to the southern hemisphere, Indian subcontinent, and southeast Asia including the Philippines, Indonesia and Melanesia.
<u>Habitat Preferences</u>	In Australia, the Barn Swallow is recorded in open country in a range of habitats, often near water, towns and cities. Birds are often sighted perched on overhead wires.
<u>Potential Occurrence</u>	<b>Unlikely to Low:</b> while listed as Migratory on DSEWPaC's Protected Matters Report (Appendix 1) there are no records of this bird in the vicinity of the proposed gas pipeline route.

## 9.5.2 Native Mammals

### 9.5.2.1 Northern Quoll (*Dasyurus hallucatus*)

<u>Status</u>	The Northern Quoll is listed as Vulnerable under the <i>EPBC Act</i> and Endangered (Schedule 1) under the <i>WC Act</i> .
<u>Distribution</u>	The Northern Quoll is found in Northern Australia from northern Queensland through to the Pilbara in Western Australia. While the distribution of Northern Quolls was once continuous between the Kimberley and southern Queensland, there is no evidence to suggest that the Pilbara population was ever anything but isolated.
<u>Ecology</u>	There is little specific data on the ecology of the Pilbara population of the Northern Quoll therefore the information provided here is mainly based on the northern Australian populations from the Kimberley to Queensland where a substantial amount of work has been conducted, particular on the effects of the invasion of habitat by Cane Toads ( <i>Chaunus [Bufo] marinus</i> ).

Both males and females have similar sized home ranges of around 35 ha although the males expand their home ranges during breeding (Oakwood 2006). Home ranges can overlap. Density of Northern Quoll populations is highest in dissected escarpments but numbers do vary with conditions.

Individuals are relatively short lived with females potentially living to 18-24 months and with a post-breeding male die-off limiting the age of most males to under 12 months (Oakwood 2008). Most common cause of direct adult mortality is predation. Predation may be increased when groundcover is removed through clearing or fire.

The species is in a steep decline across its original range where this coincides with the spread of the Cane Toad. Woinarski *et al.* (2008) state that the Cane Toad is likely to entirely overlap the range of the Northern Quoll (with the arguable possibility of excluding the quoll population in the Pilbara) within about 10-20 years (Sutherst *et al.* 1996; van Dam *et al.* 2002). While the Cane Toad poses the greatest threat, Northern Quolls populations appear to have declined in areas where the threats are more ambiguous, but could include inappropriate fire regimes, direct and indirect impacts from feral predators, and habitat modification and/or destruction (Hill and Ward 2010).

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<u>Habitat</u>	In the Pilbara this marsupial has most commonly been recorded in habitats such as rocky hills, mesas, plateaux, major drainage lines and granite tor fields (Biota 2009). The three Land Systems where the majority of Northern Quolls have been recorded contain the core habitat as it is presently understood in the Pilbara Bioregion include:
<u>Preferences</u>	<ul style="list-style-type: none"> <li>• Basalt hills;</li> <li>• Plateaux;</li> <li>• Rocky gullies and gorges, particularly in proximity to water.</li> </ul>
<u>Potential Occurrence</u>	<b>High:</b> listed on DPaW's database for the area and recorded in the Solomon project area by <i>ecologia</i> (2010) and by Biota in the Brockman Syncline area (Biota 2005). The rocky Yangadee Gorge could provide suitable denning habitat.

### 9.5.2.2 Long-tailed Dunnart (*Sminthopsis longicaudata*)

<u>Status</u>	The Long-tailed Dunnart is listed as P4 on DPaW's Priority Fauna list.
<u>Distribution</u>	Most commonly found in the Gibson Desert, this small marsupial carnivore has subsequently been found in the Pilbara, Carnarvon Basin, and the Murchison regions.
<u>Ecology</u>	Feeds mainly on invertebrates and probably shelters in cracks and crevices in rocky scree slopes.
<u>Habitat Preferences</u>	The majority of records of this species came from sparsely vegetated, rugged, rocky areas where boulders and rocks provide shelter.
<u>Potential Occurrence</u>	<b>Moderate:</b> listed on DPaW's database for the area but was not recorded by Coffey (2008) or <i>ecologia</i> (2010) in the Solomon project area. Suitable habitat is present within the Study Area.

### 9.5.2.3 Greater Bilby (*Macrotis lagotis*)

<u>Status</u>	The Greater Bilby is listed as Vulnerable under the <i>EPBC Act</i> and Vulnerable (Schedule 1) under the <i>WC Act</i> .
<u>Distribution</u>	Pavey (2006) summarises various authors and states that in Western Australia the Greater Bilby now occurs in the Gibson Desert and Great Sandy Desert Bioregions as far south as Tjirrkali Community and west to about Newman. Populations exist in the Pilbara Bioregion (including the Hamersley Range area, along the Fortescue River and north-east to Shay Gap), in the Dampierland Bioregion (along 80 Mile Beach north to Beagle Bay) and in the Central Kimberley and Ord-Victoria Plains Bioregions south of the Fitzroy and Margaret Rivers (Southgate 1990). The distribution is highly fragmented within this area (Friend 1990).
<u>Ecology</u>	Bilbies have been recorded over a variety of habitats including grasslands over cracking clays, dune fields, red earth acacia shrublands and hummock grasslands. As they derive most of their water from their food, there is no requirement for free surface water. They are solitary creatures and build deep burrow systems (up to 3m) with the entrance usually at the base of a tree, termite mound or spinifex clump and the opening is usually left open. They inhabit the burrow throughout the day emerging to feed at night. Individuals

can live up to 6 years and attain weights of 2.4 kg (Johnson 2008).

Habitat Preferences Pavey (2006) states that in the Gibson Desert, Bilbies occur in mulga shrublands on stony plains and along the lower slopes of ranges, in sandplains and in sand dune systems. Around Shay Gap, Bilbies occupy sandplain environments. In the Great Sandy Desert, they are present on recently burnt sandplains, interdune corridors or stony plains dominated by *Triodia* grasses and Acacias. The species also occupies the edges of salt-lakes where samphire (*Halosarcia* spp.) or *Melaleuca* species dominate.

Southgate (1990) states that a determining factor in Bilby habitat is a relative lack of ground cover which allows for high mobility during foraging. In the East Pilbara, Southgate (1990) considers that plains and alluvial areas with a high fire frequency appear to be favoured by Bilbies.

Potential Occurrence **Low:** while listed on the Protected Matters Report (Appendix 1), there are no records of this species in the general area but suitable habitat (cracking clay grasslands) was present in the western portion of the route. The cracking clay habitat east of Pannawonica was heavily impacted by cattle and this makes it less likely that, if once present, Bilbies would persist in these areas. One area of cracking clay grasslands that was in very good condition occurred west of Gt Northern Hwy but no signs of Bilby were noted during the field assessment.

#### 9.5.2.4 Northern Marsupial Mole (*Notoryctes carinus*)

Status The Northern Marsupial Mole is listed as Endangered under the *EPBC Act* and Vulnerable (Schedule 1) under the *WC Act*.

Distribution The Northern Marsupial Mole is found in the sand dune deserts of north-west Australia, mainly in the Great Sandy and Little Sandy Deserts, and the Gibson Desert.

Ecology Marsupial moles spend most of their time underground occasionally coming to the surface, particularly after rain. It is thought that they also come to the surface during periods associated with breeding (DSEWPaC database).

Habitat Preferences Marsupial moles tunnel through loose sand, mainly on the crests and slopes of dunes. It is thought that they avoid the swales between dunes where the sand may be more compacted.

Potential Occurrence **Unlikely:** while listed on the Protected Matters Report (Appendix 1), there are no records of this species in the general area and no suitable habitat was apparent during the field assessment.

#### 9.5.2.5 Ghost Bat (*Macroderma gigas*)

Status The Ghost Bat is listed as P4 on DPaW's priority Fauna listing.

Distribution The Ghost Bat is restricted to tropical northern Australia with an isolated population in the Pilbara region.

Ecology This spectacular bat mainly roosts in caves and abandoned mine, sometimes solitary but occasionally in colonies of between 30 to 200 individuals. Females generally congregate in maternity roosts usually in larger caves.

This is a carnivorous bat that feeds on birds, bats, other mammals, frogs and reptiles. Also known to eat large invertebrates.

Habitat Preferences The Ghost Bat may be found foraging for food over many habitats but its distribution is dictated by the presence of suitable roosting sites.

Potential Occurrence **Moderate:** listed on the results of DPaW's NatureMap and recorded by *ecologia* (2010) in the Solomon Project Area, and within the Brockman Syncline by Biota (2005). While foraging habitat is present within the Study Area, the availability of suitable roosting caves is unknown.

#### 9.5.2.6 Pilbara Leaf-nosed Bat (*Rhinonictoris aurantia*)

Status The Pilbara Leaf-nosed Bat is listed as Vulnerable under the *EPBC Act* and Vulnerable (Schedule 1) under the *WC Act*.

As it is not considered a distinct species, distribution maps and information provided in various documents discussing *Rhinonictoris aurantia*, often do not differentiate the northern Australian population from this Pilbara form.

Distribution The Pilbara Leaf-nosed Bat is restricted to the Pilbara region, probably divided into three discrete subpopulations (eastern Pilbara mines and granite, Hamersley Range, Upper Gascoyne).

Ecology While this bat is likely to forage over a range of habitats for food, primarily moths and beetles, it is the availability of suitable roosting sites that determines its continued presence in any given area. These bats are highly susceptible to dehydration and hypothermia (Churchill 2008) and die within hours if removed from their roost site.

Habitat Preferences This bat is restricted to relatively deep subterranean roosts that are able to provide a warm, humid microclimate that enable them to limit energy and water loss. Such naturally occurring subterranean structures providing suitable conditions are uncommon in the Pilbara with some underground mine workings supporting additional habitat. Mines with some complexity, especially those that reach the watertable, have become important permanent roosting sites for this species. Other mines are not occupied throughout the year, but are thought to be important for dispersal in the region with small numbers of individuals using them on a temporary basis when microclimates become favourable (K. Armstrong pers.comm.).

Potential Occurrence **Unlikely to Low:** while listed on the Protected Matters Report (Appendix 1), no records of this species were found during the data and literature review for the general area. It's presence in the current Study Area would be dependent upon suitable roosting sites being present. While foraging habitat is present within the Study Area, the availability of suitable roosting caves is unknown.

#### 9.5.2.7 Lakeland Downs Mouse (*Leggadina lakedownensis*)

Status The Lakeland Downs Mouse (also known as the Short-tailed Mouse) is listed as P4 on DPaW's Priority Fauna listing.

Distribution This small, native mouse is known from the Kimberley and Pilbara regions in Western Australia, although Pilbara populations are considered to be

genetically different to populations across northern Australia.

<u>Ecology</u>	Detailed information on the ecology of this species in Western Australia is restricted to the Thevanard Island population where it is nocturnal, remaining in burrows during the day. They also appear to be omnivorous, with the amount of invertebrates in their diet differing according to the time of year.
<u>Habitat Preferences</u>	This native rodent occurs in sandy soils and cracking clays in northern Western Australia.
<u>Potential Occurrence</u>	<b>Moderate to High:</b> while not listed in the results of the search of DPaW's NatureMap (Appendix 2) this small rodent was recorded during the survey of the Pilbara Bioregion in the Millstream Chichester National Park (Gibson and McKenzie 2009). Suitable habitat is present in the cracking clay soils present along the pipeline route.

#### 9.5.2.8 Western Pebble-Mouse (*Pseudomys chapmani*)

<u>Status</u>	The Western Pebble Mouse is listed as P4 on DPaW's Priority Fauna listing.
<u>Distribution</u>	This native rodent is distributed throughout the ranges of the Pilbara although it may once have occurred in the adjacent Gascoyne and Murchison regions of Western Australia. Not frequently captured, this small rodent is most often recorded by the presence of the large pebble-mounds that it constructs. To a trained observer it is possible to ascertain whether the mounds are active or abandoned.
<u>Ecology</u>	This small native mouse lives in large mounds constructed of pebbles which contain passages leading to nesting chambers where these gregarious animals spend the day (Start 2008). Mounds are also used by successive generations.
<u>Habitat Preferences</u>	This small rodent is usually recorded by the presence of the large pebble mounds that it constructs. These mounds are only built in areas where suitable sized pebbles for their construction are present; usually on the gentler slopes of rocky ranges. The vegetation in these locations generally consists of spinifex with emergent eucalypts and scattered shrubs.
<u>Potential Occurrence</u>	<b>Moderate to High:</b> listed in the results of the search of DPaW's NatureMap (Appendix 2) and recorded in the Solomon project area by Coffey (2008) although the identification of this small rodent was not specifically determined. While no mounds were recorded during the site assessment, suitable habitat was present in the western portion of the route.

### 9.5.3 *Reptiles*

#### 9.5.3.1 A Skink (*Ctenotus uber johnstonei*)

<u>Status</u>	The skink <i>Ctenotus uber johnstonei</i> is listed as P2 on DPaW's Priority Fauna listing.
<u>Distribution</u>	This skink is known from the arid interior of Western Australia where widespread scattered records are shown in DPaW's NatureMap.
<u>Ecology</u>	Little is known of the ecology of this small skink.

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Habitat Preferences The *Ctenotus uber* group is known to prefer the hard, reddish soils and it is likely that the *johnstonei* subspecies is similar in its habitat preferences.

Potential Occurrence **High:** listed in the results of the search of DPaW's NatureMap (Appendix 2) and recorded in the Koodaideri Western Corridor by Biota (2012) in very close proximity to the south-eastern end of the current Survey Area. Not identified in the field, two specimens have subsequently been confirmed by the WA Museum herpetology department (NatureMap).

#### 9.5.3.2 *A Skink (Notoscincus butleri)*

Status The skink *Notoscincus butleri* is listed as P4 on DPaW's Priority Fauna listing.

Distribution A Pilbara endemic species this small skink is usually found in the arid, rocky, near coastal Pilbara.

Ecology Little is known of the ecology of this small skink.

Habitat Preferences Generally associated with spinifex, particularly in the vicinity of creeks and rivers.

Potential Occurrence **High:** listed in the results of the search of DPaW's NatureMap (Appendix 2) and recorded in the Solomon Project Area by Coffey (2008).

#### 9.5.3.3 *A Blind Snake (Ramphotyphlops ganei)*

Status The blind snake *Ramphotyphlops ganei* is listed as P1 on DPaW's Priority Fauna listing.

Distribution A Pilbara endemic species, Wilson and Swan (2010) state that this blind snake occurs in widely separated areas between Newman and Pannawonicka.

Ecology Little is known of the ecology of this blind snake.

Habitat Preferences Most likely to be found in association with moist gullies and gorges.

Potential Occurrence **High:** listed in the results of the search of DPaW's NatureMap (Appendix 2) and recorded in the Solomon Project Area by Coffey (2008).

#### 9.5.3.4 *Woma (Aspidites ramsayi)*

Status The Woma is listed on Schedule 4 of the *WC Act*.

Distribution The Woma can be found in arid and semi arid areas and, within Western Australia, it can be found in two separate populations, the northern one from the Pilbara coast north to the Eighty Mile Beach area, and southern one from Cape Peron south and east to the eastern Goldfields region, although records suggest that the Peron population is isolated from the nearest south-western locality.

Ecology A nocturnal and terrestrial python, it preys on small mammals, ground birds and lizards.

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<u>Habitat Preferences</u>	It may be found in a range of habitats including woodlands, heaths and shrublands where, during the day, it shelters in abandoned reptile and/or mammal burrows, hollow logs or in thick vegetation.
<u>Potential Occurrence</u>	<b>Low:</b> listed on the results of the search of DPaW's NatureMap (Appendix 2) but no other records were found during the literature review.

#### 9.5.3.5 Pilbara Olive Python (*Liasis olivaceous barroni*)

<u>Status</u>	The Pilbara Olive Python is listed as Vulnerable under the <i>EPBC Act</i> and Endangered (Schedule 1) under the <i>WC Act</i> .
<u>Distribution</u>	This sub-species of large python is considered a Pilbara endemic and has been shown to be relatively common, particularly on the Burrup Peninsula on the Pilbara coast.
<u>Ecology</u>	An ambush predator, this python feeds on a wide range of prey including rock wallabies, euros, fruit bats, ducks, corellas, spinifex pigeons and coucals (Pearson 2003). According to the Threatened Species Profile available from DSEWPaC, the home ranges of the Pilbara Olive Python have not been extensively studied; however, a radio-tracking study by Tutt <i>et al.</i> (2004) indicates that males have larger home ranges than females. Males may travel up to 4 km to locate females for breeding (Pearson 2003).
<u>Habitat Preferences</u>	The Pilbara Olive Python prefers to inhabit areas where prey species congregate; pools in creeks or rocky ranges are particularly favoured.
<u>Potential Occurrence</u>	<b>High:</b> listed in the results of the search of DPaW's NatureMap (Appendix 2) and recorded by <i>ecologia</i> (2010) during the survey of the Solomon Project Area.

## 9.6 Summary of Species of Conservation Significance

The following table summarises the information provided in the previous sections. Twenty-seven migratory birds, three native mammals and one reptile which are protected under the *EPBC Act* are listed. One bird listed under the *WC Act* is also listed, as are three birds and two native mammals that are shown on DPaW's Priority Fauna list. Not all are likely to be present but three of the bird species were recorded during the field assessment.

**Table 3** Summary of species of conservation significance known or potentially occurring within the proposed gas pipeline route (in order of potential to occur).

Species		EPBC Act	WC Act	DPaW Priority	Probability of Occurrence
<i>Merops ornatus</i>	Rainbow Bee-eater	X	X		Recorded
<i>Ardea alba</i>	Eastern Great Egret	X	X		High
<i>Dasyurus hallucatus</i>	Northern Quoll	X	X		High
<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	X	X		High
<i>Falco peregrinus</i>	Peregrine Falcon		X		High
<i>Ardeotis australis</i>	Australian Bustard			X	High
<i>Burhinus grallarius</i>	Bush Stone-curlew			X	High
<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart			X	High
<i>Macroderma gigas</i>	Ghost Bat			X	High
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse			X	High
<i>Ctenotus uber johnstonei</i>	A skink			X	High
<i>Notoscincus butleri</i>	A skink			X	High
<i>Ramphotyphlops ganei</i>	A blind snake			X	High
<i>Apus pacificus</i>	Fork-tailed Swift	X	X		Seasonally High
<i>Leggadina lakedownensis</i>	Lakeland Downs Mouse			X	Moderate to High
<i>Glareola maldivarum</i>	Oriental Pratincole	X	X		Moderate
<i>Phaps histrionica</i>	Flock Bronzewing			X	Moderate
<i>Aspidites ramsayi</i>	Woma		X		Low to Moderate
<i>Macrotis lagotis</i>	Greater Bilby	X	X		Low
<i>Ardea ibis</i>	Cattle Egret	X	X		Unlikely to Low
<i>Hirundo rustica</i>	Barn Swallow	X	X		Unlikely to Low
<i>Charadrius veredus</i>	Oriental Plover (Dotterel)	X	X		Unlikely to Low
<i>Ardea ibis</i>	Cattle Egret	X	X		Unlikely to Low
<i>Rhinonictis aurantia</i>	Orange (Pilbara) Leaf-nosed Bat	X	X		Unlikely to Low
<i>Notoryctes caurinus</i>	Northern Marsupial Mole	X	X		Unlikely
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	X	X		Unlikely
<i>Pandion haliaetus</i>	Eastern Osprey	X	X		Unlikely
<i>Rostratula australis</i>	Australian Painted Snipe	X	X		Unlikely

In summary, one bird species of conservation significance was recorded, five bird, four native mammal and four reptile species of conservation significance have a high probability of occurrence within the proposed gas pipeline route. Two bird, one mammal and one reptile species of conservation significance have a moderate or low to moderate potential to be present, with the remaining seven bird and three mammal species are unlikely to occur.

## 9.7 Habitats of Conservation Significance

There are three habitats of some conservation significance that occur along the proposed route:

- **Major creeklines with large eucalypts.**

Burbidge *et al.* (2010) state that:

*‘..... riparian vegetation, with its distinctive bird assemblages, requires special conservation attention. These areas are of limited extent in the Pilbara and are subject to pressures such as degradation by domestic and feral stock grazing, weed invasion and disturbance by mining infrastructure and groundwater extraction.’*

The major creeks that will be crossed by the proposed pipeline will support a large range of vertebrate species that rely on the hollows in the eucalypts for both breeding and shelter. Approximately 17% of Australia's fauna require hollow tree limbs for either/or breeding or refuge (Gibbons and Lindenmayer 2002). These include cockatoos and parrots, owls, bats, a range of reptiles and mammals. The Pilbara Olive Python (*Liasis olivaceous barroni*) prefers this habitat type where prey animals such as pigeons are in abundance. As stated above, this habitat is limited in extent in the Pilbara but is crucial in supporting a wide range of species.

- **Rocky gullies and gorges.**

While it is unlikely that the proposed pipeline route will coincide with the crests, plateaux and upper slopes of the ranges, it is possible that the route will cross some of the rocky gullies and small gorges where some of the more specialised vertebrate fauna species occur. This could include species of conservation significance such as the Northern Quoll (*Dasyurus hallucatus*). This species is known to occur in rocky gullies and gorges, particularly in proximity to water (Biota 2009). The Pilbara Olive Python (*Liasis olivaceous barroni*) also prefers this habitat type where prey and shelter are available.

- **Cracking clay grasslands.**

Cracking clay grasslands will support a range of species not found in other habitats. East of Pannawonica, much of this habitat has been heavily impacted by cattle, reducing its potential to support some species; however, west of Pannawonica, this habitat is in Excellent to Pristine condition and is likely to support most of the species known to prefer this habitat; this includes the Lakeland downs Mouse (*Leggadina lakedownensis*), which is a Priority 4 species, and one of the as yet undescribed Planigale (*Planigale* sp.) species. In addition, the cracking clay habitat could potentially support the Greater Bilby (*Macrotis lagotis*) although east of Pannawonica this habitat was heavily impacted by cattle making it less likely that Bilbies would persist in these areas. However, west of Gt Northern Hwy areas of cracking clay grasslands were in very good condition but no signs of Bilby were noted during the field assessment. In general, and also from the Ninox team experience, most Bilby records in the Pilbara region appear to be more concentrated in red sandy soils.

Each of these could potentially support a range of species either not found elsewhere or, in the case of large Eucalyptus trees, provide nesting and shelter in any hollow limbs that are present.

## 10 CONCLUSIONS

While much of the eastern section of the proposed FRGP route was inaccessible by road or foot, a helicopter flyover allowed for the Ninox team to evaluate the range of habitats crossed by the route. No distinctly different habitats were noted during this flight but the lack of ground access limited the observation and recording of fauna during the field assessment. However, a wide range of bird species (51) were recorded within the limited number of locations where the eastern section was accessible and in the western section of the route.

Given the length of the proposed pipeline (266 km) the route crosses a range of fauna habitats including: spinifex grasslands with Bloodwoods; spinifex grasslands with *Acacia* species of flats and lower slopes, some with rocky outcropping; spinifex grasslands; shrublands with emergent *Eucalyptus* trees over spinifex on upper slopes and ridges; shrublands or woodlands over spinifex in flowlines and minor gullies; major drainage lines with large *Eucalyptus* species; floodplains; cracking clay grasslands and open plains. While some of these habitats are common and widespread in the Pilbara

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region, some, mainly creeklines with large eucalypts, and cracking clay grasslands, are limited in extent and are of particular importance to a large number of fauna species. However, there are no rare features as described by Kendrick (2001) and no wetlands of sub-regional significance occur along the FRGP route.

One bird, the Rainbow Bee-eater (*Merops ornatus*) of conservation significance was observed during the field assessment, and up to 14 species of vertebrate fauna of conservation significance have a high or moderate to high probability of occurrence within some of the habitats that occur within the FRGP route.

Given the relatively narrow zone of impact during construction, and if the guidelines provided in Section 12 are followed, impact on vertebrate fauna is likely to be low.

### **11 POTENTIAL IMPACT OF PIPELINE CONSTRUCTION**

The impact of construction of the pipeline can include but not be limited to:

- clearing of vegetation for access and laydown areas impacting on individual animals that are present as they will be killed by the machinery used for the removal of vegetation;
- increased fragmentation of fauna habitats resulting in potential isolation of small, ground-dwelling species;
- entrapment of animals in an open trench resulting in death and/or injury. Open trenches can have a significant impact on terrestrial animals because they can operate as pit traps. This exposes animals to rapid dehydration, starvation and predation by larger, more mobile fauna such as hawks, owls and introduced predators;
- erosion leading to more widespread impact than that from initial construction;
- incursion of weeds and/or vermin into the area impacting on habitat values;
- increased risk of uncontrolled fire resulting from the use of implements such as angle grinders, welders resulting in major degradation of habitat values;
- increased potential of vehicle/animal collisions resulting from increased traffic through the area resulting in death or injury to fauna and/or personnel;
- increased noise creating disturbance on a wider scale than the immediate surrounds of the construction;
- increased dust resulting in damage to adjacent vegetation, leading to a reduction in habitat values;
- contamination of soils and vegetation from hydrocarbon spills resulting in loss of habitat values.

Comprehensive information on the impacts of construction, operation and decommissioning of a pipeline is provided in Australian Pipeline Industry Association Ltd (APIAL) (2009).

### **12 RECOMMENDATIONS**

While detailed management approaches to pipeline construction are provided in APIAL (2009), some site specific details for the FRGP are provided below.

- Clearing of vegetation is kept to an absolute minimum requisite for safe operation of construction equipment. All topsoil and cleared vegetation should be stockpiled for future use in rehabilitation.
- Where possible, laydown areas are chosen where there is existing disturbance to native vegetation.
- There are established procedures for the management and safe removal of trapped fauna within open trenches. As a minimum, suitably trained personnel should inspect open trenches early in the morning to remove nocturnal fauna; periodical inspection during the day may also be required. However, if trenching is done during winter the number of trapped animals is likely to be less than in warm conditions when reptiles are most active. Previous studies have shown that reptiles are the most commonly captured animals during construction of pipelines (Doody *et al.* 2003).
- Appropriate design and implementation of erosion control measures will reduce the potential for more widespread impact on adjacent fauna habitats.
- Adequate weed control and feral predator control measures should be included in the construction procedures to ensure impact from these invasive species are minimised.
- All safety procedures for hot work should be implemented to ensure that accidental fires are prevented.
- All vehicles should remain on designated tracks with a low speed limit to reduce the potential for animal/vehicle collisions.
- Apart from the standard industry procedures to reduce noise, little can be done to further ameliorate the impact on fauna.
- Restricted vehicle speeds on all tracks and work sites should be applied to reduce dust. All appropriate dust suppression measures should be taken to ensure the impact on adjacent vegetation is minimised.
- Adequate bunding around hydrocarbon storage areas to reduce the area of impact from spills.
- Suitable security measures should be undertaken to prevent unauthorised entry to site.

Further to the point made above regarding fauna entrapment in an open trench, the study by Doody *et al.* (2003), 7,438 individual animals were recovered from an 800 km open trench. Of these 97% were retrieved alive and released. Of the 224 dead animals, 29 were of threatened mammal species, most of which had drowned in areas of flooded trench following rainfall. These authors also found that the majority of small, generally less mobile animals were unable to use the ‘trench plugs’ and did not survive unless retrieved. They conclude that retrieving fauna from trenches benefits the fauna, conservation, industry and the general community.

### **13 ACKNOWLEDGEMENTS**

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<http://www.ala.org.au>

[www.birddata.com.au](http://www.birddata.com.au)

<http://www.dec.wa.gov.au>

<http://www.environment.gov.au/atlas>

<http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

## Appendix 1 EPBC Database Protected Matters Report.



Australian Government  
Department of the Environment

## EPBC Act Protected Matters Report

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

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

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

Report created: 29/11/13 12:19:28

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are  
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[Coordinates](#)

Buffer: 10.0Km



## Summary

### Matters of National Environmental Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Areas:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	7
<a href="#">Listed Migratory Species:</a>	9

### Other Matters Protected by the EPBC Act

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

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

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

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

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

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### Extra Information

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

<a href="#">Place on the RNE:</a>	2
<a href="#">State and Territory Reserves:</a>	2
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	14
<a href="#">Nationally Important Wetlands:</a>	1
<a href="#">Key Ecological Features (Marine)</a>	None

### Details

#### Matters of National Environmental Significance

Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	Species or species habitat known to occur within area
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Notoryctes caurinus</a> Karkarratul, Northern Marsupial Mole [295]	Endangered	Species or species habitat may occur within area
<a href="#">Rhinonicteris aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
<b>Plants</b>		
<a href="#">Lepidium catapycnon</a> Hamersley Lepidium, Hamersley Catapycnon [9397]	Vulnerable	Species or species habitat likely to occur within area
<b>Reptiles</b>		
<a href="#">Liasis olivaceus barroni</a> Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may occur within area
<b>Listed Migratory Species</b>		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		

*Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment*

Name	Threatened	Type of Presence
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur

*Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment*

Name	Threatened	Type of Presence within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

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

Note that not all Indigenous sites may be listed.

Name	State	Status
<b>Natural</b>		
<a href="#">Hamersley Range National Park (1977 boundary)</a>	WA	Registered
<a href="#">Millstream National Park (1977 boundary)</a>	WA	Registered

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

Name	State
Karjini	WA
Millstream Chichester	WA

Invasive Species [\[ Resource Information \]](#)

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

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Columba livia</a> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<b>Mammals</b>		
<a href="#">Camelus dromedarius</a> Dromedary, Camel [7]		Species or species habitat likely to occur within area
<a href="#">Canis lupus familiaris</a> Domestic Dog [82654]		Species or species habitat likely to occur within area
<a href="#">Capra hircus</a> Goat [2]		Species or species habitat likely to occur within area
<a href="#">Equus asinus</a> Donkey, Ass [4]		Species or species habitat likely to occur

*Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment*

Name	Status	Type of Presence within area
<a href="#">Equus caballus</a> Horse [5]		Species or species habitat likely to occur within area
<a href="#">Felis catus</a> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<a href="#">Mus musculus</a> House Mouse [120]		Species or species habitat likely to occur within area
<a href="#">Oryctolagus cuniculus</a> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<a href="#">Rattus rattus</a> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<a href="#">Vulpes vulpes</a> Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
<a href="#">Cenchrus ciliaris</a> Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
<a href="#">Parkinsonia aculeata</a> Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
<a href="#">Prosopis spp.</a> Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
<b>Nationally Important Wetlands</b>		<b>[ Resource Information ]</b>
Name		State
<a href="#">Millstream Pools</a>		WA

## Coordinates

-22.14847 117.95761,-22.14799 117.98173,-21.92761 117.8931,-21.66671 117.01772,  
-21.73328 116.78791,-21.6157 116.41998,-21.68611 116.16498,-21.64022 116.0246,  
-21.44988 115.95215

## Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

## Acknowledgements

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

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

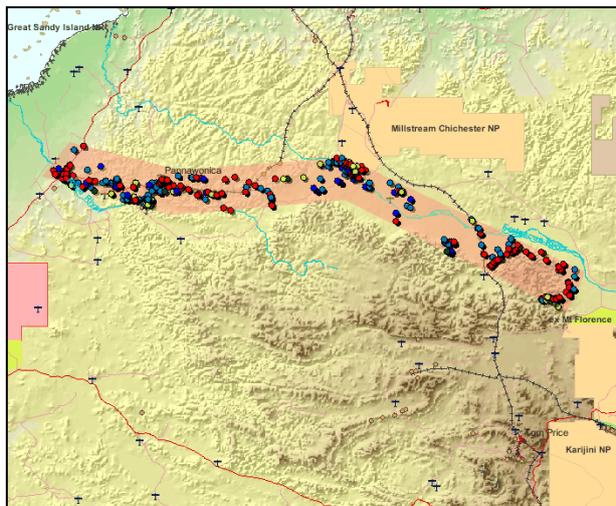
The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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

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## Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment

### Appendix 2 Results of the search of DPaW's NatureMap (November 2013).



#### Search Results

Method='By Polygon'; Kingdom=Animalia; Current Names Only=Yes; Core Datasets Only=Yes; Group By=Species Group;

Species Group	Species	Records
Amphibian	4	8888
Bird	170	2124
Fish	10	79
Invertebrate	43	228
Mammal	43	535
Reptile	111	1319
TOTAL	381	13173

#### Amphibian

[Cyclorana maini](#) Sheep Frog  
[Litoria rubella](#) Little Red Tree Frog  
[Uperoleia russelli](#) Northwest Toadlet  
[Uperoleia saxatilis](#) Pilbara Toadlet  
 4 species, 8888 records

#### Bird

[Acanthagenys rufogularis](#) Spiny-cheeked Honeyeater  
[Acanthiza uropygialis](#) Chestnut-rumped Thornbill  
[Accipiter cirrocephalus](#) Collared Sparrowhawk  
[Accipiter fasciatus](#) Brown Goshawk  
[Acrocephalus australis](#) Australian Reed Warbler  
[Acrocephalus australis subsp. gouldi](#) Australian Reed Warbler  
[Actitis hypoleucos](#) Common Sandpiper **IA**  
[Aegotheles cristatus](#) Australian Owlet-nightjar  
[Amytornis striatus](#) Striated Grasswren  
[Amytornis striatus subsp. whitei](#) Striated Grasswren  
[Anas gracilis](#) Grey Teal  
[Anas superciliosa](#) Pacific Black Duck  
[Anhinga melanogaster subsp. novaehollandiae](#) Darter  
[Anthus australis](#) Australian Pipit  
[Anthus australis subsp. australis](#) Australian Pipit  
[Aquila audax](#) Wedge-tailed Eagle  
[Aquila morphnoides](#) Little Eagle  
[Ardea alba](#) Great Egret  
[Ardea garzetta](#) Little Egret  
[Ardea intermedia](#) Intermediate Egret  
[Ardea modesta](#) Eastern Great Egret **IA**  
[Ardea novaehollandiae](#) White-faced Heron  
[Ardea pacifica](#) White-necked Heron  
[Ardeotis australis](#) Australian Bustard **P4**  
[Artamus cinereus](#) Black-faced Woodswallow  
[Artamus cinereus subsp. melanops](#) Black-faced Woodswallow  
[Artamus leucorhynchus](#) White-breasted Woodswallow  
[Artamus leucorhynchus subsp. leucopygialis](#) White-breasted Woodswallow  
[Artamus minor](#) Little Woodswallow  
[Artamus personatus](#) Masked Woodswallow  
[Aythya australis](#) Hardhead  
[Burhinus grallarius](#) Bush Stone-curlew **P4**  
[Cacatua roseicapilla](#) Galah  
[Cacatua roseicapilla subsp. assimilis](#) Galah  
[Cacatua sanguinea](#) Little Corella

## Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment

[Cacatua sanguinea subsp. westralensis](#) Little Corella  
[Cacomantis pallidus](#) Pallid Cuckoo  
[Calidris acuminata](#) Sharp-tailed Sandpiper **IA**  
[Centropus phasianinus](#) Pheasant Coucal  
[Certhionyx variegatus](#) Pied Honeyeater  
[Charadrius melanops](#) Black-fronted Dotterel  
[Charadrius veredus](#) Oriental Plover **IA**  
[Chenonetta jubata](#) Australian Wood Duck, Wood Duck  
[Chrysococcyx basalis](#) Horsfield's Bronze Cuckoo  
[Chrysococcyx osculans](#) Black-eared Cuckoo  
[Cincloramphus cruralis](#) Brown Songlark  
[Cincloramphus mathewsi](#) Rufous Songlark  
[Circus assimilis](#) Spotted Harrier  
[Cisticola exilis subsp. exilis](#) Golden-headed Cisticola  
[Climacteris melanura subsp. wellsii](#) Black-tailed Treecreeper  
[Colluricincla harmonica](#) Grey Shrike-thrush  
[Colluricincla harmonica subsp. rufiventris](#) Grey Shrike-thrush  
[Columba livia](#) Domestic Pigeon  
[Coracina novaehollandiae](#) Black-faced Cuckoo-shrike  
[Coracina novaehollandiae subsp. subpallida](#) Black-faced Cuckoo-shrike  
[Corvus bennetti](#) Little Crow  
[Corvus coronoides](#) Australian Raven  
[Corvus orru](#) Torresian Crow  
[Corvus orru subsp. ceciliae](#) Western Crow  
[Coturnix pectoralis](#) Stubble Quail  
[Coturnix ypsilophora](#) Brown Quail  
[Cracticus nigrogularis](#) Pied Butcherbird  
[Cracticus tibicen](#) Australian Magpie  
[Cracticus torquatus](#) Grey Butcherbird  
[Cygnus atratus](#) Black Swan  
[Dacelo leachii](#) Blue-winged Kookaburra  
[Dacelo leachii subsp. leachii](#) Blue-winged Kookaburra  
[Dendrocygna eytoni](#) Plumed Whistling Duck  
[Dicaeum hirundinaceum](#) Mistletoebird  
[Dromaius novaehollandiae](#) Emu  
[Elanus caeruleus](#) Black-shouldered Kite  
[Emblema pictum](#) Painted Finch  
[Epthianura tricolor](#) Crimson Chat  
[Eremiornis carteri](#) Spinifex-bird  
[Eurostopodus argus](#) Spotted Nightjar  
[Falco berigora](#) Brown Falcon  
[Falco berigora subsp. berigora](#) Brown Falcon  
[Falco cenchroides](#) Australian Kestrel  
[Falco hypoleucos](#) Grey Falcon **T**  
[Falco longipennis](#) Australian Hobby  
[Falco longipennis subsp. longipennis](#) Australian Hobby  
[Fulica atra](#) Eurasian Coot  
[Gallirallus philippensis](#) Buff-banded Rail  
[Gavicalis virescens](#) Singing Honeyeater  
[Geopelia cuneata](#) Diamond Dove  
[Geopelia striata](#) Zebra Dove  
[Geopelia striata subsp. placida](#) Peaceful Dove  
[Geophaps plumifera](#) Spinifex Pigeon  
[Gerygone fusca](#) Western Gerygone  
[Grallina cyanoleuca](#) Magpie-lark  
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle **IA**  
[Haliastur sphenurus](#) Whistling Kite  
[Hamirostra isura](#) Square-tailed Kite  
[Hamirostra melanosternon](#) Black-breasted Buzzard  
[Himantopus himantopus](#) Black-winged Stilt  
[Hirundo ariel](#) Fairy Martin  
[Hirundo neoxena](#) Welcome Swallow  
[Hirundo nigricans](#) Tree Martin  
[Hirundo nigricans subsp. nigricans](#) Tree Martin  
[Ixobrychus flavicollis](#) Black Bittern  
[Ixobrychus flavicollis subsp. australis](#) Australian Black Bittern **P3**  
[Lalage tricolor](#) White-winged Triller  
[Lichmera indistincta](#) Brown Honeyeater  
[Lichmera indistincta subsp. indistincta](#) Brown Honeyeater  
[Malurus lamberti](#) Variegated Fairy-wren  
[Malurus lamberti subsp. assimilis](#) Variegated Fairy-wren  
[Malurus leucopterus](#) White-winged Fairy-wren  
[Malurus leucopterus subsp. leuconotus](#) White-winged Fairy-wren  
[Manorina flaviqula](#) Yellow-throated Miner  
[Megalurus gramineus](#) Little Grassbird  
[Melithreptus gularis](#) Black-chinned Honeyeater  
[Melithreptus gularis subsp. laetior](#) Black-chinned Honeyeater  
[Melopsittacus undulatus](#) Budgerigar  
[Merops ornatus](#) Rainbow Bee-eater **IA**  
[Milvus migrans](#) Black Kite  
[Mirafra javanica](#) Horsfield's Bushlark, Singing Bushlark  
[Mirafra javanica subsp. horsfieldii](#) Horsfield's Bushlark, Singing Bushlark  
[Neochmia ruficauda](#) Star Finch  
[Neochmia ruficauda subsp. clarescens](#) Star Finch  
[Ninox connivens](#) Barking Owl  
[Ninox novaeseelandiae](#) Boobook Owl

## Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment

[Nycticorax caledonicus](#) Rufous Night Heron  
[Nycticorax caledonicus subsp. hilli](#) Rufous Night Heron  
[Nymphicus hollandicus](#) Cockatiel  
[Ocyphaps lophotes](#) Crested Pigeon  
[Oreoica gutturalis](#) Crested Bellbird  
[Pachycephala rufiventris](#) Rufous Whistler  
[Pachycephala rufiventris subsp. rufiventris](#) Rufous Whistler  
[Pardalotus rubricatus](#) Red-browed Pardalote  
[Pardalotus striatus](#) Striated Pardalote  
[Pardalotus striatus subsp. murchisoni](#) Striated Pardalote  
[Pelecanus conspicillatus](#) Australian Pelican  
[Petroica cucullata](#) Hooded Robin  
[Petroica goodenovii](#) Red-capped Robin  
[Phalacrocorax melanoleucus](#) Little Pied Cormorant  
[Phalacrocorax sulcirostris](#) Little Black Cormorant  
[Phalacrocorax varius](#) Pied Cormorant  
[Phaps chalcoptera](#) Common Bronzewing  
[Phaps histrionica](#) Flock Bronzewing, Flock Pigeon **P4**  
[Platalea flavipes](#) Yellow-billed Spoonbill  
[Platyercus zonarius](#) Australian Ringneck, Ring-necked Parrot  
[Platyercus zonarius subsp. zonarius](#) Port Lincoln Parrot  
[Poliiocephalus poliiocephalus](#) Hoary-headed Grebe  
[Pomatostomus temporalis](#) Grey-crowned Babbler  
[Pomatostomus temporalis subsp. rubeculus](#) Grey-crowned Babbler  
[Porphyrio porphyrio](#) Purple Swamphen  
[Porphyrio porphyrio subsp. melanotus](#) Purple Swamphen  
[Porzana pusilla](#) Baillon's Crake  
[Porzana tabuensis](#) Spotless Crake  
[Psophodes occidentalis](#) Western Wedgebill, Chiming Wedgebill  
[Ptilonorhynchus maculatus subsp. guttatus](#) Western Bowerbird  
[Ptilotula keartlandi](#) Grey-headed Honeyeater  
[Ptilotula penicillatus](#) White-plumed Honeyeater  
[Rhipidura fuliginosa subsp. preissi](#) Grey Fantail  
[Rhipidura leucophrys](#) Willie Wagtail  
[Rhipidura leucophrys subsp. leucophrys](#) Willie Wagtail  
[Smicromis brevirostris](#) Weebill  
[Stipiturus ruficeps](#) Rufous-crowned Emu-wren  
[Stipiturus ruficeps subsp. ruficeps](#) Rufous-crowned Emu-wren  
[Suqomel niger](#) Black Honeyeater  
[Tachybaptus novaehollandiae](#) Australasian Grebe, Black-throated Grebe  
[Taeniopygia guttata](#) Zebra Finch  
[Taeniopygia guttata subsp. castanotis](#) Zebra Finch  
[Threskiornis spinicollis](#) Straw-necked Ibis  
[Todiramphus pyrrhopygius](#) Red-backed Kingfisher  
[Todiramphus sanctus](#) Sacred Kingfisher  
[Tringa glareola](#) Wood Sandpiper **IA**  
[Turnix velox](#) Little Button-quail  
[Vanellus tricolor](#) Banded Lapwing  
[Zosterops luteus](#) Yellow White-eye  
 170 species, 2124 records

### Fish

[Amniataba percoides](#)  
[Anacanthus barbatus](#)  
[Anquilla bicolor](#)  
[Glossogobius giuris](#)  
[Leiopotherapon aheneus](#) Fortescue Grunter **P4**  
[Nematalosa erebi](#)  
[Nematalosa sp.](#)  
[Neoarius graeffei](#)  
[Neosilurus hyrtlii](#)  
[Netuma bilineata](#)  
 10 species, 79 records

### Invertebrate

[Aname mellosa](#)  
[Antipodogomphus hodgkini](#) dragonfly **P2**  
[Arrenurus harveyi](#)  
[Arrenurus liliaceus](#)  
[Arrenurus purpureus](#)  
[Arrenurus tripartitus](#)  
[Asadipus vundamindra](#)  
[Austrostrophus stictopygus](#)  
[Axonopsella pilbara](#)  
[Cavisternum clavatum](#)  
[Clynotis albobarbatus](#)  
[Cormocephalus turneri](#)  
[Draculoides mesozeirus](#) Middle Robe Draculoides **T**  
[Ethmostigmus curtipes](#)  
[Fissarena castanea](#)  
[Holconia neglecta](#)  
[Ideoblothrus pisolitus](#)  
[Isopedella tindalei](#)  
[Koenikea branacha](#)  
[Koenikea rubipes](#)  
[Koenikea setosa](#)  
[Lampona scutata](#)  
[Linnaeolpium linnaei](#)

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[Lycosa gibsoni](#)  
[Missulena rutraspina](#)  
[Nososticta pilbara](#) dragonfly **P2**  
[Notsodipus barlee](#)  
[Oecobius putus](#)  
[Paradraculooides bythius](#) Mesa B Paradraculooides **T**  
[Paradraculooides kryptus](#) Mesa K Paradraculooides **T**  
[Pellenes bitaeniata](#)  
[Pilbarascutigera incola](#)  
[Protogamasellus dispar](#)  
[Scolopendra laeta](#)  
[Scolopendra morsitans](#)  
[Synsphyronus gracilis](#)  
[Tamopsis occidentalis](#)  
[Tarsotomus aleantis](#)  
[Tiramideopsis lictus](#)  
[Trachyspina capensis](#)  
[Tyrannochthonius aridus](#)  
[Unionicola uncatseta](#)  
[Urodacus megamastigus](#)  
 43 species, 228 records  
**Mammal**  
[Bos taurus](#) European Cattle  
[Canis lupus](#) Dog, Dingo  
[Canis lupus subsp. dingo](#) Dingo  
[Canis lupus subsp. familiaris](#) Dog  
[Chaerephon jobensis](#) Northern Freetail-bat  
[Chalinolobus gouldii](#) Gould's Wattled Bat  
[Dasykaluta rosamondae](#) Little Red Kaluta  
[Dasyurus hallucatus](#) Northern Quoll **T**  
[Equus asinus](#) Donkey  
[Felis catus](#) Cat  
[Leggadina lakedownensis](#) Short-tailed Mouse, Karekanga **P4**  
[Macroderma gigas](#) Ghost Bat **P4**  
[Macropus robustus](#) Euro  
[Macropus robustus subsp. erubescens](#) Euro, Biggala  
[Macropus rufus](#) Red Kangaroo, Marlu  
[Mormopterus beccarii](#) Beccari's Freetail-bat  
[Mus musculus](#) House Mouse  
[Ningai timealevi](#) Pilbara Ningai  
[Notomys alexis](#) Spinifex Hopping-mouse  
[Nyctophilus daedalus](#) Northwestern Long-eared Bat  
[Nyctophilus geoffroyi](#) Lesser Long-eared Bat  
[Oryctolagus cuniculus](#) Rabbit  
[Petrogale rothschildi](#) Rothschild's Rock-wallaby  
[Planigale ingrami](#) Long-tailed Planigale  
[Planigale maculata](#) Common Planigale  
[Pseudantechinus woolleyae](#) Woolley's Pseudantechinus  
[Pseudomys chapmani](#) Western Pebble-mound Mouse, Ngadji **P4**  
[Pseudomys delicatulus](#) Delicate Mouse  
[Pseudomys desertor](#) Desert Mouse  
[Pseudomys hermannsburgensis](#) Sandy Inland Mouse  
[Pteropus alecto](#) Black Flying-fox  
[Rattus rattus](#) Black Rat  
[Saccolaimus flaviventris](#) Yellow-bellied Sheath-tail-bat  
[Scotorepens greyii](#) Little Broad-nosed Bat  
[Sminthopsis longicaudata](#) Long-tailed Dunnart **P4**  
[Sminthopsis macroura](#) Stripe-faced Dunnart  
[Tachyglossus aculeatus](#) Short-beaked Echidna  
[Tadarida australis](#) White-striped Freetail-bat  
[Taphozous georgianus](#) Common Sheath-tail-bat  
[Trichosurus vulpecula subsp. arnhemensis](#) Northern Brushtail Possum  
[Vespadelus finlaysoni](#) Finlayson's Cave Bat  
[Vulpes vulpes](#) Red Fox  
[Zyzomys argurus](#) Common Rock-rat  
 43 species, 535 records  
**Reptile**  
[Acanthophis wellsi](#) Pilbara Death Adder  
[Amphibolurus longirostris](#) Long-nosed Dragon  
[Antaresia perthensis](#) Pygmy Python  
[Antaresia stimsoni](#) Stimson's Python  
[Aspidites melanocephalus](#) Black-headed Python  
[Brachyurophis approximans](#) North-western Shovel-nosed Snake  
[Carlia munda](#) Shaded-litter Rainbow Skink  
[Carlia triacantha](#) Desert Rainbow Skink  
[Chelodina steindachneri](#) Flat-shelled Turtle  
[Crenadactylus ocellatus subsp. horni](#) Clawless Gecko  
[Cryptoblepharus buchananii](#)  
[Cryptoblepharus plagioccephalus](#)  
[Cryptoblepharus ustulatus](#)  
[Ctenophorus caudicinctus](#) Ring-tailed Dragon  
[Ctenophorus caudicinctus subsp. caudicinctus](#) Ring-tailed Dragon  
[Ctenophorus femoralis](#) Dune Dragon  
[Ctenophorus isolepis](#) Crested Dragon, Military Dragon  
[Ctenophorus isolepis subsp. isolepis](#) Crested Dragon, Military Dragon  
[Ctenophorus nuchalis](#) Central Netted Dragon

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[Ctenophorus reticulatus](#) Western Netted Dragon  
[Ctenotus duricola](#)  
[Ctenotus grandis](#)  
[Ctenotus grandis subsp. titan](#)  
[Ctenotus hanloni](#)  
[Ctenotus helenae](#)  
[Ctenotus pantherinus](#) Leopard Ctenotus  
[Ctenotus pantherinus subsp. ocellifer](#) Leopard Ctenotus  
[Ctenotus robustus](#)  
[Ctenotus rubicundus](#)  
[Ctenotus saxatilis](#) Rock Ctenotus  
[Ctenotus schomburgkii](#)  
[Ctenotus serventyi](#)  
[Ctenotus uber subsp. johnstonei](#) Spotted Ctenotus, Spotted Skink (Balgo, NE WA) **P2**  
[Cyclodomorphus maximus](#) Giant Slender Blue-tongue  
[Cyclodomorphus melanops](#) Slender Blue-tongue  
[Cyclodomorphus melanops subsp. melanops](#) Slender Blue-tongue  
[Cyclorana sp.](#)  
[Delma elegans](#)  
[Delma nasuta](#)  
[Delma pax](#)  
[Delma tinctoria](#)  
[Demansia psammophis](#) Yellow-faced Whipsnake  
[Demansia psammophis subsp. cupreiceps](#) Yellow-faced Whipsnake  
[Demansia rufescens](#) Rufous Whipsnake  
[Diplodactylus conspicillatus](#) Fat-tailed Gecko  
[Diplodactylus galaxias](#) Northern Pilbara Beak-faced Gecko  
[Diplodactylus mitchelli](#)  
[Diplodactylus savagei](#) Southern Pilbara Beak-faced Gecko  
[Egernia cygnitos](#) Western Pilbara Spiny-tailed Skink  
[Egernia formosa](#)  
[Eremiascincus isolepis](#)  
[Eremiascincus richardsonii](#) Broad-banded Sand Swimmer  
[Furina ornata](#) Moon Snake  
[Gehyra pilbara](#)  
[Gehyra punctata](#)  
[Gehyra purpurascens](#)  
[Gehyra variegata](#)  
[Heteronotia binoei](#) Bynoe's Gecko  
[Heteronotia spelea](#) Desert Cave Gecko  
[Lerista flammicauda](#)  
[Lerista jacksoni](#)  
[Lerista muelleri](#)  
[Lerista verhemens](#)  
[Lerista zietzi](#)  
[Lialis burtonis](#)  
[Liasis olivaceus subsp. barroni](#) Pilbara Olive Python **T**  
[Lucasium stenodactylum](#)  
[Lucasium wombeyi](#)  
[Menetia greyii](#)  
[Menetia surda](#)  
[Menetia surda subsp. surda](#)  
[Morethia ruficauda](#)  
[Morethia ruficauda subsp. exquisita](#)  
[Nephurus wheeleri](#)  
[Nephurus wheeleri subsp. cinctus](#)  
[Notoscincus butleri](#) Lined Soil-crevice Skink **P4**  
[Oedura marmorata](#) Marbled Velvet Gecko  
[Parasuta monachus](#)  
[Pogona minor](#) Dwarf Bearded Dragon  
[Pogona minor subsp. minor](#) Dwarf Bearded Dragon  
[Pogona minor subsp. mitchelli](#) Dwarf Bearded Dragon  
[Proablepharus reginae](#)  
[Pseudechis australis](#) Mulga Snake  
[Pseudonaja mengdeni](#) Western Brown Snake  
[Pseudonaja modesta](#) Ringed Brown Snake  
[Pseudonaja nuchalis](#) Gwardar, Northern Brown Snake  
[Pygopus nigriceps](#)  
[Ramphotyphlops ammodytes](#)  
[Ramphotyphlops ganej](#) blind snake **P1**  
[Ramphotyphlops grvpus](#)  
[Ramphotyphlops hamatus](#)  
[Ramphotyphlops pilbarensis](#)  
[Rhynchoedura ornata](#) Western Beaked Gecko  
[Strophurus elderi](#)  
[Strophurus wellingtonae](#)  
[Suta fasciata](#) Rosen's Snake  
[Suta punctata](#) Spotted Snake  
[Tiliqua multifasciata](#) Central Blue-tongue  
[Tymanocryptis cephalus](#) Pebble Dragon  
[Underwoodisaurus seorsus](#) Pilbara Barking Gecko **P1**  
[Varanus acanthurus](#) Spiny-tailed Monitor  
[Varanus brevicauda](#) Short-tailed Pygmy Monitor  
[Varanus bushi](#) Pilbara Mulga Monitor  
[Varanus eremius](#) Pygmy Desert Monitor  
[Varanus gilleni](#) Pygmy Mulga Monitor

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[Varanus gouldii](#) Bungarra or Sand Monitor  
[Varanus panoptes](#) Yellow-spotted Monitor  
[Varanus panoptes subsp. rubidus](#)  
[Varanus tristis](#) Racehorse Monitor  
[Varanus tristis subsp. tristis](#) Racehorse Monitor  
[Vermicella snelli](#)  
111 species, 1319 records

### **Conservation Status**

T - Rare or likely to become extinct  
X - Presumed extinct  
IA - Protected under international agreement  
S - Other specially protected fauna  
1 - Priority 1  
2 - Priority 2  
3 - Priority 3  
4 - Priority 4  
5 - Priority 5

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**Appendix 3 Detailed descriptions of fauna habitats based on and extracted from MCPL vegetation community descriptions.**

Veg. Code	Vegetation Community Description	Representative Plate of Community
FL10	<p><b>Habitat 1: Spinifex with Bloodwoods</b></p> <p><i>Corymbia hamersleyana</i> low open woodland over <i>Acacia trachycarpa</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia dictyophleba</i> tall open shrubland and <i>Gossypium australe</i>, <i>Grevillea wickhamii</i>, <i>Senna artemisioides</i> subsp. <i>helmsii</i> mid sparse shrubland over <i>Triodia pungens</i>, <i>Triodia wiseana</i> low open hummock grassland and <i>Eulalia aurea</i>, <i>Aristida latifolia</i>, <i>Themeda triandra</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia colei</i> var. <i>colei</i>, <i>Acacia inaequilatera</i>, <i>Bonamia erecta</i>, <i>Corchorus tectus</i>, <i>Indigofera monophylla</i>, <i>Ptilotus nobilis</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i> and <i>Ptilotus calostachyus</i>.</p> <p><b>Soils and Landform:</b> Red/brown clay loam with ironstone pebbles on flats.</p> <p><b>Condition:</b> Excellent to Pristine</p>	
FL1	<p><b>Habitat 2: Spinifex Grasslands with <i>Acacia xiphophylla</i></b></p> <p><i>Acacia xiphophylla</i>, <i>Acacia synchronicia</i>, <i>Acacia bivenosa</i> tall sparse shrubland and <i>Senna notabilis</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i> mid isolated shrubs over <i>Salsola australis</i>, <i>Enchylaena tomentosa</i>, <i>Maireana planifolia</i> low isolated chenopod shrubs with <i>Eragrostis xerophila</i>, <i>Sporobolus australasicus</i> low isolated tussock grasses and <i>Triodia pungens</i>, <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Angianthus acrohyalinus</i>, <i>Dysphania kalpari</i>, <i>Heliotropium heteranthum</i>, <i>Ptilotus nobilis</i> and <i>Sida trichopoda</i>.</p> <p><b>Soils and Landform:</b> Red/brown clay loam with sparse pebbles on flats.</p> <p><b>Condition:</b> Very Good to Pristine</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
FL3	<p><i>Acacia xiphophylla</i>, <i>Acacia synchronicia</i>, <i>Acacia bivenosa</i> tall sparse shrubland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Sarcostemma viminale</i>, <i>Hibiscus sturtii</i> var. <i>platyklamys</i> mid isolated shrubs over <i>Triodia wiseana</i> low sparse hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Aristida holathera</i> var. <i>holathera</i>, <i>Enneapogon caerulescens</i>, <i>Maireana planifolia</i>, <i>Maireana melanocoma</i>, <i>Maireana tomentosa</i> subsp. <i>tomentosa</i> and <i>Salsola australis</i>.</p> <p><b>Soils and Landform:</b> Red sandy loam with compact pebbles and rock fragments on flats to lower slopes. Occasional breakaways with ironstone outcropping.</p> <p><b>Condition:</b> Excellent to Pristine</p>	
FL14	<p><i>Acacia xiphophylla</i>, <i>Acacia atkinsiana</i> tall sparse shrubland and <i>Senna artemisioides</i> subsp. <i>helmsii</i>, <i>Senna notabilis</i>, <i>Hibiscus sturtii</i> mid sparse shrubland over <i>Triodia pungens</i> low open hummock grassland and <i>Eulalia aurea</i>, <i>Sporobolus australasicus</i>, <i>Chrysopogon fallax</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Aristida latifolia</i>, <i>Corchorus tectus</i>, <i>Eragrostis xerophila</i>, <i>Goodenia microptera</i>, <i>Ptilotus nobilis</i> and <i>Urochloa occidentalis</i></p> <p><b>Soils and Landform:</b> Red clay loam on flats.</p> <p><b>Condition:</b> Very Good to Pristine</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
	<b>Habitat 3: <i>Acacia</i> shrublands over <i>Spinifex</i> on Flats</b>	
FL2	<p><i>Corymbia hamersleyana</i> low isolated clumps of trees over <i>Acacia inaequilatera</i>, <i>Acacia bivenosa</i>, <i>Acacia tumida</i> var. <i>pilbarensis</i> tall sparse shrubland and <i>Cullen martini</i>, <i>Senna notabilis</i>, <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> mid isolated shrubs over <i>Tephrosia uniovulata</i>, <i>Isotropis atropurpurea</i>, <i>Corchorus tectus</i> low sparse shrubs and <i>Triodia wiseana</i> low sparse hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia synchronicia</i>, <i>Bonamia erecta</i>, <i>Bonamia pannosa</i>, <i>Evolvulus alsinoides</i>, <i>Goodenia tenuiloba</i>, <i>Indigofera monophylla</i>, <i>Solanum diversiflorum</i> and <i>Triumfetta clementii</i>.</p> <p><b>Soils and Landform:</b> Red/brown sandy loam with occasional red clayey loam on flats to lower slopes.</p> <p><b>Condition:</b> Good to Excellent</p>	
FL6	<p><i>Acacia inaequilatera</i> tall open shrubland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, *<i>Vachellia farnesiana</i> mid sparse shrubland over <i>Eriachne aristidea</i>, <i>Enneapogon caeruleus</i>, <i>Aristida anthoxanthoides</i> low sparse tussock grassland and <i>Triodia brizoides</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Boerhavia burbridgeana</i>, <i>Calocephalus knappii</i>, <i>Corchorus walcottii</i>, <i>Evolvulus alsinoides</i>, <i>Heliotropium cunninghamii</i>, <i>Ptilotus aervoides</i> and <i>Sida trichopoda</i>.</p> <p><b>Soils and Landform:</b> Red loamy clay with compact ironstone and quartz pebbles on flats and lower slopes.</p> <p><b>Condition:</b> Very Good to Excellent</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
FL7	<p><i>Acacia ancistrocarpa</i>, <i>Acacia colei</i> var. <i>colei</i>, <i>Acacia dictyophleba</i> tall sparse shrubland over <i>Ptilotus astrolasius</i>, <i>Pterocaulon sphacelatum</i>, <i>Indigofera boviparda</i> subsp. <i>boviparda</i> low sparse shrubland over <i>Triodia pungens</i>, <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia atkinsiana</i>, <i>Acacia bivenosa</i>, <i>Acacia pyrifolia</i>, <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Corymbia hamersleyana</i>, <i>Grevillea wickhamii</i> and <i>Senna artemisioides</i> subsp. <i>oligophylla</i>.</p> <p><b>Soils and Landform:</b> Red/brown clayey loam with occasionally cracking clay or scattered pebbles on flats.</p> <p><b>Condition:</b> Very Good to Pristine</p>	
FL8	<p><i>Acacia ancistrocarpa</i>, <i>Acacia bivenosa</i>, <i>Acacia synchronicia</i> tall sparse shrubland over <i>Gossypium australe</i>, <i>Eremophila longifolia</i>, <i>Senna artemisioides</i> subsp. <i>helmsii</i> mid sparse shrubland over <i>Triodia pungens</i> low sparse hummock grassland and <i>Eulalia aurea</i>, <i>Chrysopogon fallax</i>, <i>Bothriochloa ewartiana</i> low open tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia aneura</i>, <i>Acacia colei</i> var. <i>colei</i>, <i>Acacia trachycarpa</i>, <i>Aristida latifolia</i>, <i>Corymbia hamersleyana</i>, <i>Indigofera monophylla</i>, <i>Rhynchosia minima</i> and <i>Sporobolus australasicus</i>.</p> <p><b>Soils and Landform:</b> Red/Brown clayey loam on flats.</p> <p><b>Condition:</b> Excellent to Pristine.</p>	
FL9	<p><i>Acacia atkinsiana</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia bivenosa</i> tall sparse shrubland over <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Scaevola spinescens</i> mid sparse shrubland over <i>Triodia wiseana</i>, <i>Triodia longiceps</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia inaequilatera</i>, <i>Acacia synchronicia</i>, <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Eremophila longifolia</i>, <i>Hibiscus sturtii</i>, <i>Ptilotus appendiculatus</i> and <i>Tephrosia rosea</i>.</p> <p><b>Soils and Landform:</b> Red/brown clayey loam to red clay with pebbles on flats.</p> <p><b>Condition:</b> Excellent to Pristine</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
	<b>Habitat 4: <i>Acacia</i> shrublands over spinifex on slopes with rocky outcropping</b>	
MR2	<p><i>Acacia monticola</i>, <i>Acacia pyrifolia</i>, <i>Acacia trachycarpa</i> tall sparse shrubland over <i>Petalostylis cassioides</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i> mid isolated shrubs over <i>Triodia wiseana</i> low hummock grassland.</p> <p><b>Other Associated Species:</b> N/A</p> <p><b>Soils and Landform:</b> Brown sandy loam with quartz pebbles on slopes.</p> <p><b>Condition:</b> Pristine</p>	
MR3	<p><i>Acacia inaequilatera</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia bivenosa</i> tall sparse shrubland and <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> mid sparse shrubland over <i>Ptilotus nobilis</i>, <i>Ptilotus calostachyus</i>, <i>Corchorus tectus</i> low isolated shrubs and <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Alysicarpus muelleri</i>, <i>Aristida contorta</i>, <i>Dysphania kalpari</i>, <i>Ptilotus aervoides</i>, <i>Ptilotus astrolasius</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i> and <i>Tribulus platypterus</i>.</p> <p><b>Soils and Landform:</b> Red/brown clay loam with ironstone pebbles on slopes. Occasional ironstone outcropping.</p> <p><b>Condition:</b> Excellent</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
MR5	<p><i>Acacia inaequilatera</i>, <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>, <i>Hakea lorea</i> tall sparse shrubland over <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> mid sparse shrubland over <i>Triodia wiseana</i> low open hummock grassland and <i>Aristida holathera</i> var. <i>holathera</i>, <i>Enneapogon caerulescens</i>, <i>Eriachne flaccida</i> low isolated tussock grasses.</p> <p><b>Other Associated Species:</b> <i>Boerhavia coccinea</i>, <i>Corchorus tectus</i>, <i>Indigofera monophylla</i>, <i>Ptilotus astrolasius</i>, <i>Ptilotus calostachyus</i>, <i>Ptilotus nobilis</i>, <i>Sida echinocarpa</i> and <i>Triumfetta clementii</i>.</p> <p><b>Soils and Landform:</b> Red/brown sandy loam with ironstone and quartz pebbles on slopes. Occasional moderate ironstone outcropping.</p> <p><b>Condition:</b> Very Good to Pristine</p>	
MR6	<p><i>Acacia xiphophylla</i>, <i>Acacia bivenosa</i>, <i>Hakea lorea</i> tall isolated shrubs over <i>Triodia wiseana</i> low sparse hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Sclerolaena limbata</i></p> <p><b>Soils and Landform:</b> Red/brown sandy loam with loose ironstone gravel on slopes and breakaways. Moderate exposed granite outcropping.</p> <p><b>Condition:</b> Excellent</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
FL13	<p><b>Habitat 5: Spinifex grasslands</b></p> <p><i>Acacia bivenosa</i>, <i>Acacia synchronicia</i> tall isolated shrubs over <i>Triodia longiceps</i>, <i>Triodia pungens</i> low sparse hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Ptilotus nobilis</i>, <i>Sclerolaena densiflora</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i> and <i>Triodia wiseana</i>.</p> <p><b>Soils and Landform:</b> Red clay loam with gravel on flats.</p> <p><b>Condition:</b> Excellent</p>	
MR1	<p><b>Habitat 6: Acacia shrublands with occasional eucalyptus species over spinifex on upper slopes &amp; ridges</b></p> <p><i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>, <i>Corymbia hamersleyana</i> low isolated trees over <i>Acacia bivenosa</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia inaequilatera</i> tall sparse shrubland and <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, <i>Acacia maitlandii</i> mid isolated shrubs over <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia orthocarpa</i>, <i>Acacia synchronicia</i> and <i>Ptilotus nobilis</i></p> <p><b>Soils and Landform:</b> Red/brown sandy loam with numerous ironstone pebbles on slopes and ridges. Moderate mixed outcropping.</p> <p><b>Condition:</b> Excellent to Pristine</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
MR7	<p><i>Eremophila longifolia</i>, <i>Acacia maitlandii</i>, <i>Acacia atkinsiana</i> mid sparse shrubland over <i>Abutilon lepidum</i>, <i>Gomphrena cunninghamii</i>, <i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186) low sparse shrubland and <i>Triodia wiseana</i> low hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia inaequilatera</i>, <i>Cymbopogon obtectus</i>, <i>Cyperus hesperius</i>, <i>Eriachne mucronata</i>, <i>Gossypium robinsonii</i> and <i>Senna glutinosa</i> subsp. <i>glutinosa</i></p> <p><b>Soils and Landform:</b> Red/brown sandy loam with loose ironstone gravel on ridges. Moderate outcropping.</p> <p><b>Condition:</b> Pristine</p>	
MR4	<p><i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>, <i>Acacia inaequilatera</i>, <i>Acacia colei</i> var. <i>ileocarpa</i> tall isolated shrubs and <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>, <i>Cajanus cinereus</i>, <i>Abutilon lepidum</i> mid sparse shrubland over <i>Corchorus tectus</i>, <i>Triumfetta clementii</i>, <i>Tribulus platypterus</i> low sparse shrubland and <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Cucumis maderaspatanus</i>, <i>Cymbopogon obtectus</i>, <i>Euphorbia coghlanii</i>, <i>Indigofera linifolia</i>, <i>Indigofera rugosa</i>, <i>Ptilotus axillaris</i>, <i>Rhynchosia minima</i>, <i>Senna notabilis</i> and <i>Solanum dioicum</i>.</p> <p><b>Soils and Landform:</b> Red sandy loam with ironstone pebbles on slopes. Moderate ironstone outcropping.</p> <p><b>Condition:</b> Excellent to Pristine.</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
	<p><b>Habitat 7: <i>Acacia</i> shrublands or <i>Eucalyptus</i> woodlands dominated by <i>Acacias</i> over spinifex on flowlines &amp; small gullies</b></p>	
CD5	<p><i>Corymbia hamersleyana</i> low open woodland over <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Acacia atkinsiana</i>, <i>Acacia inaequilatera</i> tall sparse shrubland over <i>Bonamia erecta</i>, <i>Goodenia stobbsiana</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i> low isolated shrubs and <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia maitlandii</i>, <i>Aristida contorta</i>, <i>Cymbopogon obtectus</i>, <i>Grevillea pyramidalis</i>, <i>Isotropis atropurpurea</i>, <i>Petalostylis labicheoides</i> and <i>Senna artemisioides</i> subsp. <i>oligophylla</i></p> <p><b>Soils and Landform:</b> Red/brown clay with ironstone pebbles on gullies. Occasional granite outcropping.</p> <p><b>Condition:</b> Excellent</p>	
CD6	<p><i>Acacia bivenosa</i>, <i>Jasminum didymium</i> subsp. <i>lineare</i>, <i>Acacia ampliceps</i> tall sparse shrubland over <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Indigofera monophylla</i> mid sparse shrubland over <i>Triodia wiseana</i> isolated hummock grasses and <i>Cymbopogon obtectus</i>, <i>Aristida contorta</i>, <i>Eriachne aristidea</i> low isolated tussock grasses.</p> <p><b>Other Associated Species:</b> *<i>Cenchrus ciliaris</i>, <i>Acacia inaequilatera</i>, <i>Acacia pyrifolia</i>, <i>Corymbia hamersleyana</i> and <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i></p> <p><b>Soils and Landform:</b> Red/brown sandy loam on minor channels and gullies.</p> <p><b>Condition:</b> Very Good</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
CD1	<p><i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia trachycarpa</i> tall open shrubland and <i>Gossypium robinsonii</i>, <i>Acacia pyrifolia</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i> mid sparse shrubland over <i>Hybanthus aurantiacus</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i>, <i>Ptilotus nobilis</i> low isolated shrubs with <i>Triodia pungens</i> low open hummock grassland and <i>Themeda triandra</i>, <i>Cymbopogon obtectus</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia bivenosa</i>, <i>Evolvulus alsinoides</i>, <i>Hakea lorea</i>, <i>Indigofera monophylla</i>, <i>Ptilotus calostachyus</i>, <i>Rhynchosia minima</i> and <i>Sida rohlenae</i> subsp. <i>rohlenae</i>.</p> <p><b>Soils and Landform:</b> Red/brown sandy loam on minor channels and gullies.</p> <p><b>Condition:</b> Excellent</p>	
FL12	<p><i>Corymbia hamersleyana</i> low open woodland over <i>Grevillea wickhamii</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia bivenosa</i> tall sparse shrubland and <i>Gossypium australe</i>, <i>Acacia dictyophleba</i> mid sparse shrubland over <i>Bonamia erecta</i>, <i>Corchorus tectus</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i> low sparse shrubland and <i>Triodia pungens</i>, <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Indigofera boviperda</i> subsp. <i>boviperda</i>, <i>Isotropis atropurpurea</i>, <i>Ptilotus calostachyus</i>, <i>Ptilotus nobilis</i>, <i>Tephrosia uniovulata</i>.</p> <p><b>Soils and Landform:</b> Red/brown clay loam on flats.</p> <p><b>Condition:</b> Excellent to Pristine</p>	
FL11	<p><i>Corymbia hamersleyana</i> low open woodland over <i>Acacia trachycarpa</i>, <i>Cullen lachnostachys</i>, <i>Grevillea wickhamii</i> mid sparse shrubland over <i>Themeda triandra</i>, <i>Eulalia aurea</i>, <i>Paraneurachne muelleri</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>, <i>Senna notabilis</i> and <i>Solanum diversiflorum</i>.</p> <p><b>Soils and Landform:</b> Red/brown sandy clay loam on flats.</p> <p><b>Condition:</b> Excellent</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
CD4	<p><b>Habitat 8: Major drainage lines with large <i>Eucalyptus</i> species</b></p> <p><i>Eucalyptus victrix</i>, <i>Eucalyptus camaldulensis</i> mid open woodland over <i>Acacia pyrifolia</i>, <i>Grevillea wickhamii</i>, <i>Acacia trachycarpa</i> tall open shrubland over <i>Pterocaulon sphacelatum</i>, <i>Phyllanthus maderaspatensis</i>, <i>Hybanthus aurantiacus</i> mid sparse shrubland with <i>Cyperus vaginatus</i> mid sparse sedgeland and <i>Sporobolus australasicus</i>, <i>Chrysopogon fallax</i>, <i>Enteropogon ramosus</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia bivenosa</i>, <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Cleome viscosa</i>, <i>Cucumis maderaspatanus</i>, <i>Euphorbia coghlanii</i>, <i>Gossypium robinsonii</i>, <i>Rhynchosia minima</i>, <i>Stemodia grossa</i>, <i>Tephrosia rosea</i> and <i>Triodia wiseana</i></p> <p><b>Soils and Landform:</b> Red/brown sandy ironstone gravel on major channels. Occasional ironstone outcropping.</p> <p><b>Condition:</b> Very Good</p>	
CD8	<p><i>Eucalyptus victrix</i> low open woodland over <i>Grevillea wickhamii</i>, <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Acacia pyrifolia</i> tall open shrubland and <i>Tephrosia rosea</i>, <i>Corchorus lasiocarpus</i>, <i>Indigofera monophylla</i> mid sparse shrubland over <i>Triodia pungens</i> low open hummock grassland and <i>Eriachne aristidea</i>, <i>Eriachne pulchella</i>, <i>*Cenchrus ciliaris</i> low open tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia dictyophleba</i>, <i>Cleome viscosa</i>, <i>Gossypium robinsonii</i>, <i>Polymeria ambigua</i>, <i>Senna notabilis</i> and <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i></p> <p><b>Soils and Landform:</b> Red/brown clay loam with scattered ironstone on major channels.</p> <p><b>Condition:</b> Very Good</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
CD3	<p><i>Eucalyptus victrix</i> mid open woodland over <i>Acacia ampliceps</i>, <i>Acacia trachycarpa</i>, <i>Sesbania cannabina</i> tall sparse shrubland over <i>Cyperus vaginatus</i> mid sparse sedgeland and <i>Eriachne benthamii</i>, <i>Enneapogon caerulescens</i>, <i>Cymbopogon obtectus</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Indigofera linifolia</i> and <i>Rhynchosia minima</i></p> <p><b>Soils and Landform:</b> Red/brown clay on minor channels.</p> <p><b>Condition:</b> Excellent</p>	
<b>Habitat 9: Floodplains</b>		
CD2	<p><i>Corymbia candida</i>, <i>Corymbia hamersleyana</i>, <i>Eucalyptus camaldulensis</i> low open woodland over <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Gossypium robinsonii</i>, <i>Acacia ancistrocarpa</i> tall sparse shrubland over <i>Eragrostis tenellula</i>, <i>Sporobolus australasicus</i>, <i>Eragrostis cumingii</i> low sparse tussock grassland and <i>Alternanthera nodiflora</i>, <i>Ipomoea muelleri</i>, <i>Waltheria indica</i> low sparse forbland.</p> <p><b>Other Associated Species:</b> <i>Acacia bivenosa</i>, <i>Alternanthera nana</i> and <i>Ptilotus nobilis</i></p> <p><b>Soils and Landform:</b> Red clay and sandy loam on open channels and floodplains.</p> <p><b>Condition:</b> Very Good</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
CD7	<p><i>Corymbia hamersleyana</i> low open woodland over <i>Acacia ancistrocarpa</i>, <i>Acacia trachycarpa</i>, <i>Acacia dictyophleba</i> tall sparse shrubland and <i>Cullen lachnostachys</i>, <i>Gossypium australe</i>, <i>Grevillea wickhamii</i> mid sparse shrubland over <i>Pterocaulon sphacelatum</i>, <i>Pluchea dunlopii</i>, <i>Senna artemisioides</i> subsp. <i>helmsii</i> low open shrubland with <i>Triodia pungens</i> low open hummock grassland and <i>Eulalia aurea</i>, <i>Chrysopogon fallax</i>, <i>Eriachne pulchella</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Acacia inaequilatera</i>, <i>Cucumis maderaspatanus</i>, <i>Eriachne aristidea</i>, <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>, <i>Hakea lorea</i>, <i>Ptilotus nobilis</i>, <i>Rhynchosia minima</i> and <i>Stemodia grossa</i></p> <p><b>Soils and Landform:</b> Red/brown clay loam on floodplains.</p> <p><b>Condition:</b> Excellent</p>	
<b>Habitat 10: Cracking clay grasslands</b>		
FL15	<p><i>Astrebla lappacea</i> (P3), <i>Aristida latifolia</i>, <i>Panicum decompositum</i> low tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Aristida holathera</i> var. <i>holathera</i>, <i>Aristida obscura</i>, <i>Astrebla pectinata</i>, <i>Bothriochloa ewartiana</i>, <i>Brachyachne convergens</i>, <i>Dichanthium sericeum</i>, <i>Eragrostis setifolia</i>, <i>Eragrostis xerophila</i>, <i>Indigofera trita</i> subsp. <i>trita</i>, <i>Iseilema eremaeum</i>, <i>Operculina aequisejala</i>, <i>Ptilotus nobilis</i>, <i>Rhynchosia minima</i>, <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Urochloa occidentalis</i>.</p> <p><b>Soils and Landform:</b> Red/brown clayey loam with cracking clay on flats.</p> <p><b>Condition:</b> Excellent to Pristine</p>	

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Veg. Code	Vegetation Community Description	Representative Plate of Community
	<b>Habitat 11: Open plains</b>	
FL4	<p><i>Streptoglossa bubakii</i>, <i>Phyllanthus maderaspatensis</i>, <i>Sida trichopoda</i> low sparse forbland with <i>Aristida latifolia</i>, <i>Brachyachne convergens</i>, <i>Eragrostis xerophila</i> low sparse tussock grassland and <i>Triodia wiseana</i> low open hummock grassland.</p> <p><b>Other Associated Species:</b> <i>Euphorbia coghlanii</i>, <i>Heliotropium crispatum</i>, <i>Indigofera trita</i> subsp. <i>trita</i>, <i>Ptilotus carinatus</i>, <i>Ptilotus gomphrenoides</i> subsp. <i>gomphrenoides</i>, <i>Rhynchosia minima</i> and <i>Sida spinosa</i>.</p> <p><b>Soils and Landform:</b> Deep, red clayey loam with compact rock fragments on flats.</p> <p><b>Condition:</b> Good to Excellent</p>	
FL5	<p><i>Sida spinosa</i>, <i>Phyllanthus maderaspatensis</i>, <i>Cullen cinereum</i> low sparse shrubland with <i>Stemodia kingii</i>, <i>Heliotropium crispatum</i>, <i>Desmodium muelleri</i> low sparse forbland and <i>Panicum decompositum</i>, <i>Enneapogon caeruleus</i> low sparse tussock grassland.</p> <p><b>Other Associated Species:</b> <i>Hibiscus brachysiphonius</i>, <i>*Malvastrum americanum</i>, <i>Senna notabilis</i> and <i>*Vachellia farnesiana</i>.</p> <p><b>Soils and Landform:</b> Red clayey loam with scattered ironstone rocks on flats</p> <p><b>Condition:</b> Good</p>	

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**Appendix 4** *List of bird species recorded or expected to occur within the proposed Solomon Hub to CS 1 Gas Pipeline route. (Although recorded in the data searches, red indicates that the species is unlikely to occur within the FRGP Study Area as no suitable habitat is present.)*

**Key**

DPaW	-	DPaW's NatureMap
BA	-	Birds Australia database
Coffey	-	Coffey Environment (2008)
<i>ecologia</i>	-	<i>ecologia</i> Environment (2010)
Biota	-	Biota Environmental Sciences (2005)
Ninox	-	Recorded during the Level 1 field assessment

**Status**

1	=	Listed under the <i>EPBC Act</i>
2	=	Listed under the <i>WC Act</i>
3	=	Listed on DPaW's Priority Fauna listing

BIRDS		Status	DPaW	BA	Coffey	<i>ecologia</i>	Biota	Ninox
<b>Casuariidae</b>								
<i>Dromaius novaehollandiae</i>	Emu		X	X	X	X	X	X
<b>Phasianidae</b>								
<i>Coturnix pectoralis</i>	Stubble Quail		X		X			
<i>Coturnix ypsilophora</i>	Brown Quail		X	X	X	X		
<b>Anatidae</b>								
<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck		X					
<i>Cygnus atratus</i>	Black Swan		X	X				
<i>Chenonetta jubata</i>	Australian Wood Duck		X					
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck							
<i>Anas gracilis</i>	Grey Teal		X	X			X	
<i>Anas superciliosa</i>	Pacific Black Duck		X	X	X		X	
<i>Aythya australis</i>	Hardhead		X	X				
<b>Podicipedidae</b>								
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		X	X				
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		X	X				
<b>Columbidae</b>								
<i>Phaps chalcoptera</i>	Common Bronzewing		X	X	X	X	X	X
<i>Phaps histrionica</i>	Flock Bronzewing	P4	X					
<i>Ocyphaps lophotes</i>	Crested Pigeon		X	X	X	X		X
<i>Geophaps plumifera</i>	Spinifex Pigeon		X	X	X	X	X	X
<i>Geopelia cuneata</i>	Diamond Dove		X	X	X	X	X	X
<i>Geopelia striata</i>	Peaceful Dove		X	X	X	X	X	X
<b>Podargidae</b>								
<i>Podargus strigoides</i>	Tawny Frogmouth			X		X		
<b>Eurostopodidae</b>								
<i>Eurostopodus argus</i>	Spotted Nightjar		X	X		X		
<b>Aegothelidae</b>								
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		X	X		X		
<b>Apodidae</b>								
<i>Apus pacificus</i>	Fork-tailed Swift	1, 2				X		
<b>Anhingaidae</b>								
<i>Anhinga novaehollandiae</i>	Australasian Darter		X	X				
<b>Phalacrocoracidae</b>								
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant		X	X	X			
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		X					
<i>Phalacrocorax varius</i>	Pied Cormorant		X	X				
<b>Pelecanidae</b>								

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<b>BIRDS</b>		<b>Status</b>	<b>DPaW</b>	<b>BA</b>	<b>Coffey</b>	<b>ecologia</b>	<b>Biota</b>	<b>Ninox</b>
<i>Pelecanus conspicillatus</i>	Australian Pelican		X	X				
<b>Ardeidae</b>								
<i>Ixobrychus flavicollis</i>	Black Bittern		X					
<i>Ardea pacifica</i>	White-necked Heron			X		X	X	X
<i>Ardea modesta</i>	Eastern Great Egret	1, 2	X	X				
<i>Ardea intermedia</i>	Intermediate Egret		X					
<i>Butorides striata</i>	Striated Heron			X				
<i>Egretta novaehollandiae</i>	White-faced Heron		X	X			X	
<i>Egretta garzetta</i>	Little Egret		X					
<i>Nycticorax caledonicus</i>	Nankeen Night-Heron		X	X				
<b>Threskiornithidae</b>								
<i>Threskiornis spinicollis</i>	Straw-necked Ibis		X	X				
<i>Platalea flavipes</i>	Yellow-billed Spoonbill		X					
<b>Accipitridae</b>								
<i>Elanus axillaris</i>	Black-shouldered Kite		X	X	X	X		X
<i>Lophoictinia isura</i>	Square-tailed Kite		X	X		X		
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard		X					
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		X	X				
<i>Haliastur sphenurus</i>	Whistling Kite		X	X	X	X		X
<i>Milvus migrans</i>	Black Kite		X	X				X
<i>Accipiter fasciatus</i>	Brown Goshawk		X	X	X	X	X	
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk		X	X	X	X		
<i>Circus assimilis</i>	Spotted Harrier		X	X				X
<i>Circus approximans</i>	Swamp Harrier							
<i>Aquila audax</i>	Wedge-tailed Eagle		X	X		X		X
<i>Hieraetus morphnoides</i>	Little Eagle		X	X			X	X
<b>Falconidae</b>								
<i>Falco cenchroides</i>	Nankeen Kestrel		X	X	X	X	X	
<i>Falco berigora</i>	Brown Falcon		X	X	X	X	X	X
<i>Falco longipennis</i>	Australian Hobby		X	X		X		
<i>Falco hypoleucos</i>	Grey Falcon		X					
<i>Falco subniger</i>	Black Falcon							
<i>Falco peregrinus</i>	Peregrine Falcon	2		X				
<b>Rallidae</b>								
<i>Porphyrio porphyrio</i>	Purple Swamphen		X					
<i>Gallirallus philippensis</i>	Buff-banded Rail		X					
<i>Porzana pusilla</i>	Baillon's Crake		X					
<i>Porzana tabuensis</i>	Spotless Crake		X					
<i>Tribonyx ventralis</i>	Black-tailed Native-hen							
<i>Fulica atra</i>	Eurasian Coot		X	X				
<b>Otididae</b>								
<i>Ardeotis australis</i>	Australian Bustard	3	X	X		X		
<b>Burhinidae</b>								
<i>Burhinus grallarius</i>	Bush Stone-curlew	3	X	X			X	
<b>Recurvirostridae</b>								
<i>Himantopus himantopus</i>	Black-winged Stilt		X					
<b>Charadriidae</b>								
<i>Charadrius ruficapillus</i>	Red-capped Plover			X				
<i>Charadrius veredus</i>	Oriental Plover	1, 2	X					
<i>Charadrius australis</i>	Inland Dotterel							
<i>Erythronyx cinctus</i>	Red-kneed Dotterel							
<i>Elsemyornis melanops</i>	Black-fronted Dotterel		X	X		X	X	
<i>Vanellus tricolor</i>	Banded Lapwing		X					
<b>Scolopacidae</b>								
<i>Actitis hypoleucos</i>	Common Sandpiper		X	X				
<i>Tringa nebularia</i>	Common Greenshank			X				
<i>Tringa glareola</i>	Wood Sandpiper		X	X				
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		X					

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BIRDS		Status	DPaW	BA	Coffey	ecologia	Biota	Ninox
<b>Turnicidae</b>								
<i>Turnix velox</i>	Little Button-quail		X	X	X	X		X
<b>Glareolidae</b>								
<i>Stiltia Isabella</i>	Australian Pratincole							
<i>Glareola maldivarum</i>	Oriental Pratincole	1, 2						
<b>Laridae</b>								
<i>Chlidonias hybrida</i>	Whiskered Tern			X				
<i>Chroicocephalus novaehollandiae</i>	Silver Gull			X				
<b>Cacatuidae</b>								
<i>Eolophus roseicapillus</i>	Galah		X	X		X	X	X
<i>Cacatua sanguinea</i>	Little Corella		X	X	X	X	X	X
<i>Nymphicus hollandicus</i>	Cockatiel		X	X	X	X	X	X
<b>Psittacidae</b>								
<i>Barnardius zonarius</i>	Australian Ringneck		X	X	X	X	X	X
<i>Psephotus varius</i>	Mulga Parrot							
<i>Melopsittacus undulatus</i>	Budgerigar		X	X	X	X	X	X
<i>Neopsephotus bourkii</i>	Bourke's Parrot							
<i>Neophema elegans</i>	Elegant Parrot							
<b>Cuculidae</b>								
<i>Centropus phasianinus</i>	Pheasant Coucal		X	X	X	X		
<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo		X	X	X	X	X	
<i>Chalcites osculans</i>	Black-eared Cuckoo		X	X				
<i>Cacomantis pallidus</i>	Pallid Cuckoo		X	X	X	X	X	X
<b>Strigidae</b>								
<i>Ninox connivens</i>	Barking Owl		X					
<i>Ninox novaeseelandiae</i>	Southern Boobook		X	X		X		
<b>Tytonidae</b>								
<i>Tyto javanica</i>	Eastern Barn Owl			X				
<b>Halcyonidae</b>								
<i>Dacelo leachii</i>	Blue-winged Kookaburra		X	X	X	X	X	
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		X	X		X	X	X
<i>Todiramphus sanctus</i>	Sacred Kingfisher			X	X	X	X	
<b>Meropidae</b>								
<i>Merops ornatus</i>	Rainbow Bee-eater	1, 2	X	X	X	X	X	X
<b>Climacteridae</b>								
<i>Climacteris melanura</i>	Black-tailed Treecreeper		X		X			
<b>Ptilonorhynchidae</b>								
<i>Ptilonorhynchus guttatus</i>	Western Bowerbird		X	X	X	X		
<b>Maluridae</b>								
<i>Malurus leucopterus</i>	White-winged Fairy-wren		X	X	X	X		X
<i>Malurus lamberti</i>	Variiegated Fairy-wren		X	X	X	X	X	
<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren		X	X			X	
<i>Amytornis striatus</i>	Striated Grasswren		X	X	X	X	X	
<b>Acanthizidae</b>								
<i>Pyrrholaemus brunneus</i>	Redthroat			X				
<i>Calamanthus capestris</i>	Rufous Fieldwren							
<i>Smicromnis brevirostris</i>	Weebill		X	X	X	X	X	X
<i>Gerygone fusca</i>	Western Gerygone		X	X	X	X	X	
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill			X				
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			X				
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		X	X				
<i>Aphelocephala leucopsis</i>	Southern Whiteface			X				
<b>Pardalotidae</b>								
<i>Pardalotus rubricatus</i>	Red-browed Pardalote		X	X	X	X	X	X
<i>Pardalotus striatus</i>	Striated Pardalote		X	X	X	X	X	
<b>Meliphagidae</b>								
<i>Certhionyx variegatus</i>	Pied Honeyeater		X			X		
<i>Lichenostomus virescens</i>	Singing Honeyeater		X	X	X	X	X	X

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<b>BIRDS</b>		<b>Status</b>	<b>DPaW</b>	<b>BA</b>	<b>Coffey</b>	<b>ecologia</b>	<b>Biota</b>	<b>Ninox</b>
<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater		X	X	X	X	X	
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater		X	X	X	X	X	X
<i>Manorina flavigula</i>	Yellow-throated Miner		X	X	X	X		X
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		X	X	X	X		X
<i>Conopophila whitei</i>	Grey Honeyeater			X				
<i>Epthianura tricolor</i>	Crimson Chat		X	X				X
<i>Epthianura aurifrons</i>	Orange Chat							
<i>Sugomel niger</i>	Black Honeyeater		X			X	X	
<i>Lichmera indistincta</i>	Brown Honeyeater		X	X	X	X	X	X
<i>Melithreptus gularis</i>	Black-chinned Honeyeater		X	X	X	X		
<b>Pomatostomidae</b>								
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler		X	X	X	X	X	
<i>Pomatostomus superciliosus</i>	White-browed Babbler			X				X
<b>Eupetidae</b>								
<i>Cinclosoma castaneothorax</i>	Chestnut-breasted Quail-thrush			X				
<i>Psophodes occidentalis</i>	Chiming Wedgebill		X					
<b>Neosittidae</b>								
<i>Daphoenositta chrysoptera</i>	Varied Sittella			X	X			
<b>Campephagidae</b>								
<i>Coracina maxima</i>	Ground Cuckoo-shrike					X		
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		X	X	X	X	X	X
<i>Lalage sueurii</i>	White-winged Triller		X	X	X	X	X	X
<b>Pachycephalidae</b>								
<i>Pachycephala rufiventris</i>	Rufous Whistler		X	X	X	X	X	X
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		X	X	X	X		X
<i>Oreoica gutturalis</i>	Crested Bellbird		X	X	X	X	X	X
<b>Artamidae</b>								
<i>Artamus personatus</i>	Masked Woodswallow		X	X		X		
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow		X					
<i>Artamus cinereus</i>	Black-faced Woodswallow		X		X	X	X	X
<i>Artamus minor</i>	Little Woodswallow		X	X	X	X	X	
<i>Cracticus torquatus</i>	Grey Butcherbird		X	X	X	X		X
<i>Cracticus nigrogularis</i>	Pied Butcherbird		X	X	X	X	X	
<i>Cracticus tibicen</i>	Australian Magpie		X	X	X	X		X
<b>Rhipiduridae</b>								
<i>Rhipidura albiscapa</i>	Grey Fantail			X			X	
<i>Rhipidura leucophrys</i>	Willie Wagtail		X	X	X	X	X	X
<b>Corvidae</b>								
<i>Corvus bennetti</i>	Little Crow		X	X		X		X
<i>Corvus orru</i>	Torresian Crow		X	X	X	X	X	X
<b>Monarchidae</b>								
<i>Grallina cyanoleuca</i>	Magpie-lark		X	X	X	X	X	X
<b>Petroicidae</b>								
<i>Petroica goodenovii</i>	Red-capped Robin		X	X				
<i>Melanodryas cucullata</i>	Hooded Robin		X	X	X	X		
<b>Alaudidae</b>								
<i>Mirafra javanica</i>	Horsfield's Bushlark		X					
<b>Cisticolidae</b>								
<i>Cisticola exilis</i>	Golden-headed Cisticola		X					
<b>Acrocephalidae</b>								
<i>Acrocephalus australis</i>	Australian Reed-Warbler		X					
<b>Megaluridae</b>								
<i>Megalurus gramineus</i>	Little Grassbird		X					
<i>Cincloramphus mathewsi</i>	Rufous Songlark		X	X	X	X	X	X
<i>Cincloramphus cruralis</i>	Brown Songlark		X	X		X		X
<i>Eremiornis carteri</i>	Spinifexbird		X	X	X	X	X	X
<b>Timaliidae</b>								
<i>Zosterops luteus</i>	Yellow White-eye		X					

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<b>BIRDS</b>		<b>Status</b>	<b>DPaW</b>	<b>BA</b>	<b>Coffey</b>	<i>ecologia</i>	<b>Biota</b>	<b>Ninox</b>
<b>Hirundinidae</b>								
<i>Hirundo neoxena</i>	Welcome Swallow		X					
<i>Petrochelidon ariel</i>	Fairy Martin		X	X			X	X
<i>Petrochelidon nigricans</i>	Tree Martin		X	X	X	X		
<b>Nectariniidae</b>								
<i>Dicaeum hirundinaceum</i>	Mistletoebird		X	X	X	X	X	
<b>Estrildidae</b>								
<i>Taeniopygia guttata</i>	Zebra Finch		X	X	X	X	X	X
<i>Neochmia ruficauda</i>	Star Finch		X	X				
<i>Emblema pictum</i>	Painted Finch		X	X	X	X	X	X
<b>Motacillidae</b>								
<i>Anthus novaeseelandiae</i>	Australasian Pipit		X	X				
	<b>Number of Species (152 +15)</b>		<b>133</b>	<b>121</b>	<b>65</b>	<b>79</b>	<b>56</b>	<b>51</b>

*Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment***Appendix 5 List of native mammal species recorded or expected to occur within the proposed Solomon Hub to CS 1 Gas Pipeline route.****Key**

DPaW	-	DPaW's NatureMap
Coffey	-	Coffey Environment (2008)
<i>ecologia</i>	-	<i>ecologia</i> Environment (2010)
Biota	-	Biota Environmental Sciences (2005)
Ninox	-	Recorded during the Level 1 field assessment

**Status**

1	=	Listed under the <i>EPBC Act</i>
2	=	Listed under the <i>WC Act</i>
3	=	Listed on DPaW's priority Fauna listing

NATIVE MAMMALS		Status	DPaW	PIL	Coffey	<i>ecologia</i>	Biota	Ninox
<b>Tachyglossidae</b>								
<i>Tachyglossus aculeatus</i>	Echidna		X			X	X	
<b>Dasyuridae</b>								
<i>Dasykaluta rosamondae</i>	Little Red Kaluta		X	X	X	X		
<i>Dasyurus hallucatus</i>	Northern Quoll	1, 2	X			X	X	
<i>Pseudantechinus roryi</i>	Rory's Pseudantechinus			X				
<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus		X	X				
<i>Pseudantechinus</i> sp.	Unidentified Pseudantechinus					X		
<i>Planigale ingrami</i>	Long-tailed Planigale		X	X	X			
<i>Planigale maculata</i>	Common Planigale		X	X	X			
<i>Planigale</i> sp.	Unidentified Planigale					X		
<i>Ningauai timealeyi</i>	Pilbara Ningauai		X	X	X	X	X	
<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart	3	X	X				
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart		X	X	X	X		
<i>Sminthopsis ooldea</i>	Ooldea Dunnart			X				
<i>Sminthopsis youngsoni</i>	Lesser Hairy-footed Dunnart			X				
<b>Thylacomyidae</b>								
<i>Macrotis lagotis</i>	Bilby	1, 2						
<b>Phalangeridae</b>								
<i>Trichosurus vulpecula arnhemensis</i>	Northern Brushtail Possum		X					
<b>Macropodidae</b>								
<i>Macropus robustus</i>	Euro		X			X	X	X
<i>Macropus rufus</i>	Red Kangaroo		X			X		X
<i>Petrogale rothschildi</i>	Rothschild's Rock-wallaby		X					
<b>Pteropodidae</b>								
<i>Pteropus alecto</i>	Black Flying-fox		X					
<i>Pteropus scapulatus</i>	Little Red Flying-fox							
<b>Megadermatidae</b>								
<i>Macrotis gigas</i>	Ghost Bat	3	X	X		X	X	
<b>Hipposideridae</b>								
<i>Rhinonicteris aurantia</i>	Orange (Pilbara) Leafnosed-bat	1, 2		X				
<b>Emballonuridae</b>								
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat		X	X	X	X		
<i>Taphozous georgianus</i>	Common Sheath-tail-bat		X		X	X		
<i>Taphozous hilli</i>	Hills's Sheath-tail-bat			X?		X		
<b>Molossidae</b>								
<i>Austronomus australis</i>	White-striped Freetail-bat		X	X				
<i>Chaerephon jobensis</i>	Northern Freetail-bat		X	X	X	X	X	
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat		X	X	X	X		
<b>Vespertilionidae</b>								
<i>Nyctophilus daedalus</i>	Northern Long-eared Bat		X	X				
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat		X	X				

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<b>NATIVE MAMMALS</b>		<b>Status</b>	<b>DPaW</b>	<b>PIL</b>	<b>Coffey</b>	<b>ecologia</b>	<b>Biota</b>	<b>Ninox</b>
<i>Nyctophilus</i> sp.	Unidentified Nyctophilus					X		
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		X	X	X	X	X	
<i>Chalinolobus morio</i>	Chocolate Wattled Bat			X				
<i>Scotorepens greyii</i>	Little Broad-nosed Bat		X	X	X	X	X	
<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat		X	X	X	X	X	
<b>Muridae</b>								
<i>Leggadina lakedownensis</i>	Lakeland Downs Mouse	3	X	X				
<i>Notomys alexis</i>	Spinifex Hopping-mouse		X	X				
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	3	X	X		X		
<i>Pseudomys delicatulus</i>	Delicate Mouse		X	X			X	
<i>Pseudomys desertor</i>	Desert Mouse		X	X	X	X		
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse		X	X	X	X		
<i>Zyomys argurus</i>	Common Rock-rat		X	X	X	X	X	
<b>Canidae</b>								
<i>Canis lupus dingo</i>	Dingo		X		X	X	X	
	<b>Number of Species (41)</b>		<b>33</b>	<b>17</b>	<b>16</b>	<b>24</b>	<b>12</b>	<b>2</b>

*Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment*

**Appendix 6** *List of amphibian species recorded or expected to occur within the proposed Solomon Hub to CS 1 Gas Pipeline route.*

**Key**

- DPaW - DPaW's NatureMap  
 Coffey - Coffey Environment (2008)  
*ecologia* - *ecologia* Environment (2010)  
 Biota - Biota Environmental Sciences (2005)

<b>FROGS</b>		<b>Status</b>	<b>DPaW</b>	<b>Coffey</b>	<b><i>ecologia</i></b>	<b>Biota</b>
<b>Hylidae</b>	<b>Tree Frogs</b>					
<i>Cyclorana maini</i>	Main's Frog		X	X	X	
<i>Cyclorana platycephala</i>	Water-holding Frog					
<i>Litoria rubella</i>	Red Tree Frog		X	X	X	
<b>Limnodynastidae</b>						
<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog					
<i>Neobatrachus sutor</i>	Shoemaker Frog					
<i>Notaden nichollsi</i>	Desert Spadefoot Toad					
<i>Platyplectrum spenceri</i>	Spencer's Burrowing Frog					
<b>Myobatrachidae</b>						
<i>Pseudophryne douglasi</i>	Douglas's Toadlet					
<i>Uperoleia glandulosa</i>					X	
<i>Uperoleia russelli</i>	Russell's Toadlet		X	X	X	
<i>Uperoleia saxatilis</i>			X			
	<b>(11)</b>		<b>4</b>	<b>3</b>	<b>4</b>	<b>0</b>

*Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment*

**Appendix 7 List of reptile species recorded or expected to occur within the proposed Solomon Hub to CS 1 Gas Pipeline route.**

**Key**

- DPaW - DPaW's NatureMap  
 Coffey - Coffey Environment (2008)  
*ecologia* - *ecologia* Environment (2010)  
 Biota - Biota Environmental Sciences (2005)  
 Ninox - Recorded during the Level 1 field assessment

**Status**

- 1 = Listed under the *EPBC Act*  
 2 = Listed under the *WC Act*  
 3 = Listed on DPaW's priority Fauna listing

REPTILES		Status	DPaW	Coffey	<i>ecologia</i>	Biota	Ninox
<b>Cheluidae</b>	<b>Freshwater Tortoises</b>						
<i>Chelodina steindachneri</i>			X				
<b>Diplodactylidae</b>	<b>Geckos</b>						
<i>Crenadactylus o. ocellatus</i>			X		X		
<i>Diplodactylus conspicillatus</i>			X	X	X	X	
<i>Diplodactylus galaxias</i>			X				
<i>Diplodactylus mitchelli</i>			X				
<i>Diplodactylus pulcher</i>							
<i>Diplodactylus savagei</i>			X	X	X		
<i>Lucasium stenodactylus</i>			X		X	X	
<i>Lucasium wombeyi</i>			X	X	X		
<i>Oedura marmorata</i>			X		X	X	
<i>Rhynchoedura ornata</i>			X			X	
<i>Strophurus ciliaris</i>							
<i>Strophurus elderi</i>			X	X	X		
<i>Strophurus jeanae</i>				X	X		
<i>Strophurus strophurus</i>					X		
<i>Strophurus wellingtonae</i>			X	X	X		
<b>Gekkonidae</b>	<b>Geckos</b>						
<i>Gehyra pilbara</i>			X	X	X		
<i>Gehyra punctata</i>			X	X	X		
<i>Gehyra purpurascens</i>			X		X		
<i>Gehyra variegata</i>			X	X	X		X
<i>Heteronotia binoei</i>			X	X	X	X	
<i>Heteronotia spelea</i>			X		X		
<b>Carphodactylidae</b>	<b>Geckos</b>						
<i>Nephrurus levis pilbarensis</i>						X	
<i>Nephrurus wheeleri cinctus</i>			X	X	X		
<i>Underwoodisaurus seorsus</i>			X				
<b>Pygopodidae</b>	<b>Legless Lizards</b>						
<i>Delma butleri</i>							
<i>Delma elegans</i>			X	X	X		
<i>Delma haroldi</i>							
<i>Delma nasuta</i>			X	X	X	X	
<i>Delma pax</i>			X	X	X		
<i>Delma tincta</i>			X				

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<b>REPTILES</b>		<b>Status</b>	<b>DPaW</b>	<b>Coffey</b>	<i>ecologia</i>	<b>Biota</b>	<b>Ninox</b>
<i>Lialis burtonis</i>			X	X	X	X	
<i>Pygopus nigriceps</i>			X	X	X	X	
<b>Scincidae</b>	<b>Skinks</b>						
<i>Carlia munda</i>			X	X	X	X	
<i>Carlia triacantha</i>			X	X	X		
<i>Cryptoblepharus buchanani</i>			X			X	
<i>Cryptoblepharus plagiocephalus</i>			X				
<i>Cryptoblepharus ustulatus</i>			X		X		
<i>Ctenotus duricola</i>			X	X	X	X	
<i>Ctenotus grandis titan</i>			X	X	X	X	
<i>Ctenotus hanloni</i>			X			X	
<i>Ctenotus helenae</i>			X	X	X	X	
<i>Ctenotus leonhardii</i>				X	X		
<i>Ctenotus pantherinus ocellifer</i>			X	X	X	X	
<i>Ctenotus robustus</i>			X				
<i>Ctenotus rubicundus</i>			X				
<i>Ctenotus rutilans</i>				X	X		
<i>Ctenotus saxatilis</i>			X	X	X	X	X
<i>Ctenotus schomburgkii</i>			X				
<i>Ctenotus serventyi</i>			X				
<i>Ctenotus severus</i>							
<i>Ctenotus uber johnstonei</i>		P2	X				
<i>Ctenotus u. uber</i>							
<i>Cyclodomorphus m. melanops</i>			X	X	X		
<i>Egernia cygnitos</i>			X				
<i>Egernia formosa</i>			X	X	X		
<i>Egernia pilbarensis</i>					X		
<i>Eremiascincus fasciolatus</i>				X	X		
<i>Eremiascincus richardsonii</i>						X	
<i>Eremiascincus isolepis</i>			X				
<i>Lerista bipes</i>						X	
<i>Lerista clara</i>							
<i>Lerista flammicauda</i>			X				
<i>Lerisa jacksoni</i>			X				
<i>Lerista muelleri</i>			X		X	X	
<i>Lerista neander</i>							
<i>Lerista rolfei</i>							
<i>Lerista verhmens</i>			X	X	X		
<i>Lerista zietzi</i>			X	X	X		
<i>Menetia greyii</i>			X	X	X	X	
<i>Menetia s. surda</i>			X				
<i>Morethia ruficauda exquisita</i>			X	X	X	X	
<i>Notoscincus butleri</i>		3	X	X			
<i>Notoscincus ornatus</i>							
<i>Proablepharus reginae</i>			X	X	X		
<i>Tiliqua multifasciata</i>			X	X	X		
<b>Agamidae</b>	<b>Dragon Lizards</b>						
<i>Amphibolurus longirostris</i>			X	X	X	X	X
<i>Ctenophorus c. caudicinctus</i>			X	X	X	X	X
<i>Ctenophorus i. isolepis</i>			X	X	X	X	X

**Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment**

<b>REPTILES</b>		<b>Status</b>	<b>DPaW</b>	<b>Coffey</b>	<b>ecologia</b>	<b>Biota</b>	<b>Ninox</b>
<i>Ctenophorus nuchalis</i>			X			X	X
<i>Ctenophorus reticulatus</i>			X				
<i>Ctenophorus scutulatus</i>							
<i>Diporiphora amphiboluroides</i>							
<i>Diporiphora valens</i>							
<i>Pogona minor</i>			X	X	X		
<i>Tympanocryptis cephalus</i>			X				X
<b>Varanidae</b>	<b>Goannas, Monitors</b>						
<i>Varanus acanthurus</i>			X	X	X		
<i>Varanus brevicauda</i>			X	X	X		
<i>Varanus bushi</i>			X	X	X		
<i>Varanus caudolineatus</i>							
<i>Varanus eremius</i>			X	X	X	X	
<i>Varanus giganteus</i>					X		
<i>Varanus gouldii</i>			X				
<i>Varanus panoptes rubidus</i>			X	X	X		X
<i>Varanus pilbarensis</i>					X		
<i>Varanus t. tristis</i>			X	X	X		
<b>Typhlopidae</b>	<b>Blind Snakes</b>						
<i>Ramphotyphlops ammodytes</i>			X	X	X		
<i>Ramphotyphlops ganei</i>		3	X		X		
<i>Ramphotyphlops grypus</i>			X	X	X		
<i>Ramphotyphlops hamatus</i>			X				
<i>Ramphotyphlops pilbarensis</i>			X	X	X		
<b>Boidae</b>	<b>Pythons</b>						
<i>Antaresia perthensis</i>			X		X		
<i>Antaresia s. stimsoni</i>			X	X	X		
<i>Aspidites melanocephalus</i>			X		X	X	
<i>Aspidites ramsayi</i>		2					
<i>Liasis olivaceus barroni</i>		1, 2	X		X		
<b>Elapidae</b>	<b>Front-Fanged Snakes</b>						
<i>Acanthophis wellsi</i>			X		X	X	
<i>Brachyuropis approximans</i>			X	X	X		
<i>Demansia psammophis cupreiceps</i>			X	X		X	
<i>Demansia rufescens</i>			X	X	X		
<i>Furina ornata</i>			X	X	X	X	
<i>Parasuta monachus</i>			X	X	X		
<i>Pseudechis australis</i>			X	X	X		
<i>Pseudonaja mengdeni</i>			X	X	X		
<i>Pseudonaja modesta</i>			X	X	X		
<i>Simoselaps anomalus</i>							
<i>Simoselaps bertholdi</i>							
<i>Suta fasciata</i>			X	X	X		
<i>Suta punctata</i>			X			X	
<i>Vermicella snelli</i>			X		X		
	<b>Number of Species (119)</b>		<b>92</b>	<b>58</b>	<b>73</b>	<b>32</b>	<b>8</b>

*Fortescue River Gas Pipeline – Level 1 Vertebrate Fauna Assessment*

**Appendix 8** *List of introduced species recorded or expected to occur within the proposed Solomon Hub to CS 1 Gas Pipeline route.*

**Key**

- DPaW - DPaW's NatureMap  
 Coffey - Coffey Environment (2008)  
 ecologia - *ecologia* Environment (2010)  
 Biota - Biota Environmental Sciences (2005)  
 Ninox - Recorded during the Level 1 field assessment

INTRODUCED MAMMALS		DPaW	Coffey	ecologia	Biota	Ninox
<b>Muridae</b>						
<i>Mus musculus</i>	House Mouse	X	X	X	X	
<b>Canidae</b>						
<i>Canis familiaris</i>	Wild/Domestic Dog					
<i>Vulpes vulpes</i>	Fox					
<b>Felidae</b>						
<i>Felis catus</i>	Cat	X	X	X	X	X
<b>Equidae</b>						
<i>Equus asinus</i>	Donkey					
<i>Equus caballus</i>	Brumby					X
<b>Bovidae</b>						
<i>Bos taurus</i>	European Cattle	X		X		X
<i>Capra hircus</i>	Goat					
<b>Camelidae</b>						
<i>Camelus dromedarius</i>	One-humped Camel	X				
Leporidae						
<i>Oryctolagus cuniculus</i>	Rabbit					
	<b>Number of Species (10)</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>