

**A LEVEL 1 VERTEBRATE FAUNA ASSESSMENT
OF THE
PROPOSED TUBRIDGI TO WHEATSTONE GAS PIPELINE,
WESTERN AUSTRALIA**

Prepared for Matiske Consulting Pty Ltd

By Ninox Wildlife Consulting



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1 EXECUTIVE SUMMARY

This document describes a vertebrate fauna assessment of the proposed CS 2 to Tubridgi gas pipeline route and a proposed camp location (together hereafter called the Survey Area) in the vicinity of Onslow in the Pilbara Region of Western Australia. The Survey Area falls within extreme north-eastern limit of the Carnarvon Bioregion (CAR), close to the boundary of the Pilbara Bioregion (PIL)

The study objectives were fulfilled by means of a detailed literature review of both published and unpublished data, and searches of the vertebrate fauna databases held by various authorities. This was followed by a Level 1 Reconnaissance Survey by two experienced personnel in April 2013 which was conducted in order to assess the potential of the various habitats to support the fauna species resulting from the data and literature review. All active fauna was identified and searches for inactive fauna, and signs such as scats and tracks was undertaken. The length of the route was approximately 110 km and an area approximately 200 m either side of a centreline was assessed.

The 30 plant communities have been grouped into 12 major fauna habitats that range from tidal zones, through sand dunes, clayey plains, cracking clay grasslands, shrublands and riparian zones. 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 144 species of bird (excluding shorebirds and migratory wading birds) could occur in the general area. Based on the habitats present within the proposed gas pipeline route and camp site, 132 of these could be present either as resident, nomadic or migratory species. Eleven of these species of bird have a strong preference for mangrove habitat in the Pilbara region and are unlikely to be found elsewhere. Fifty-four species of bird were recorded during the field assessment; 19 of these were only observed in riverine habitat, particularly at the Ashburton River crossing where water was present. The presence of large trees at this location provided a rich source of feeding and roosting areas. The presence of shorebirds, and particularly migratory wading species, would be ephemeral and dependent on cyclonic activity in early summer flooding the large numbers of claypans in the vicinity of the proposed pipeline route. These were dry at the time of the survey.

Up to 22 species, or 48% of the original mammal fauna, have become extinct in the Carnarvon Basin area and this includes a large number of medium-sized marsupials, some of which are now only found on offshore islands. However, of the remaining species known from this sub-region, 33 species could be expected to occur in the habitats of the current Survey Area. Typically for a Level 1 assessment, only three species of native mammal were noted during the field assessment.

As conditions were dry at the time of the field assessment, no frogs were recorded although seven species could be present in the Survey Area. However, up to 116 reptiles could be present in the habitats of the Survey Area with 17 species that will be restricted to mangroves and nearby coastal zones. In addition to the mangrove-inhabiting snakes, there is one record of the Salt-water Crocodile (*Crocodylus porosus*) from 2008 just south-west of Onslow. Twelve species of reptile were recorded during the field assessment. Intensive systematic sampling over a number of seasons and years are required to more fully document the actual occurrence of many species of reptile.

Of the eight species of introduced species that are known to occur in the general area, three were identified during the field assessment. While the introduced carnivores have a major impact on native animals, the herbivores have a much greater and wider impact on the habitats that support the native animals from grazing, increasing the spread of weeds, and soil compaction and modification.

Twenty-seven birds, three native mammals and one reptile which are protected under the *EPBC Act* could potentially occur within the survey area. One bird listed under the *WC Act* could occur, as could three birds and three native mammals that are shown on DEC's Priority Fauna list. Not all are likely to be present but three of the bird species were recorded during the field assessment. The majority of the

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birds are migratory species that will only be present along coastal mudflats and sandy shorelines, inland lakes, both fresh and saline. Other habitats such as estuaries and mangroves may also be utilised by some of these bird species.

With the exception of mangroves, the majority of fauna habitats are widespread in the area. However, some areas, while not differentiated in the plant community descriptions support specific habitat elements that are of importance to some vertebrate fauna species. For example, large termite mounds are present in some areas and these support a number of vertebrates such as the small gecko *Gehyra pilbara* that are unlikely to be found elsewhere. In addition, areas of cracking clay soils will support a wide range of species that use the cracks as shelter during the dry season, including small carnivorous marsupials such as planigales and dunnarts.

The proposed pipeline route traverses a wide range of fauna habitats and, as a result, the number of species that could be present is high. While large areas within the Survey Area have been severely degraded by cattle and weed infestation, there are areas of habitat that are in extremely good condition, mainly in the red sand with a covering of spinifex (*Triodia* species) with emergent eucalypts.

2 INTRODUCTION

This document has been prepared for Mattiske Consulting Pty Ltd (MCPL) on behalf of DBP by Ninox Wildlife Consulting (Ninox). It describes a vertebrate fauna assessment of the proposed CS 2 - Tubridgi gas pipeline route and a proposed camp location (together hereafter called the Survey Area). During the course of this study, the area from Tubridgi to the coast (Wheatstone) was added to the survey area and this included habitats such as tidal mudflats and mangroves, habitats that were not present in the original study area.

For much of the length of the proposed gas pipeline from CS 2 - Tubridgi to Wheatstone (approximately 110 kilometres) this new route will be located adjacent to an existing underground gas pipeline and associated access track. For a more complete description of the project see Mattiske Consulting Pty Ltd (2013).

3 STUDY OBJECTIVES

This study is based on two phases: Phase 1 ó a literature and data review; and Phase 2 ó 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 Survey Area; and
- review species considered to be rare, threatened, vulnerable or geographically restricted that could be present in the Survey Area.

Phase 2.

A field assessment was undertaken to provide more detailed information on vertebrate fauna species and their habitats within the Survey 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 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 Survey 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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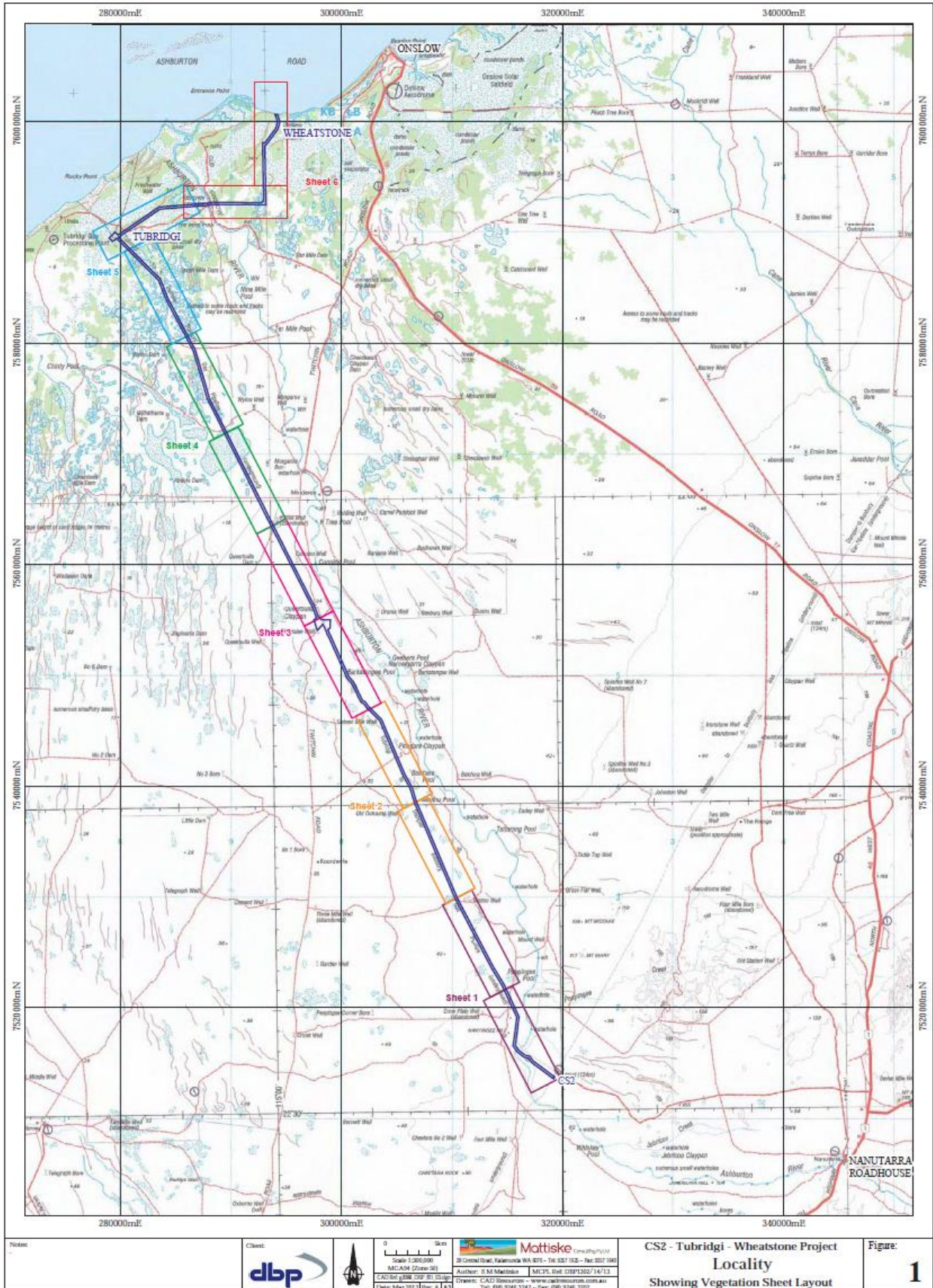


Figure 1 Location of the CS 2 to Tubridgi Gas Pipeline. (Figure extracted from Mattiske Consulting Pty Ltd 2013).

4 NOMENCLATURE, TAXONOMY AND DISTRIBUTION PATTERNS

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

- Birds:** Barrett *et al.* (2003); Johnstone & Storr (1998, 2004); Morcombe (2003).
Mammals: Van Dyck & Strahan (2008); **Bats:** Churchill (2008)
Amphibians: Tyler and Doughty (2009).
Reptiles: Wilson & Swann (2010).

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

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 Environment and Conservation (DEC). The results of the data and literature search provided the basis for a list of vertebrate fauna that could potentially occur within the Survey Area. From this list the rare, threatened and vulnerable species were identified and any additional species of special conservation interest highlighted.

A comprehensive survey of the vertebrate fauna of the general area surrounding the proposed gas pipeline was undertaken by Biota Environmental Services (Biota) in April 2009. This survey consisted of intensive sampling for birds, mammals, frogs and reptiles within 16 sampling sites that were situated in seven habitat types (Biota 2010). Where relevant, the results of this survey have been used within this Level 1 assessment report. Other surveys in the general area consisted of Yannarie and Onslow salt field surveys (Biota 2005a and b).

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 3rd and 7th April 2013 within the area as shown on Figure 1. The field work was conducted in conjunction with the botanical team to allow for accurate identification of plant communities along the route. The area assessed was approximately 200 metres either side of a centreline along the 110 km route. This provided a buffer should there be minor deviations from the proposed alignment.

All 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 all personnel. The information recorded included details such as the habitat utilised. 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. Hand foraging for inactive and/or cryptic species was undertaken by all personnel. Driving along the existing pipeline is not allowed at night, therefore, in order to record nocturnal fauna, foot transects using head-torches were conducted on two nights (10 person hours) in habitats similar to those present along the route but in the vicinity of Onslow.

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.

5.1 Study Team

The vertebrate fauna assessment was supervised by Ninox Principal Jan Henry who, since 1973, has worked extensively throughout Western Australia. The Level 1 Reconnaissance Survey was carried out by Maureen Francesconi and Greg Harold, who have assisted Ninox in many surveys between 1984 and 2012 and who have wide experience throughout Western Australia. All personnel involved in this assessment have had field experience in the Pilbara Region and are familiar with the majority of habitats present in the current Survey Area.

| | |
|--|--|
| 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. |

5.2 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 | Access to all habitat types was unconstrained. 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 DEC NatureMap database and the Atlas of Living Australia. Detailed information was available from surveys conducted within the general area. |
| 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. |

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| Possible Limitations | Constraints (Yes/No): Significant, Moderate or Negligible | Comment |
|---|---|--|
| Timing/weather/season/cycle | Negligible | Conditions during the field work were suitable for opportunistic sampling of many vertebrate groups, although most migratory birds were not present and reptile activity in autumn is not optimal. |
| Completeness (e.g. Was relevant area fully surveyed?) | No Constraint | 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. |
| Remoteness and/or access problems | No Constraint | Tracks provided excellent access to all fauna habitats within the survey area. |
| 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 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. |
| 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 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 CS 2 to Tubridgi Gas Pipeline Study Area falls within extreme north-eastern limit of the Carnarvon Bioregion (CAR). The location of the survey area is close to the boundary between this Bioregion and the Pilbara Bioregion (PIL) and it is likely that there is some overlap of the faunal distribution patterns of a large number of vertebrate fauna species.

Kendrick and Mau (2002) state that the Carnarvon Bioregion is a mosaic of saline alluvial plains with samphire and saltbush low shrublands, Bowgada low woodland on sandy ridges and plains, snakewood scrubs on clay flats, and tree to shrub steppe over hummock grasslands on and between red sand dune fields. Limestone strata with *Acacia stuartii* and *A. bivenosa* shrublands outcrop in the north, where extensive tidal flats in sheltered embayments support extensive mangroves. The climate is arid, semi-desert to sub-tropical with variable summer and winter rainfall. Cyclonic systems may affect the coast and hinterland annually. The bioregion contains two subregions, Cape Range and Wooramel; the proposed gas pipeline route and campsite lie within the Cape Range sub-region. Kendrick and Mau (2002) describe this sub-region as:

–Cape Range and Giralia dunefields form the northern part of Carnarvon Basin. Rugged tertiary limestoneranges and extensive areas of red aeolian dunefield, Quaternary coastal beach dunes and mud flats. Acacia shrublands over *Triodia* on limestone (*Acacia stuartii* or *A. bivenosa*) and red dunefields, *Triodia* hummock grasslands with sparse *Eucalyptus* trees and shrubs on the Cape Range. Extensive hummock grasslands (*Triodia*) on the Cape Range and eastern dune-fields. Tidal mudflats of sheltered embayments of Exmouth Gulf support extensive mangroves. Beach dunes with *Spinifex* communities. An extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf.

7 SITE 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 large range of vertebrate fauna species.

MCPL (this document) describes 30 plant communities within the proposed gas pipeline route and camp site. In Table 2, these have been summarised and grouped into 13 major fauna habitats that range from tidal zones, through sand dunes, clayey plains, cracking clay grasslands, shrublands and riparian zones. 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. For example, a large number of waterfowl could be present in the claypans (Fauna habitat 2) following cyclonic rainfall but they will be absent when these areas are dry.

Table 2 Plant Communities and corresponding fauna habitats in the Survey Area.

| Vegetation Codes and Descriptions | | Fauna Habitats |
|--|--|----------------|
| Tidal Mudflats/Creeks & Mangroves | | |
| T2 | <i>Avicennia marina</i> mid open scrubland (B). | 1 |
| T1 | <i>Tecticornia</i> spp. low scattered shrubs (B). | 1 |
| Seasonally inundated inland wetlands | | |
| C1 | Bare Claypan. | 2 |
| Chenopod Shrublands | | |
| C2 | <i>Tecticornia</i> spp. low sparse chenopod shrubland with <i>Sporobolus mitchellii</i> , <i>Eriachne helmsii</i> low isolated tussock grasses. | 3 |
| C4 | <i>Tecticornia</i> spp. low shrubland (B). | 3 |
| Acacia over spinifex & buffel on sand | | |
| CD1 | <i>Acacia coriacea</i> subsp. <i>coriacea</i> tall shrubland over <i>Crotalaria cunninghamii</i> , <i>Trichodesma zeylanicum</i> var. <i>grandiflorum</i> mid open shrubland over <i>Triodia epactia</i> mid open hummock grassland with * <i>Cenchrus ciliaris</i> low open tussock grassland (B). | 4 |
| ID2 | <i>Acacia stellaticeps</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> mid sparse shrubland with <i>Bonamia erecta</i> , <i>Hibiscus brachychlaenus</i> , <i>Scaevola sericophylla</i> low sparse shrubland over <i>Triodia epactia</i> mid hummock grassland with * <i>Cenchrus ciliaris</i> , <i>Eragrostis eriopoda</i> low sparse tussock grassland. | 4 |
| Acacia over spinifex on clay | | |
| CP3 | <i>Acacia tetragonophylla</i> low scattered shrubs over <i>Triodia epactia</i> low hummock grassland with * <i>Cenchrus ciliaris</i> low open tussock grassland (B). | 5 |
| CP4 | * <i>Prosopis pallida</i> , <i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i> tall scattered shrubs over <i>Triodia epactia</i> mid sparse hummock grassland with * <i>Cenchrus ciliaris</i> low open tussock grassland (B). | 5 |
| Acacia over grasses on clay | | |
| C3 | <i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i> , * <i>Vachellia farnesiana</i> mid isolated shrubs over <i>Urochloa occidentalis</i> var. <i>occidentalis</i> , <i>Chrysopogon fallax</i> , <i>Sporobolus mitchellii</i> , * <i>Cenchrus ciliaris</i> low open tussock grasses. | 6 |
| IP4 | <i>Acacia xiphophylla</i> , <i>Acacia synchronicia</i> low open shrubland over <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Solanum lasiophyllum</i> low sparse shrubland over <i>Eragrostis xerophila</i> , * <i>Cenchrus ciliaris</i> low sparse tussock grassland. | 6 |
| IP5 | <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> low sparse shrubland over <i>Chrysopogon fallax</i> , <i>Eriachne helmsii</i> , <i>Urochloa occidentalis</i> var. <i>occidentalis</i> low open tussock grassland. | 6 |
| IP6 | <i>Acacia synchronicia</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Acacia xiphophylla</i> low sparse shrubland over <i>Eragrostis eriopoda</i> , <i>Eriachne aristidea</i> , * <i>Cenchrus ciliaris</i> low open tussock grassland. | 6 |
| IF2 | <i>Acacia xiphophylla</i> , <i>Acacia synchronicia</i> mid open shrubland over <i>Salsola australis</i> , <i>Rhagodia eremaea</i> , <i>Maireana</i> spp. mid sparse chenopod shrubland over <i>Eriachne benthamii</i> , <i>Sporobolus australasicus</i> , * <i>Cenchrus ciliaris</i> low open tussock grassland. | 6 |

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| Vegetation Codes and Descriptions | | Fauna Habitats |
|--|---|----------------|
| IF3 | <i>Acacia synchronicia</i> , <i>Acacia xiphophylla</i> , <i>Acacia trachycarpa</i> low sparse shrubland over <i>Salsola australis</i> , <i>Threlkeldia diffusa</i> , <i>Rhagodia eremaea</i> mid sparse chenopod shrubland with <i>Chrysopogon fallax</i> , <i>Enteropogon ramosus</i> , * <i>Cenchrus ciliaris</i> low open tussock grassland. | 6 |
| Grasslands on clay | | |
| CP5 | <i>Sporobolus mitchellii</i> , <i>Eriachne</i> aff. <i>benthamii</i> , <i>Eriachne benthamii</i> , <i>Eulalia aurea</i> mid tussock grassland (B). | 7 |
| Shrubs over spinifex on sand | | |
| ID1 | <i>Grevillea stenobotrya</i> low sparse shrubland over <i>Acacia stellaticeps</i> mid open shrubland over <i>Triodia epactia</i> hummock grassland. | 8 |
| ID3 | <i>Grevillea stenobotrya</i> tall open shrubland over <i>Crotalaria cunninghamii</i> , <i>Trichodesma zeylanicum</i> var. <i>grandiflorum</i> mid open shrubland over <i>Triodia epactia</i> mid open hummock grassland (B). | 8 |
| Eucs & shrubs over grasses on clay | | |
| CP2 | <i>Eucalyptus victrix</i> low open woodland over <i>Abutilon oxycarpum</i> , <i>Ipomoea muelleri</i> , <i>Panicum decompositum</i> mid sparse forbland over <i>Enteropogon ramosus</i> , <i>Eriachne helmsii</i> , <i>Sporobolus mitchellii</i> low open tussock grassland. | 9 |
| IP7 | <i>Eucalyptus victrix</i> low open woodland over <i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i> , <i>Cullen leucanthum</i> mid sparse shrubland over <i>Eriachne helmsii</i> , <i>Eulalia aurea</i> , * <i>Cenchrus ciliaris</i> low sparse tussock grassland. | 9 |
| Eucs & shrubs over spinifex & buffel on clay | | |
| CP1 | <i>Eucalyptus victrix</i> low open woodland over <i>Acacia tetragonophylla</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Scaevola spinescens</i> tall sparse shrubland over <i>Triodia epactia</i> mid open hummock grassland with <i>Sporobolus mitchellii</i> , <i>Chrysopogon fallax</i> , * <i>Cenchrus ciliaris</i> low sparse tussock grassland. | 10 |
| IP1 | <i>Eucalyptus victrix</i> low scattered trees over <i>Acacia synchronicia</i> , <i>Acacia xiphophylla</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> tall open shrubland over <i>Triodia lanigera</i> mid hummock grassland with * <i>Cenchrus ciliaris</i> low sparse tussock grassland. | 10 |
| IP2 | <i>Eucalyptus victrix</i> low isolated trees over <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Acacia xiphophylla</i> tall sparse shrubland with <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Scaevola spinescens</i> low sparse shrubland over <i>Triodia epactia</i> mid hummock grassland with <i>Eriachne helmsii</i> , * <i>Cenchrus ciliaris</i> low open tussock grassland. | 10 |
| IP3 | <i>Eucalyptus victrix</i> , <i>Grevillea striata</i> low isolated trees over <i>Hakea chordophylla</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Acacia trachycarpa</i> tall open shrubland with <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> low sparse shrubland over <i>Triodia epactia</i> mid isolated hummock grasses with * <i>Cenchrus ciliaris</i> low sparse tussock grassland. | 10 |
| IP8 | <i>Eucalyptus victrix</i> low isolated trees over <i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i> tall isolated shrubs with <i>Acacia stellaticeps</i> , <i>Acacia coriacea</i> subsp. <i>coriacea</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> low sparse shrubland over <i>Triodia epactia</i> mid hummock grassland with <i>Eulalia aurea</i> , <i>Eragrostis eriopoda</i> , * <i>Cenchrus ciliaris</i> low sparse tussock grassland. | 10 |
| IF1 | <i>Eucalyptus victrix</i> low open woodland over <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Scaevola spinescens</i> tall sparse shrubland with <i>Rhynchosia minima</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Eremophila longifolia</i> mid sparse shrubland over <i>Triodia epactia</i> low isolated hummock grasses with <i>Eriachne helmsii</i> , <i>Chrysopogon fallax</i> , <i>Urochloa occidentalis</i> var. <i>occidentalis</i> low sparse tussock grassland. | 10 |
| Eucs over shrubs & grasses on clay | | |
| IF4 | <i>Eucalyptus victrix</i> low open woodland over <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Scaevola spinescens</i> tall sparse shrubland over <i>Sporobolus mitchellii</i> , <i>Eriachne helmsii</i> , <i>Eulalia aurea</i> low open tussock grassland. | 11 |
| IF5 | <i>Eucalyptus victrix</i> low open woodland over <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> mid sparse shrubland over <i>Panicum decompositum</i> , <i>Rhynchosia minima</i> , <i>Neptunia dimorphantha</i> mid sparse forbland with <i>Eriachne helmsii</i> , <i>Eragrostis xerophila</i> , <i>Iseilema membranaceum</i> low open tussock grassland. | 11 |
| Riparian Zones on clay | | |
| R1 | <i>Eucalyptus victrix</i> , * <i>Parkinsonia aculeata</i> low woodland over <i>Acacia tetragonophylla</i> , <i>Acacia coriacea</i> subsp. <i>coriacea</i> tall open shrubland over <i>Eulalia aurea</i> , <i>Leptochloa digitata</i> low tussock grassland. | 12 |
| Riparian Zones on sandy clay | | |
| R2 | <i>Eucalyptus victrix</i> , <i>Eucalyptus camaldulensis</i> low woodland over <i>Scaevola spinescens</i> , <i>Acacia coriacea</i> subsp. <i>coriacea</i> , <i>Melaleuca glomerata</i> mid sparse shrubland over <i>Ipomoea muelleri</i> , <i>Euphorbia boophthona</i> , * <i>Portulaca oleracea</i> low sparse forbland with * <i>Cenchrus ciliaris</i> low sparse tussock grassland. | 13 |
| Note: (B) Denotes vegetation communities defined and described by Biota (2010). * Denotes weed species. | | |

8 RESULTS

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

8.1 Bird Species

8.1.1 Data and Literature Review Results

The data and literature review showed that up to 144 species of bird (excluding shorebirds and migratory wading birds) could occur in the general area. Based on the habitats present within the CS 2 to Tubridgi section of the route and camp site, 132 of these could be present either as resident, nomadic or migratory species.

Shorebirds, and particularly migratory wading species, are discussed separately in this document as their presence along the proposed pipeline route and within the camp site would be ephemeral; it would be dependent on cyclonic activity in early summer flooding the large numbers of claypans, particularly in the vicinity of the proposed pipeline route (see Section 8.2). However, there are a number of bird species associated with river pools and their sandy shorelines that are discussed in this section of the report. There are also a large number of migratory wading and shorebirds associated with coastal mudflats and tidal areas and these are also discussed in Section 8.2.

During their 2009 survey Biota Environmental Services (Biota) recorded 62 species of bird (Biota 2010); this does not include the separate survey conducted by Bamford Consulting Ecologists (BCE) which specifically targeted wading and shorebirds in the more coastal sections of the Wheatstone project area. Some of the species recorded by Biota (2010), while listed on Appendix 2, are unlikely to be present in the habitats along the current study area and these are excluded from the list of species predicted to occur there; this includes species restricted to mangrove and other coastal habitats. However, the 2009 survey showed that the highest diversity of bird species was found in the inland dune system which had 50% of the species recorded, partly as a result of sampling intensity but mainly because of the structural diversity and number of flowering plants.

The combined results of Biota's studies of Yannarie and Onslow salt field surveys (Biota 2005a and b) showed a total of 37 species of bird recorded (Appendix 2) which is substantially less than the Wheatstone Project Area and is most likely in response to the optimal timing of this 2009 survey (Biota 2010) when 60 species were recorded.

The search of DEC's NatureMap revealed a total of 84 species that could potentially occur in the current Study Area (not counting wetland birds), with 48 of these being recorded by Biota in the Wheatstone Project Area (Appendices 1 and 2).

8.1.2 Field Results

Fifty-four species of bird were recorded during the field assessment; 19 of these were only observed in riverine habitat, particularly at the Ashburton River crossing where water was present. This small range of wetland species are discussed in 8.2.2. Appendix 2 lists all of the species recorded in this brief but intense survey, along with those that could potentially occur along the proposed pipeline route. Fifteen species recorded in this Level 1 Reconnaissance Survey were not listed in the results of the DEC NatureMap results (Appendix 2). Eighteen species of land bird were mainly recorded in the riverine habitat where large trees were present. This included four species of birds of prey, five species of cockatoo and parrot, the Sacred Kingfisher, Rainbow Bee-eater and White-plumed Honeyeater. While some of these species were observed in a variety of other habitats, the presence of the large trees at this location provided a rich source of feeding and roosting areas.

Of the 21 species of bird of prey that could be present, 10 were observed during the field assessment, and five of the six species of cockatoo and parrot listed on Appendix 2 were also recorded. No other group of species was as well represented as these two. For example, only four of the predicted 11 species of honeyeater and chats were recorded. Of particular interest was the recording of the Black Falcon (*Falco subniger*), a species rarely seen; only 78 records are shown on DEC's NatureMap for the State with one of these being a record from Onslow in 2007. This record is shown on Appendix 2 in the WAM 2009 column as discussed in Biota (2010). However, while infrequently observed, this bird of prey is not considered of particular conservation significance.

Three bird species of conservation significance were observed and these are discussed in detail in Section 9.

8.2 Wetland Birds

8.2.1 Data and Literature Review

This group of bird species has been discussed separately due to the ephemeral nature of their potential presence within the current Survey Area. Wetland habitats within the Survey Area consist mainly of claypans of various sizes and, while similar claypans were investigated by Biota in 2009, they were sampled for invertebrates only (Timms 2010). Other wetland habitats included in the habitats of the proposed pipeline route include the Ashburton River crossing where some species listed on Appendix 2 will congregate when other surface water habitats are dry. This includes species such as ducks, herons, terns and some of the dotterel and plover species. The greatest number of species of wading and shorebird species that could be present are most likely to occur during the southern hemisphere summer; they may be observed in the tidal mudflat habitat where they will feed on a wide range of invertebrates. The majority of these birds are protected under international agreements and have been discussed as a group rather than as individual species in Section 9.6.

Waterbirds were specifically sampled during investigations for the Wheatstone Project in November 2008 and March 2009 (BCE 2010). The majority of sampling sites were coastal, including mangroves and salt marshes. Inland claypans were visited by BCE in November 2008 but most were dry; in March 2009, inland wetlands were extensive following rain and difficult to access from the ground (BCE 2010) although aerial surveys were conducted.

BCE (2010) states that the freshwater marshes were dry in November 2008; however, following significant rainfall, by March 2009 they had become locally and possibly regionally significant in the region when large numbers of birds were observed. Twenty-four species of migratory waterbird and shorebird species were recorded by BCE in 2009 in the various wetland habitats of the Wheatstone project Area (BCE 2010), including these inland claypans, tidal mudflats, beaches and river pools.

8.2.2 Field Results

As the claypans that are located along the proposed pipeline route were dry at the time of the Level 1 Reconnaissance Survey, no wetland birds were recorded in this habitat. However, 19 species were observed in the riverine habitat, especially where pools of fresh water were present at the Ashburton River crossing. This included, but was not limited to, three species of duck, four species of heron and egret, the Australian Pelican, three species of tern and the Silver Gull.

8.2.3 Bird Species of Conservation Significance

The following bird species of conservation significance have been recorded or could potentially occur within the Survey Area.

- *Ardea modesta* Eastern Great Egret - Recorded
- *Merops ornatus* Rainbow Bee-eater - Recorded
- *Ardeotis australis* Australian Bustard - Recorded
- *Apus pacificus* Fork-tailed Swift
- *Hirundo rustica* Barn Swallow
- *Glareola maldivarum* Oriental Pratincole
- *Charadrius veredus* Oriental Plover (Dotterel)
- *Ardea ibis* Cattle Egret
- *Haliaeetus leucogaster* White-bellied Sea-eagle
- 19 species of migratory wading and shorebirds
- *Falco peregrinus* Peregrine Falcon
- *Burhinus grallarius* Bush Stone-curlew
- *Phaps histrionic* Flock Bronzewing

These birds are discussed in detail in Section 9.6.1 which provides notes on distribution, ecology, habitat preferences and the likelihood of their occurrence within the survey area.

8.3 Native Mammal Species

8.3.1 Data and Literature Review Results

McKenzie *et al.* (2000) state that a possible 22 species, or 48% of the original mammal fauna, have become extinct in the Carnarvon Basin area and this includes a large number of medium-sized marsupials, some of which are now only found on offshore islands. However, of the remaining species known from this sub-region, 33 species could be expected to occur in the habitats of the current Survey Area. Of these, nine non-volant native mammals and five bat species were recorded by Biota (Appendix 3) during the survey of the total Wheatstone project area. Sixteen species resulted from the search of DEC's NatureMap (Appendix 1).

The native mammals that could be present consist of one monotreme, eight small carnivorous marsupial, two large kangaroos, 16 species of bat, five native rodents and one large placental carnivore. All of these are listed in Appendix 3. Six native mammal species of conservation significance are listed in Appendix 3 and these are discussed in detail in Section 9.

8.3.2 Field Results

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. Therefore, typically for this level of assessment, very few native mammals were recorded during the field survey; the Echidna (*Tachyglossus aculeatus*) was noted by the presence of distinctive scats, Euros (*Macropus robustus*) and Red Kangaroos (*Macropus rufus*) were observed active. While scats of dog/dingo were noted, it was not possible to determine which of these two were present, or whether hybrids are present in the vicinity of Onslow.

8.3.3 Native Mammal Species of Conservation Significance

The following native mammal species of conservation significance could potentially occur within the Survey Area.

- *Dasyurus hallucatus* Northern Quoll
- *Macrotis lagotis* Greater Bilby
- *Rhinonictoris aurantia* Pilbara Leaf-nosed Bat (unnamed Pilbara form)
- *Pseudomys chapmani* Western Pebble-mound Mouse
- *Leggadina lakedownensis* Lakeland Downs Mouse

These mammals are discussed in detail in Section 9.6.2 which provides notes on distribution, ecology, habitat preferences and the likelihood of their occurrence within the survey area.

8.4 Amphibian Species

8.4.1 Data and Literature Review Results

Biota recorded four species of frog during their survey of the Wheatstone project area; one species (*Notoden nichollsi*) was particularly common in the dune systems following recent rainfall. Six species resulted from the search of DEC's NatureMap (Appendix 1). Appendix 4 lists the species recorded by Biota, along with other records from the general area. In total, seven species of frog could occur in the various habitats of the current Study Area.

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

8.4.2 Field Results

Due to the dry conditions experienced during the Level 1 Reconnaissance Survey, no frog species were recorded.

8.5 Reptile Species

8.5.1 Data and Literature Review Results

The Biota (2010) report shows that 49 species of reptile resulted from the 2009 survey of the total Wheatstone project area (Appendix 5). Sixty-seven species resulted from data search of the DEC's NatureMap for the general area (Appendices 1 and 5).

When additional literature sources were searched, a total of 99 species of reptile comprised of 19 geckos, six legless lizards, 34 skinks, 12 dragons, nine monitors, four blind snakes, four pythons and 11 elapid (venomous) snakes are known from the general area (Appendix 5). However, an additional 17 species of reptile could occur that will be restricted to mangroves and nearby coastal zones; these are denoted with (M) in Appendix 5.

While this is an extremely high number of reptiles that are known from the area, not all will be present along the proposed pipeline route due to either the lack of suitable habitat or the general patchiness of animal distributions through their preferred habitat.

Intensive systematic sampling over a number of seasons and years are required to more fully document the actual occurrence of many species of reptile, particularly those that are difficult to sample such as snakes, or those that are generally uncommon. However, given the range of habitats present along the proposed route, up to 96 species of reptile could be present (Appendix 5). None of these are of particular conservation significance, although the Pilbara Olive Python (*Liasis olivaceous barroni*) is listed as being present in the general area; however, there is no suitable habitat for this large snake.

8.5.2 Field Results

Twelve reptiles consisting of six geckos, four dragons, two monitors, were recorded during the Level 1 Reconnaissance Survey (Appendix 5). These were recorded by hand foraging and observation. All of the species recorded are common and widespread reptiles, with none of particular conservation significance.

This low number of species is typical for a survey relying on hand foraging and observations for recording of reptiles, particularly in autumn when many species become relatively inactive. However, it is not an indication of a lack of species diversity within the Survey Area and, as stated earlier, only intensive sampling over many years and various seasons would provide sufficient data to discuss the reptile assemblage of the Survey area.

8.5.3 Reptile Species of conservation Significance

The following reptile species of conservation significance could potentially occur within the Survey Area.

- *Liasis olivaceous barroni* Pilbara Olive Python
- *Crocodylus porosus* Salt-water Crocodile
- *Aspidites ramsayi* Woma

These reptiles are discussed in detail in Section 9.6.3 which provides notes on distribution, ecology, habitat preferences and the likelihood of their occurrence within the survey area.

8.6 Introduced Species

8.6.1 Data and Literature Review Results

Five introduced species resulted from the search of DEC's NatureMap (Appendix 1), and three were recorded by Biota in 2009 (Appendix 6). In total, eight species of introduced, feral or stock mammals are known to occur in the general area. These include one rodent, three carnivores and four 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 the native animals from grazing, increasing the spread of weeds, and soil compaction and modification.

8.6.2 Field Results

Three species of introduced animal were recorded during the field study; these included the scats of a dog (possible dog or dog/dingo hybrid), a cat was observed and signs of cattle were noted, particularly along the Ashburton River where the habitat is highly degraded from grazing and soil disturbance.

8.7 Habitats of Conservation Significance

Mangrove habitat is of particular importance as it forms the only closed canopy forest in the area and supports a range of species not found elsewhere.

Eleven species of bird have a strong preference for mangrove habitat in the Pilbara region (Johnstone 1990) and are unlikely to be found elsewhere. These species include but are not limited to the Mangrove Kingfisher (*Halcyon chloris*), Mangrove Robin (*Eopsaltria pulverulenta*), White-breasted Whistler (*Pachycephala lanioides*), Mangrove Golden Whistler (*Pachycephala melanura*) and Mangrove Grey Fantail (*Rhipidura phasiana*). Biota (2010) state that nine species of mangrove dependent bird species have been recorded in the Wheatstone project area over time, although only three of these were recorded during 2009.

Johnstone (1990) also states that:

“The Pilbara (region D) has in many places a greater diversity of mangal habitats than most of south-west Kimberley. This is due to the large number of rivers and a more dissected coast. On the other hand it is more arid than regions to the north, lacks some mangrove species, and to landward has no structurally similar habitats except for small *Acacia* thickets. Extensive *Rhizophora* forest occurs throughout the region south to Exmouth Gulf, which is the southern limit for the Mangrove Golden Whistler and Mangrove Robin, both of which depend on *Rhizophora*. Exmouth Gulf also supports the southernmost woodland of thick-trunked *Avicennia*, a habitat important for the Mangrove Kingfisher whose range also ends at the Gulf.”

One small bat the Mangrove Freetail Bat (*Mormopterus loriae cobourensis*) lives and feeds within mangroves although it may also forage for prey over adjacent habitats. This species is of conservation significance and is discussed in detail in Section 9.6. No other native mammal in the area is dependent upon this habitat.

There are a number of venomous snakes that inhabit mangroves, with two species being recorded in the vicinity of the Wheatstone area by Biota (2010 and 2005): the Mangrove Mud Snake (*Ephalophis grayea*) and the Black-ringed Mangrove Snake (*Hydrelaps darwiniensis*). There is also a relatively large number of sea snakes that may occur in turbid estuaries and inshore waters of northern Australia including the Pilbara coast. In total, 17 species of reptile could occur that will be restricted to mangroves and nearby coastal zones (Appendix 5).

In addition to the mangrove-inhabiting snakes, there is one record of the Salt-water Crocodile (*Crocodylus porosus*) from 2008 just south-west of Onslow. This animal is discussed in more detail in Section 9.6 as it is considered of both Federal and State conservation significance.

Some habitat elements, while not differentiated in the plant community descriptions and cannot be described as specific fauna habitats are of importance to a small number of vertebrate fauna species. For example, large termite mounds are present in some areas and support a number of vertebrates such as the small gecko *Gehyra pilbara* that are unlikely to be found elsewhere. In addition, areas of cracking clay soils have a wide range of species that use the cracks as shelter during the dry season, including small carnivorous marsupials such as planigales and dunnarts.

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).

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 DEC's Faunabase website (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 DEC'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 Recorded During the Survey

Information on the species discussed below has been extracted from a number of sources including Johnstone and Storr (1998 and 2004), Morcombe (2003), Nevill (2008) and includes anecdotal information from the highly experienced Ninnox team.

9.5.1 Rainbow Bee-eater (*Merops ornatus*)

| | |
|-----------------------------|---|
| <u>Status</u> | The Rainbow Bee-eater is listed under the <i>EPBC Act (1999)</i> on the Japan/Australia Migratory Bird Agreement. It is also listed on Schedule 3 of the <i>WC Act (1950)</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> | Recorded during the Level 1 Reconnaissance Survey at the Ashburton River crossing; also recorded by Biota in 2009 and listed in the results of the search of DEC's NatureMap (Appendices 2 and 1). |

9.5.2 Eastern Great (White) 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 (1999)</i> on the Japan/Australia and China/Australia Migratory Bird Agreements. It is also listed on Schedule 3 of the <i>WC Act (1950)</i> . |
| <u>Distribution</u> | Kimberley and wetter western half of Western Australia. Not listed on DEC's database for the area. |

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| | |
|-----------------------------|---|
| <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> | Recorded during the Level 1 Reconnaissance Survey at the Ashburton river crossing; there are no additional records from the literature and data searches. |

9.5.3 *Australian Bustard (Ardeotis australis)*

| | |
|-----------------------------|---|
| <u>Status</u> | The Australian Bustard is listed as P4 on DEC'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. It is highly nomadic. |
| <u>Ecology</u> | A highly nomadic species which may be seasonally abundant 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> | Three sets of tracks were noted during the Level 1 Reconnaissance Survey at: 307 108mE and 7 537 590mN; 283 257mE and 7 592 107mN; 285 300mE and 7 581 700mN. Also recorded by Biota in 2009 and listed in the results of the search of DEC's NatureMap (Appendix 2 and 1). |

9.6 Species of Conservation Significance Potentially Occurring in the Survey Area

The following species resulted from a search of DSEWPac's rare species database as potentially occurring in the CS 2 to Tubridgi gas pipeline area (Appendix 7). 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 is made following the criteria listed below:

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

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These categories are necessarily broad and the high mobility of many species of fauna, particularly migratory and nomadic birds, have required a combination of two or more categories.

Information on the species discussed below has been extracted from a number of sources including Johnstone and Storr (1998 and 2004), Morcombe (2003), Nevill (2008), Van Dyck and Strahan (2008), Churchill (2008), Wilson and Swann (2010) 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).

There are a number of migratory wading and shorebirds of conservation significance listed on the results of the data searches (DEC and DSEWPaC) that will not be present within the habitats along the proposed gas pipeline route or within the proposed camp location. These birds have not been discussed in this report.

9.6.1 Birds

9.6.1.1 Fork-tailed Swift (*Apus pacificus*)

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|-----------------------------|---|
| <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 (www.environment.gov.au). 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. |
| <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> | Seasonally High: recorded by Biota in 2009 and listed in the results of the search of DEC's NatureMap and DSEWPaC's Protected Matters Report (Appendices 2, 1 and 7). May be observed flying over all habitats within the survey area. |

9.6.1.2 Barn Swallow (*Hirundo rustica*)

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|---------------|---|
| <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> | 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 (Cramp 1988; Turner & Rose 1989) and northern Australia (Blakers <i>et al.</i> 1984). |
| <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> | Low to Moderate: while suitable habitat such as grasslands and open shrublands occurs within the Survey Area this species has not been recorded in the vicinity of Onslow. However, there is a possibility that the Barn Swallow could occur along the coastal sections of the Survey Area. |

9.6.1.3 Oriental Pratincole (*Glareola maldivarum*)

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| <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> | Moderate; has been recorded just north of Onslow in 1966. Listed in the results of the search of DEC's NatureMap (Appendix 1). Also listed as Migratory on DSEWPac's Protected Matters Report (Appendix 7). Suitable habitat within the Survey Area mainly consists of grasslands, river pools and clay pans. |

9.6.1.4 Oriental Plover (*Charadrius veredus*)

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|-----------------------------|---|
| <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 Preferences</u> | Prefers open plains, ploughed land, grassy sportfields, lawns, muddy or sandy wastes near inland swamps or tidal mudflats; often far from water. |
| <u>Potential Occurrence</u> | Moderate: observed in the vicinity of Onslow in 1983 although this record does not appear on the results of DEC's NatureMap search. Listed as Migratory on DSEWPac's Protected Matters Report (Appendix 7). Suitable habitat within the Survey Area includes tidal mudflats and inland claypans. |

9.6.1.5 Cattle Egret (*Ardea ibis*)

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| <u>Status</u> | The Cattle Egret is listed as Migratory under the <i>EPBC Act (1999)</i> on the Japan/Australia Migratory Bird Agreement (Appendix 7). It is also listed on Schedule 3 of the <i>WC Act (1950)</i> . |
| <u>Distribution</u> | Wetter northern portion of the Kimberley and south-western Western Australia. Not listed on DECø or Birds Australia databases for the area. |
| <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> | Unlikely: there is one record from 1952 of this species in the vicinity of the current Survey Area but this record is not listed on the results of the search of DECø NatureMap. No suitable habitat occurs within the Survey Area. |

9.6.1.6 White-bellied Sea-eagle (*Haliaeetus leucogaster*)

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| <u>Status</u> | Listed under the <i>EPBC Act (CAMBA)</i> , 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 ² . 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> | Moderate to High: recorded by Biota (2010); suitable habitat occurs along the sections of the Ashburton River where large river pools are present. Listed on the results of the search of DECø NatureMap (Appendix 1) and DSEWPACø Protected Matters Report (Appendix 7). |

9.6.1.7 Wading and Shorebirds

A relatively large number of wading and shorebirds could potentially be present in the tidal mudflat habitat within the study area. These are discussed below as a group rather than individual species as the majority have similar ecological and habitat requirements. Only two migratory wading or shorebirds were listed on the search of DSEWPACø database for the area (Appendix 7) but a greater number resulted from the search of DECø NatureMap (Appendix 1) and these are listed below.

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| | |
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| <u>Species</u> | Common Sandpiper (<i>Actitis hypoleucos</i>); Ruddy Turnstone (<i>Arenaria interpres</i>); Sharp-tailed Sandpiper (<i>Calidris acuminata</i>); Sanderling (<i>Calidris alba</i>); Red-necked Stint (<i>Calidris ruficollis</i>); Red Knot (<i>Calidris tenuirostris</i>); Greater Sand Plover (<i>Charadrius leschenaultia</i>); Lesser Sand Plover (<i>Charadrius mongolus</i>); Bar-tailed Godwit (<i>Limosa lapponica</i>); Eastern Curlew (<i>Numenius madagascariensis</i>); Whimbrel (<i>Numenius phaeopus</i>); Grey-tailed Tattler (<i>Tringa brevipes</i>); Wood Sandpiper (<i>Tringa glareola</i>); Common Greenshank (<i>Tringa nebularia</i>); Lesser-crested Tern (<i>Sterna bengalensis</i>); Caspian Tern (<i>Sterna caspia</i>); Roseate Tern (<i>Sterna dougallii</i>); Common Tern (<i>Sterna hirundo</i>); White-winged Black Tern (<i>Sterna leucoptera</i>). |
| <u>Status</u> | Listed on the <i>EPBC Act</i> on one or more of JAMBA/CAMBA/ROKAMBA; also listed on Schedule 3 of the <i>WC Act</i> . |
| <u>Distribution</u> | All of these birds are non-breeding summer visitors to the Australian coast. |
| <u>Ecology</u> | These species breed in the northern hemisphere summer, migrating to the southern hemisphere to feed. |
| <u>Habitat</u> <u>Preferences</u> | Mainly found along coastal mudflats and sandy shorelines; also known from inland lakes, both fresh and saline. Other habitats such as estuaries and mangroves may also be utilised by some species. |
| <u>Potential</u> <u>Occurrence</u> | High: all of these species were listed in the search of DEC's NatureMap for the area. Suitable habitat occurs in the coastal sections of the proposed pipeline route, mudflats and seasonally inundated claypans. |

9.6.1.8 Peregrine Falcon (*Falco peregrinus*)

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| <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</u> <u>Preferences</u> | Most frequently observed near cliffs along the coast and ranges of the interior; also along wooded watercourses and lakes. |
| <u>Potential</u> <u>Occurrence</u> | High: a large number of observations in the vicinity of the current Survey Area; listed in the results of the search of DEC's NatureMap (Appendix 1). The most suitable habitat for this species occurs along the river systems where its prey species are most likely to be present. |

9.6.1.9 Bush Stone-curlew (*Burhinus grallarius*)

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|---------------------|---|
| <u>Status</u> | The Bush Stone-curlew is listed as P4 on DEC'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. |

| | |
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| <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> | Moderate: listed in the results of the search of DEC's NatureMap (Appendix 1) and suitable habitat is present within the Survey Area where open shrublands are present. |

9.6.1.10 Flock Bronzewing (*Phaps histrionica*)

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| <u>Status</u> | The Flock Bronzewing is listed as P4 on DEC'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> | Low to Moderate: listed in the results of the search of DEC's NatureMap (Appendix 1). One record from 2008 in the vicinity of Onslow. The grasslands within the Survey Area could provide suitable habitat. |

9.6.2 Native Mammals

9.6.2.1 Northern Quoll (*Dasyurus hallucatus*)

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|---------------------|---|
| <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).

Habitat Preferences 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 Environmental Services 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. This includes:

- Basalt hills;
- Plateaux;
- Rocky gullies and gorges, particularly in proximity to water.

Potential Occurrence **Unlikely:** while not recorded during Biota's survey of the Wheatstone project Area, there are two records from the vicinity of Onslow on DEC's NatureMap (Appendix 1) and the Protected Matters Report (Appendix 7) also lists this species. However, there does not appear to be any suitable habitat within the current Study Area.

9.6.2.2 Greater Bilby (*Macrotis lagotis*)

Status The Greater Bilby is listed as Vulnerable under the *EPBC Act* and Vulnerable (Schedule 1) under the *WC Act*.

Distribution 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).

Ecology 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 **Unlikely:** while listed on the Protected Matters Report (Appendix 7), there are no records of this species in the general area and little suitable habitat is present.

9.6.2.3 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:** while listed on the Protected Matters Report (Appendix 7), no suitable roosting sites were apparent within the current Survey Area; there are no records of this species in the general area.

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9.6.2.4 Little North-western Mastiff Bat (*Mormopterus loriae cobourgiana*)

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| <u>Status</u> | The Little North-western Mastiff Bat is listed as P1 on DEC's Priority Fauna listing. Considered a full species (Mangrove Freetail Bat <i>Mormopterus cobourgiana</i>) by Churchill (2008). |
| <u>Distribution</u> | In Western Australia, this species is found in coastal areas between Broome to Exmouth Gulf. |
| <u>Ecology</u> | These bat are known to roost in small spouts and crevices in the dead upper branches of mangroves, particularly <i>Avicenna marina</i> . They tend to emerge early in the evening, flying over the mangrove canopy soon after sunset. |
| <u>Habitat Preferences</u> | Churchill (2008) states that they are primarily restricted to mangrove forests and adjacent areas of monsoon forest along larger waterways. |
| <u>Potential Occurrence</u> | Moderate: while not listed in the results of the search of DEC's NatureMap (Appendix 1), this bat was recorded by Biota (2010) in mangroves; aerial foraging may occur along the Ashburton River where large trees may attract their invertebrate prey. |

9.6.2.5 Western Pebble- Mouse (*Pseudomys chapmani*)

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|-----------------------------|---|
| <u>Status</u> | The Western Pebble Mouse is listed as P4 on DEC'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> | Unlikely: while listed in the results of the search of DEC's NatureMap (Appendix 1) with one record from 2005 in the more coastal area just south of Onslow, there is no suitable habitat within the current study area. |

9.6.2.6 Lakeland Downs Mouse (*Leggadina lakedownensis*)

| | |
|---------------------|--|
| <u>Status</u> | The Lakeland Downs Mouse (also known as the Short-tailed Mouse) is listed as P4 on DEC's Priority Fauna listing. |
| <u>Distribution</u> | 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. |

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| <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> | Moderate; listed in the results of the search of DEC's NatureMap (Appendix 1) and suitable cracking clay habitat is present within the Survey Area. |

9.6.3 Reptiles

9.6.3.1 Woma (*Aspidites ramsayi*)

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|-----------------------------|--|
| <u>Status</u> | The Woma is listed on Schedule 4 of the <i>WC Act</i> . |
| <u>Distribution</u> | 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. |
| <u>Ecology</u> | A nocturnal and terrestrial python, it preys on small mammals, ground birds and lizards. |
| <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 (DEC 2010). |
| <u>Potential Occurrence</u> | Low to Moderate: there are no records of this species in the general area but suitable habitat is present within the Survey Area including shrublands and open woodlands. |

9.6.3.2 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 they have large home ranges, from 87.76 to 449.26 ha. Males have larger home ranges than females. Males may travel up to 4 km to locate females for breeding (Pearson 2003). |

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|-----------------------------|---|
| <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> | Unlikely: while listed in the results of the search of DEC's NatureMap (Appendix 1) suitable habitat does not appear to be present in the Survey Area. |

9.6.3.3 Salt-water Crocodile (*Crocodylus porosus*)

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|-----------------------------|--|
| <u>Status</u> | The Salt-water Crocodile is listed as Marine under the EBPC Act and is shown as Schedule 1 under the <i>WC Act</i> . |
| <u>Distribution</u> | Known mainly from the coastal areas of the Kimberley but often observed far inland in the major river systems and lagoons. Isolated records from the Pilbara Region. |
| <u>Ecology</u> | Small individuals feed mainly on invertebrates including crustaceans; however, larger individuals feed on a wide range of prey including mammals such as pigs, dogs, cats and horses. |
| <u>Habitat Preferences</u> | While ranging from oceanic, tidal and riverine habitats, the preferred nesting habitat of these large reptiles is generally isolated freshwater swamps that are not influenced by tidal movement of water. |
| <u>Potential Occurrence</u> | Unlikely except possibly at the Ashburton river crossing: listed in the results of the search of DEC's NatureMap (Appendix 1). One record from 2008 just south-west of Onslow. |

9.7 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 three native mammals that are shown on DEC's Priority Fauna list. Not all are likely to be present but three of the bird species were recorded during the field assessment.

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Table 3 Summary of species of conservation significance known or potentially occurring within the proposed gas pipeline route or camp site.

| Species | EPBC Act | WC Act | DEC Priority | Probability of Occurrence |
|--|----------|--------|--------------|--|
| <i>Apus pacificus</i> Fork-tailed Swift | X | X | | Seasonally High ó recorded from the general area in 2009. |
| <i>Hirundo rustica</i> Barn Swallow | X | X | | Low to Moderate ó no records in the general area but suitable habitat is present. |
| <i>Glareola maldivarum</i> Oriental Pratincole | X | X | | Moderate ó previous records from the general area and suitable habitat is present. |
| <i>Ardea modesta</i> Eastern Great Egret | X | X | | Recorded during the survey - at the Ashburton River crossing. |
| <i>Charadrius veredus</i> Oriental Plover (Dotterel) | X | X | | Moderate ó previous records from the general area and suitable habitat is present. |
| <i>Ardea ibis</i> Cattle Egret | X | X | | Unlikely ó only one record from 1952, no suitable habitat is present. |
| <i>Merops ornatus</i> Rainbow Bee-eater | X | X | | Recorded during the survey - at the Ashburton River crossing. |
| <i>Haliaeetus leucogaster</i> White-bellied Sea-eagle | X | X | | Moderate to High ó recorded in 2009 and suitable habitat occurs at the Ashburton River crossing. |
| 19 species of migratory wading and shorebirds | X | X | | High ó previous records from the general area and suitable habitat is present. |
| <i>Dasyurus hallucatus</i> Northern Quoll | X | X | | Unlikely to occur ó lack of suitable habitat. |
| <i>Macrotis lagotis</i> Greater Bilby | X | X | | Unlikely to occur ó no records for the area. |
| <i>Rhinonicteris aurantia</i> Pilbara Leaf-nosed Bat (unnamed Pilbara form) | X | X | | Unlikely ó no suitable roosting habitat is present |
| <i>Liasis olivaceus barroni</i> Pilbara Olive Python | X | X | | Unlikely ó no suitable habitat is present. |
| <i>Crocodylus porosus</i> Salt-water Crocodile | X | X | | Unlikely ó except at the Ashburton river crossing. |
| <i>Falco peregrinus</i> Peregrine Falcon | | X | | High ó large numbers of observations in the general area and suitable habitat is present. |
| <i>Aspidites ramsayi</i> Woma | | X | | Low to Moderate ó no previous records in the general area but suitable habitat is present. |
| <i>Ardeotis australis</i> Australian Bustard | | | X | Recorded in three locations during the field investigations. |
| <i>Burhinus grallarius</i> Bush Stone-curlew | | | X | Moderate ó previous records in the general area and suitable habitat is present. |
| <i>Phaps histrionica</i> Flock Bronzewing | | | X | Low to Moderate ó one record from the vicinity of Onslow in 2008. |
| <i>Mormopterus loriae cobourgiana</i> Little North-western Mastiff Bat | | | X | Moderate ó may be recorded in mangroves and adjacent areas. |
| <i>Pseudomys chapmani</i> Western Pebble-mound Mouse | | | X | Unlikely ó no suitable habitat. |
| <i>Leggadina lakedownensis</i> Lakeland Downs Mouse | | | X | Moderate ó previous records in the general area and suitable habitat is present. |

10 CONCLUSIONS

Typically for this type of Level 1 Reconnaissance Survey, the most commonly recorded species were birds with 54 species being observed. Three of these are of particular conservation significance. In total 132 species of bird could be present in the habitats of the survey area, not counting wetland species.

As claypans were dry at the time of the field assessment, wetland birds were only recorded at the Ashburton River where pools of water were present. However, following cyclonic activity, a large range of both migratory and nomadic bird species could be present wherever standing water occurs.

Three species of native mammal were recorded, including one monotreme and two large kangaroo species. Scats of a dog/dingo were noted but it is not possible to state which of these was present. It is not possible to state with any certainty how many species of small native mammals may be present without extensive trapping over several seasons. However, eight small carnivorous marsupial, 16 species of bat and five native rodents in addition to the three recorded species could be present.

No frogs but 12 species of reptile, consisting of six geckos, four dragons and two monitors were recorded during the assessment. All are common and widespread species with none of particular conservation significance. In total, seven species of frog and 99 species of reptile comprised of 19 geckos, six legless lizards, 34 skinks, 12 dragons, nine monitors, four blind snakes, four pythons and 11 elapid (venomous) snakes are known from the general area.

Three species of introduced mammal were recorded including two carnivores and one herbivore. While the carnivores have an impact on individual animals, the herbivore (cattle) has a much wider impact on habitats by over grazing and soil compaction and potential erosion.

While the majority of fauna habitats are widespread in the area, the mangrove habitat is of particular importance as it forms the only closed canopy forest in the area and supports a range of species not found elsewhere. Some areas, while not differentiated in the plant community descriptions support specific habitat elements that are of importance to some vertebrate fauna species. For example, large termite mounds are present in some areas and these support a number of vertebrates such as the small gecko *Gehyra pilbara* that are unlikely to be found elsewhere. In addition, areas of cracking clay soils will support a wide range of species that use the cracks as shelter during the dry season, including small carnivorous marsupials such as planigales and dunnarts.

The proposed pipeline route traverses a wide range of fauna habitats and, as a result, the number of species that could be present is high. However, large areas have been severely degraded by cattle and weed infestation. However, there are areas of habitat that are in extremely good condition, mainly in the red sand with a covering of spinifex (*Triodia* species) with emergent eucalypts. The pre-existing pipeline does not appear to have had any major adverse impact on the habitats through which it passes although there has been some death of vegetation in small areas where drainage may have changed.

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;

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- 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, particularly in the high sand dune area in the western section of the pipeline route, 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 ACKNOWLEDGEMENTS

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13 REFERENCES

- Australian Pipeline Industry Association Ltd (2009). *Code of Environmental Practice Onshore Pipelines*. Australian Pipeline Industry Association Ltd.
- Bamford Consulting Ecologists (2010). Survey for Migratory Waterbirds in the Wheatstone LNG Project Area, November 2008 and March 2009. Unpublished report prepared for URS Australia Pty Ltd.
- Barrett G, Silcocks A, Barry S, Cunningham R & Poulter R (2003). *The new atlas of Australian birds*. Birds Australia, Victoria.
- Biota Environmental Services (2005a). Yannarie Salt Project Fauna Survey. Unpublished report for Staits Salt Pty Ltd.
- Biota Environmental Services (2005b). Onslow Solar Salt Field Annual Environmental Report 2005. Unpublished report for Onslow Salt Pty Ltd.
- Biota Environmental Services (2009). *Hope Downs IV Northern Quoll Position Paper*. Unpublished report prepared for Rio Tinto Iron Ore on behalf of Hamersley HMS.
- Biota Environmental Services (2010). Wheatstone Project Terrestrial Fauna Survey. Unpublished report prepared for URS Australia Pty Ltd and Chevron Australia Pty Ltd.
- Churchill S (2008). *Australia Bats*. 2nd Edition. Jacana Books, Allen & Unwin.

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

- Environmental Protection Authority (2004). *Guidance for the Assessment of Environmental Factors in accordance with the Environmental Protection Act 1986 Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia No. 56*. Environmental Protection Authority.
- Friend, J. A. (1990). Status of bandicoots in Western Australia. In: J. H. Seeback, P. R. Brown, R. L. Wallis & C. M. Kemper (eds) *Bandicoots and Bilbies*. Surrey Beatty & Sons.
- Hill, B. M. & Ward, S. J. (2010) National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*. Department of Natural Resources, Environment, the Arts and Sport, Darwin.
- Johnson, K.A. (2008). *Bilby*. In Van Dyck, S. Strahan, R. (eds) 2008 *The Mammals of Australia Third edition*. Australian Museum /New Holland Publishers Pty Ltd.
- Johnstone, R.E. (1990). Mangroves and mangrove birds of Western Australia. *Rec. West. Aust. Mus.* Suppl. 32.
- Johnstone RE & Storr GM (1998). *Handbook of Western Australian Birds Volume 1 - Non-passerines (Emu to Dollarbird)*. Western Australian Museum.
- Johnstone RE & Storr GM (2004). *Handbook of Western Australian Birds Volume II - Passerines (Blue-winged Pitta to Goldfinch)*. Western Australian Museum.
- Kendrick, P. & Mau, R. (2002). Carnarvon 1 (CAR1 ó Cape Range subregion). A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Dept of Conservation and Land Management.
- Mattiske Consulting Pty Ltd (2013). *Flora and Vegetation of the CS2 – Tubridgi to Wheatstone Gas Pipeline Project Area*. Prepared for DBP by Mattiske Consulting Pty Ltd, April 2013.
- McKenzie, N.L., Hall, A. & Muir, W.P. (2000). Non-volant mammals of the southern Carnarvon Basin, Western Australia. In: *Biodiversity of the southern Carnarvon Basin*. Eds: A.H. Burbidge, M.S. Harvey, and N.L. McKenzie. Records of the Western Australian Museum Suppl. No. 61.
- Morcombe, M. (2003). *Field Guide to Australian Birds*. Steve Parish Publishing Pty Ltd, QLD, Australia.
- Nevill, S.J. (2008). *Birds of the Greater South West, Western Australia*. Simon Nevill Publications, Perth, Western Australia.
- Oakwood, M. (2008). Northern Quoll *Dasyurus hallucatus* (Gould, 1842). In: Van Dyck, S. and Strahan, R. (eds) (2008). *The Mammals of Australia*. Third Edition. Queensland Government and Queensland Museum.
- Pavey, C. (2006). National Recovery Plan for the Greater Bilby *Macrotis lagotis*. Northern Territory Department of Natural Resources, Environment and the Arts.
- Pearson, D. (2003). Giant Pythons of the Pilbara. *Landscape*. 19(1).
- Southgate, R.I. (1990). Habitats and diet of the Greater Bilby *Macrotis lagotis* Reid (Marsupialia: peramelidae). In: *Bandicoots and Bilbies*. Eds. J.H. Seebeck, P.R. Brown, R.W Wallis and C.M. Kemper.
- Start, A.N. (2008). Western Pebble-mouse *Pseudomys chapmani* Kitchener, 1980. In: Van Dyck, S. and Strahan, R. (eds) (2008). *The Mammals of Australia*. Third Edition. Queensland Government and Queensland Museum.
- Sutherst, R. W., Floyd, R.B., and Maywald, G.F. (1996). The potential geographical distribution of the cane toad, *Bufo marinus* L in Australia. *Conservation Biology* 10, 294-299.

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

- Thackway R. and Cresswell I.D. Eds. (1995). *An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves, Version 4.0*. Australian Nature Conservation Agency, Canberra.
- Timms, B. (2010). Wheatstone Project Claypan Ephemeral Fauna Survey. Unpublished report prepared for Chevron Australia Pty Ltd and URS Australia Pty Ltd.
- Tyler MJ & Doughty P (2009). *A Field Guide to the Frogs of Western Australia – 4th Edition*. West. Aust. Mus. Perth.
- van Dam, R.A., Walden, D.J., and Begg, G.W. (2002). *A preliminary risk assessment of cane toads in Kakadu National Park*. Report 164. (Supervising Scientist, Darwin.)
- Van Dyck, S & Strahan, R. (eds) (2008). *The Mammals of Australia. Third Edition*. Queensland Government & Queensland Museum.
- Wilson SK & Swann G. (2010). *A complete guide to reptiles of Australia*. New Holland, Australia.

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

Woinarski, J.C.Z., Oakwood, M., Winter, J., Burnett, S., Milne, D., Foster, P., Myles, H. and Holmes, B. (2008). Surviving the toads: patterns of persistence of the northern quoll *Dasyurus hallucatus* in Queensland. Report to The Australian Government's Natural Heritage Trust March 2008. Report submitted to the Natural Heritage Trust Strategic Reserve Program, as a component of project 2005/162: *Monitoring & Management of Cane Toad Impact in the Northern Territory*.

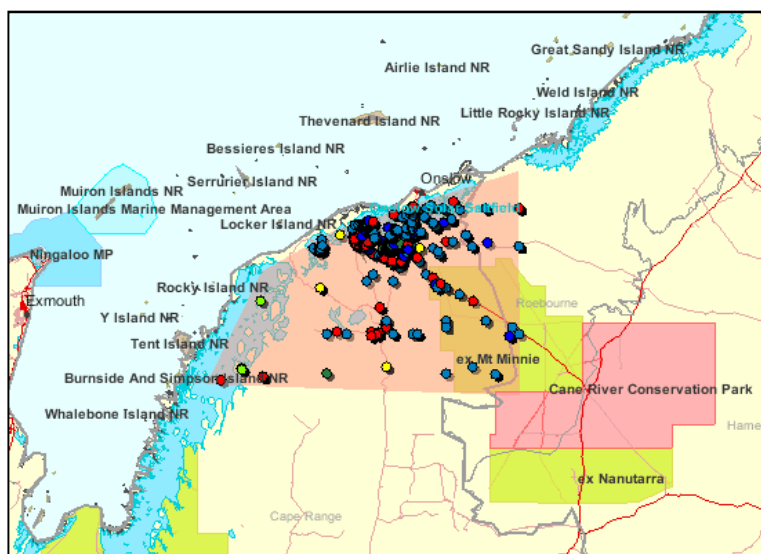
<http://www.ala.org.au>

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

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

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

Appendix 1 Results of the search of DEC's NatureMap.



Search Results

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

| Species Group | Species | Records |
|---------------|---------|---------|
| Amphibian | 6 | 962 |
| Bird | 150 | 892 |
| Mammal | 21 | 178 |
| Reptile | 82 | 3712 |
| TOTAL | 291 | 5818 |

Amphibian

[Cyclorana maini](#) Sheep Frog
[Litoria caerulea](#) Green Tree Frog
[Litoria rubella](#) Little Red Tree Frog
[Neobatrachus aquilonius](#) Northern Burrowing Frog
[Neobatrachus fulvus](#) Tawny Trilling Frog
[Notaden nichollsi](#) Desert Spadefoot
 6 species, 962 records

Bird

[Accipiter cirrocephalus](#) Collared Sparrowhawk
[Accipiter fasciatus](#) Brown Goshawk
[Actitis hypoleucos](#) Common Sandpiper **IA**
[Aegotheles cristatus](#) Australian Owllet-nightjar
[Anas gracilis](#) Grey Teal
[Anas superciliosa](#) Pacific Black Duck
[Anhinga melanogaster](#) Darter
[Anthus australis](#) Australian Pipit
[Apus pacificus](#) Fork-tailed Swift **IA**
[Aquila audax](#) Wedge-tailed Eagle
[Aquila morphnoides](#) Little Eagle
[Ardea alba](#) Great Egret
[Ardea garzetta](#) Little Egret
[Ardea novaehollandiae](#) White-faced Heron
[Ardea pacifica](#) White-necked Heron
[Ardeotis australis](#) Australian Bustard **P4**
[Arenaria interpres](#) Ruddy Turnstone **IA**
[Artamus cinereus](#) Black-faced Woodswallow
[Artamus cyanopterus](#) Dusky Woodswallow
[Artamus leucorhynchus](#) White-breasted Woodswallow
[Artamus personatus](#) Masked Woodswallow
[Aythya australis](#) Hardhead
[Burhinus grallarius](#) Bush Stone-curlew **P4**
[Butorides striatus](#) Striated Heron
[Cacatua roseicapilla](#) Galah
[Cacatua sanguinea](#) Little Corella
[Calidris acuminata](#) Sharp-tailed Sandpiper **IA**
[Calidris alba](#) Sanderling **IA**
[Calidris ruficollis](#) Red-necked Stint **IA**
[Calidris tenuirostris](#) Great Knot **IA**
[Centropus phasianinus](#) Pheasant Coucal
[Certhionyx niger](#) Black Honeyeater
[Certhionyx variegatus](#) Pied Honeyeater

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[Charadrius leschenaultii](#) Greater Sand Plover **IA**
[Charadrius melanops](#) Black-fronted Dotterel
[Charadrius mongolus](#) Lesser Sand Plover **IA**
[Charadrius ruficapillus](#) Red-capped Plover
[Chenonetta jubata](#) Australian Wood Duck
[Cheramoeca leucosternus](#) White-backed Swallow
[Chrysococcyx basalis](#) Horsfield's Bronze Cuckoo
[Chrysococcyx osculans](#) Black-eared Cuckoo
[Cincloramphus cruralis](#) Brown Songlark
[Cincloramphus mathewsi](#) Rufous Songlark
[Circus approximans](#) Swamp Harrier
[Circus assimilis](#) Spotted Harrier
[Colluricincla harmonica](#) Grey Shrike-thrush
[Coracina novaehollandiae](#) Black-faced Cuckoo-shrike
[Corvus bennetti](#) Little Crow
[Corvus orru](#) Torresian Crow
[Coturnix pectoralis](#) Stubble Quail
[Coturnix ypsilophora](#) Brown Quail
[Cracticus nigrogularis](#) Pied Butcherbird
[Cracticus tibicen](#) Australian Magpie
[Cracticus tibicen subsp. longirostris](#)
[Cracticus torquatus](#) Grey Butcherbird
[Cygnus atratus](#) Black Swan
[Dacelo leachii](#) Blue-winged Kookaburra
[Dacelo leachii subsp. leachii](#)
[Dromaius novaehollandiae](#) Emu
[Elanus caeruleus](#) Black-shouldered Kite
[Emblema pictum](#) Painted Finch
[Epthianura aurifrons](#) Orange Chat
[Epthianura tricolor](#) Crimson Chat
[Eurostopodus argus](#) Spotted Nightjar
[Falco berigora](#) Brown Falcon
[Falco cenchroides](#) Australian Kestrel
[Falco longipennis](#) Australian Hobby
[Falco peregrinus](#) Peregrine Falcon **S**
[Geopelia cuneata](#) Diamond Dove
[Geopelia humeralis](#) Bar-shouldered Dove
[Geopelia striata](#) Peaceful Dove
[Geopelia striata subsp. placida](#)
[Geophaps plumifera](#) Spinifex Pigeon
[Gerygone tenebrosa](#) Dusky Gerygone
[Glareola maldivarum](#) Oriental Pratincole **IA**
[Grallina cyanoleuca](#) Magpie-lark
[Grus rubicunda](#) Brolga
[Haematopus fuliginosus](#) Sooty Oystercatcher
[Haematopus longirostris](#) Pied Oystercatcher
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle **IA**
[Haliastur indus](#) Brahminy Kite
[Haliastur sphenurus](#) Whistling Kite
[Hamirostra melanosternon](#) Black-breasted Buzzard
[Himantopus himantopus](#) Black-winged Stilt
[Hirundo ariel](#) Fairy Martin
[Hirundo neoxena](#) Welcome Swallow
[Hirundo nigricans](#) Tree Martin
[Lalage tricolor](#) White-winged Triller
[Larus novaehollandiae](#) Silver Gull
[Lichenostomus penicillatus](#) White-plumed Honeyeater
[Lichenostomus virescens](#) Singing Honeyeater
[Lichmera indistincta](#) Brown Honeyeater
[Limosa lapponica](#) Bar-tailed Godwit **IA**
[Limosa lapponica subsp. menzbieri](#) Bar-tailed Godwit **IA**
[Malurus lamberti](#) Variegated Fairy-wren
[Malurus leucopterus](#) White-winged Fairy-wren
[Malurus leucopterus subsp. leuconotus](#)
[Manorina flavigula](#) Yellow-throated Miner
[Melopsittacus undulatus](#) Budgerigar
[Merops ornatus](#) Rainbow Bee-eater **IA**
[Milvus migrans](#) Black Kite
[Mirafra javanica](#) Horsfield's Bushlark
[Mirafra javanica subsp. horsfieldii](#)
[Mirafra javanica subsp. woodwardi](#)
[Myiagra inquieta](#) Restless Flycatcher
[Neochmia ruficauda](#) Star Finch
[Ninox novaeseelandiae](#) Boobook Owl
[Numenius madagascariensis](#) Eastern Curlew **P4**
[Numenius phaeopus](#) Whimbrel **IA**
[Nymphicus hollandicus](#) Cockatiel
[Ocyphaps lophotes](#) Crested Pigeon
[Oreoica gutturalis](#) Crested Bellbird
[Pachycephala lanioides](#) White-breasted Whistler
[Pachycephala melanura subsp. melanura](#)
[Pandion haliaetus subsp. cristatus](#)
[Pardalotus rubricatus](#) Red-browed Pardalote
[Pelecanus conspicillatus](#) Australian Pelican
[Phalacrocorax carbo](#) Great Cormorant
[Phalacrocorax melanoleucus](#) Little Pied Cormorant

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[Phalacrocorax sulcirostris](#) Little Black Cormorant
[Phalacrocorax varius](#) Pied Cormorant
[Phaps chalcoptera](#) Common Bronzewing
[Phaps histrionica](#) Flock Bronzewing **P4**
[Platyercus zonarius](#) Australian Ringneck
[Platyercus zonarius subsp. zonarius](#)
[Pomatostomus temporalis](#) Grey-crowned Babbler
[Pomatostomus temporalis subsp. rubeculus](#)
[Psophodes occidentalis](#) Western Wedgebill
[Rhipidura leucophrys](#) Willie Wagtail
[Rhipidura phasiana](#) Mangrove Grey Fantail
[Smicromis brevirostris](#) Weebill
[Sterna \(albigifrons\) sinensis](#) White-shafted Little Tern
[Sterna bengalensis](#) Lesser Crested Tern **IA**
[Sterna caspia](#) Caspian Tern **IA**
[Sterna dougallii](#) Roseate Tern **IA**
[Sterna hirundo](#) Common Tern **IA**
[Sterna leucoptera](#) White-winged Black Tern **IA**
[Sterna nilotica](#) Gull-billed Tern
[Tachybaptus novaehollandiae](#) Australasian Grebe
[Taeniopygia guttata](#) Zebra Finch
[Threskiornis spinicollis](#) Straw-necked Ibis
[Todiramphus chloris](#) Collared Kingfisher
[Todiramphus chloris subsp. pilbara](#)
[Todiramphus sanctus](#) Sacred Kingfisher
[Tringa brevipes](#) Grey-tailed Tattler **IA**
[Tringa glareola](#) Wood Sandpiper **IA**
[Tringa nebularia](#) Common Greenshank **IA**
[Turnix velox](#) Little Button-quail
[Tyto alba](#) Barn Owl
[Zosterops luteus](#) Yellow White-eye
 150 species, 892 records

Mammal

[Bos taurus](#) European Cattle
[Canis lupus](#)
[Chaerephon jobensis](#) Northern Freetail-bat
[Chalinolobus gouldii](#) Gould's Wattle Bat
[Dasykaluta rosamondae](#) Little Red Kaluta
[Dasyurus hallucatus](#) Northern Quoll **T**
[Felis catus](#) Cat
[Leggadina lakedownensis](#) Short-tailed Mouse, Lakeland Downs Mouse, Kerakenga **P4**
[Macropus robustus](#) Euro
[Macropus rufus](#) Red Kangaroo
[Mus musculus](#) House Mouse
[Ningauia timealeyi](#) Pilbara Ningau
[Notomys alexis](#) Spinifex Hopping-mouse
[Oryctolagus cuniculus](#) Rabbit
[Plani-gale ingrami](#) Long-tailed Planigale
[Pseudomys chapmani](#) Western Pebble-mound Mouse, Ngadji **P4**
[Pseudomys desertor](#) Desert Mouse
[Pseudomys hermannsburgensis](#) Sandy Inland Mouse
[Sminthopsis macroura](#) Stripe-faced Dunnart
[Sminthopsis youngsoni](#) Lesser Hairy-footed Dunnart
[Tachyglossus aculeatus](#) Echidna
 21 species, 178 records

Reptile

[Amphibolurus longirostris](#)
[Antaresia perthensis](#) Pygmy Python
[Antaresia stimsoni](#) Stimson's Python
[Antaresia stimsoni subsp. stimsoni](#)
[Aspidites melanocephalus](#) Black-headed Python
[Crocodylus porosus](#) Salt-water Crocodile **S**
[Ctenophorus caudicinctus](#) Ring-tailed Dragon
[Ctenophorus caudicinctus subsp. caudicinctus](#)
[Ctenophorus femoralis](#) Dune Dragon
[Ctenophorus isolepis](#) Crested Dragon
[Ctenophorus isolepis subsp. gularis](#) Central Military Dragon
[Ctenophorus isolepis subsp. isolepis](#)
[Ctenophorus nuchalis](#) Central Netted Dragon
[Ctenophorus reticulatus](#) Western Netted Dragon
[Ctenophorus rubens](#) Red Dragon
[Ctenophorus rufescens](#) Red Rock Dragon
[Ctenotus grandis](#)
[Ctenotus grandis subsp. titan](#)
[Ctenotus hanloni](#)
[Ctenotus helenae](#)
[Ctenotus iapetus](#)
[Ctenotus maryani](#)
[Ctenotus pantherinus](#) Leopard Ctenotus
[Ctenotus pantherinus subsp. ocellifer](#)
[Ctenotus quattuordecimlineatus](#)
[Ctenotus rufescens](#)
[Ctenotus saxatilis](#) Rock Ctenotus
[Ctenotus schomburgkii](#)
[Delma haroldi](#)
[Delma nasuta](#)

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[Delma tineta](#)
[Demansia psammophis](#) Yellow-faced Whipsnake
[Demansia psammophis subsp. cupreiceps](#)
[Diplodactylus conspicillatus](#) Fat-tailed Gecko
[Diplodactylus pulcher](#)
[Diporiphora winneckeii](#) Blue-lined Dragon
[Eremiascincus fasciolatus](#) Narrow-banded Sand Swimmer
[Furina ornata](#) Moon Snake
[Gehyra pilbara](#)
[Gehyra punctata](#)
[Gehyra variegata](#)
[Heteronotia binoei](#) Bynoe's Gecko
[Lerista bipes](#)
[Lerista clara](#)
[Lerista elegans](#)
[Lerista onslowiana](#)
[Lerista uniduo](#) Spotted Broad-blazed Slider, skink
[Lialis burtonis](#)
[Lialis olivaceus subsp. barroni](#) Pilbara Olive Python **T**
[Lucasium stenodactylum](#)
[Menetia greyii](#)
[Morethia ruficauda subsp. exquisita](#)
[Morethia ruficauda subsp. ruficauda](#)
[Nephrurus levis](#)
[Nephrurus levis subsp. occidentalis](#)
[Nephrurus levis subsp. pilbarensis](#)
[Pogona minor](#)
[Pogona minor subsp. minor](#)
[Pseudechis australis](#) Mulga Snake
[Pseudonaja modesta](#) Ringed Brown Snake
[Pseudonaja nuchalis](#) Gwardar
[Pygopus nigriceps](#)
[Ramphotyphlops ammodytes](#)
[Ramphotyphlops grypus](#)
[Ramphotyphlops hamatus](#)
[Ramphotyphlops pilbarensis](#)
[Rhynchoedura ornata](#) Beaked Gecko
[Simoselaps anomalus](#) Desert Banded Snake
[Strophurus jeanae](#)
[Strophurus rankini](#)
[Strophurus strophurus](#)
[Suta punctata](#) Spotted Snake
[Tiliqua multifasciata](#) Central Blue-tongue
[Varanus acanthurus](#) Spiny-tailed Monitor
[Varanus brevicauda](#) Short-tailed Pygmy Monitor
[Varanus caudolineatus](#)
[Varanus eremius](#) Pygmy Desert Monitor
[Varanus gouldii](#) Bungarra or Sand Monitor
[Varanus panoptes](#) Yellow-spotted Monitor
[Varanus panoptes subsp. rubidus](#)
[Varanus tristis](#) Racehorse Monitor
 82 species, 3712 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

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

Appendix 2 List of bird species recorded or expected to occur within the proposed CS 2 to Tubridgi Gas Pipeline route.

Key

- Biota 2010: Wheatstone Project Terrestrial Fauna Survey.
 Biota 2005a & b: Yannarie Salt Project Fauna Survey & Onslow Solar Salt Field Report.
 DEC NMap: NatureMap search results
 Ninox 2013: Field study results.
 R: Recorded during the field survey
 P: Predicted to occur within the habitats of the proposed pipeline route.
 X: Recorded in literature/data searches.
 (M) Mainly restricted to mangrove habitat.

Status

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

| BIRD SPECIES | | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|---------------------------------|---------------------------|--------|------------|---------------|-----------|------------|
| Casuariidae | | | | | | |
| <i>Dromaius novaehollandiae</i> | Emu | | X | X | X | P |
| Phasianidae | | | | | | |
| <i>Coturnix pectoralis</i> | Stubble Quail | | | | X | P |
| <i>Coturnix ypsilophora</i> | Brown Quail | | | | | P |
| Anatidae | | | | | | |
| <i>Chenonetta jubata</i> | Australian Wood Duck | | | | | R |
| <i>Anas superciliosa</i> | Pacific Black duck | | X | | | R |
| <i>Aythya australis</i> | Hardhead | | | | | R |
| Columbidae | | | | | | |
| <i>Phaps chalcoptera</i> | Common Bronzewing | | | | X | P |
| <i>Phaps histrionica</i> | Flock Bronzewing | 3 | | | X | |
| <i>Ocyphaps lophotes</i> | Crested Pigeon | | X | | X | R |
| <i>Geophaps plumifera</i> | Spinifex Pigeon | | X | | X | P |
| <i>Geopelia cuneata</i> | Diamond Dove | | X | | X | P |
| <i>Geopelia striata</i> | Peaceful Dove | | X | | X | R |
| <i>Geopelia humeralis</i> | Bar-shouldered Dove | | | | X | P (M) |
| Podargidae | | | | | | |
| <i>Podargus strigoides</i> | Tawny Frogmouth | | | | | P |
| Eurostopodidae | | | | | | |
| <i>Eurostopodus argus</i> | Spotted Nightjar | | | | X | P |
| Aegothelidae | | | | | | |
| <i>Aegotheles cristatus</i> | Australian Owlet-nightjar | | X | | X | P |
| Apodidae | | | | | | |
| <i>Apus pacificus</i> | Fork-tailed Swift | 1, 2 | X | | X | P |
| Pelecanidae | | | | | | |
| <i>Pelecanus conspicillatus</i> | Australian Pelican | | X | | | R |
| Ardeidae | | | | | | |
| <i>Ardea pacifica</i> | White-necked Heron | | | | | R |
| <i>Ardea modesta</i> | Eastern Great Egret | | | | | R |
| <i>Butorides straita</i> | Striated (Mangrove) Heron | | | | | P (M) |
| <i>Egretta sacra</i> | Eastern Reef Heron | | X | | | |
| <i>Egretta novaehollandiae</i> | White-faced Heron | | | | | R |
| <i>Egretta garzetta</i> | Little Egret | | X | | | R |
| Accipitridae | | | | | | |
| <i>Elanus axillaris</i> | Black-shouldered Kite | | X | X | X | R |
| <i>Elanus scriptus</i> | Letter-winged Kite | | | | | P |
| <i>Lophoictinia isura</i> | Square-tailed kite | | | | | P |
| <i>Hamirostra melanosternon</i> | Black-breasted Buzzard | | X | | X | P |
| <i>Haliaeetus leucogaster</i> | White-bellied Sea-eagle | | X | | | P |
| <i>Haliastur sphenurus</i> | Whistling Kite | | X | X | X | R |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

| BIRD SPECIES | | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|--|--------------------------------|--------|------------|---------------|-----------|------------|
| <i>Haliastur Indus</i> | Brahminy Kite | | X | | | P |
| <i>Milvus migrans</i> | Black Kite | | | | X | R |
| <i>Accipiter fasciatus</i> | Brown Goshawk | | | | X | R |
| <i>Accipiter cirrhocephalus</i> | Collared Sparrowhawk | | | | X | P |
| <i>Circus assimilis</i> | Spotted Harrier | | X | X | X | R |
| <i>Circus approximans</i> | Swamp Harrier | | | | | P |
| <i>Aquila audax</i> | Wedge-tailed Eagle | | X | X | X | R |
| <i>Hieraaetus morphnoides</i> | Little Eagle | | | X | X | R |
| <i>Pandion haliaetus</i> | Osprey | | X | | | P |
| Falconidae | | | | | | |
| <i>Falco cenchroides</i> | Nankeen Kestrel | | X | X | X | R |
| <i>Falco berigora</i> | Brown Falcon | | | | X | R |
| <i>Falco longipennis</i> | Australian Hobby | | X | | X | P |
| <i>Falco hypoleucos</i> | Grey Falcon | 2 | | | | P |
| <i>Falco subniger</i> | Black Falcon | | | | | R |
| <i>Falco peregrinus</i> | Peregrine Falcon | 2 | | | X | P |
| Gruidae | | | | | | |
| <i>Grus rubicund</i> | Brolga | | | | | P |
| Otididae | | | | | | |
| <i>Ardeotis australis</i> | Australian Bustard | 3 | X | X | X | R |
| Burhinidae | | | | | | |
| <i>Burhinus grallarius</i> | Bush Stone-curlew | 3 | | | X | P |
| Recurvirostridae | | | | | | |
| <i>Himantopus himantopus</i> | Black-winger Stilt | | | | | R |
| Charadriidae | | | | | | |
| <i>Charadrius ruficapillus</i> | Red-capped Plover | | | X | X | P |
| <i>Charadrius veredus</i> | Oriental Plover | | | | | P |
| <i>Charadrius australis</i> | Inland Dotterel | | | | | P |
| <i>Elsyornis melanops</i> | Black-fronted Dotterel | | | | X | R |
| <i>Erythrogonys cinctus</i> | Red-kneed Dotterel | | | X | | R |
| <i>Vanellus tricolor</i> | Banded Lapwing | | | | | P |
| Turnicidae | | | | | | |
| <i>Turnix velox</i> | Little button-quail | | X | X | X | R |
| Laridae | | | | | | |
| <i>Sternula albifrons</i> | Little Tern | | | | | R |
| <i>Gelochelidon nilotica</i> | Gull-billed Tern | | | | | R |
| <i>Hydroprogne caspia</i> | Caspian Tern | | X | | | R |
| <i>Chroicocephalus noveahollandiae</i> | Silver Gull | | X | | | R |
| Cacatuidae | | | | | | |
| <i>Eolophus roseicapillus</i> | Galah | | X | X | X | R |
| <i>Cacatua sanguinea</i> | Little Corella | | X | X | X | R |
| <i>Nymphicus hollandicus</i> | Cockatiel | | X | X | X | R |
| Psittacidae | | | | | | |
| <i>Barnardius zonarius</i> | Australian Ringneck | | X | | X | R |
| <i>Melopsittacus undulatus</i> | Budgerigar | | X | | X | R |
| <i>Neophema elegans</i> | Elegant Parrot | | | | | P |
| Cuculidae | | | | | | |
| <i>Centropus phasianinus</i> | Pheasant Coucal | | | | | P |
| <i>Chalcites basalis</i> | Horsfield's Bronze-Cuckoo | | X | X | X | P |
| <i>Chalcites osculans</i> | Black-eared Cuckoo | | | | X | P |
| <i>Cuculus pallidus</i> | Pallid Cuckoo | | | | | P |
| Strigidae | | | | | | |
| <i>Ninox connivens</i> | Barking owl | | | | | P |
| <i>Ninox novaeseelandiae</i> | Southern Boobook | | X | | X | P |
| Tytonidae | | | | | | |
| <i>Tyto javanica</i> | Eastern Barn Owl | | | | X | P |
| Halcyonidae | | | | | | |
| <i>Dacelo leachii</i> | Blue-winged Kookaburra | | X | | X | P |
| <i>Todirhamphus pyrrhopygius</i> | Red-backed Kingfisher | | | | | P |
| <i>Todirhamphus sanctus</i> | Sacred Kingfisher | | | X | X | R |
| <i>Todirhamphus chloris</i> | Collared (Mangrove) Kingfisher | | | | X | P (M) |
| Meropidae | | | | | | |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

| BIRD SPECIES | | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|-----------------------------------|----------------------------|--------|------------|---------------|-----------|------------|
| <i>Merops ornatus</i> | Rainbow Bee-eater | 1, 2 | X | X | X | R |
| Climacteridae | | | | | | |
| <i>Climacteris melanura</i> | Black-tailed Tree-creeper | | | | | P |
| Maluridae | | | | | | |
| <i>Malurus leucopterus</i> | White-winged Fairy-wren | | X | X | X | R |
| <i>Malurus lamberti</i> | Variegated Fairy-wren | | X | | X | P |
| <i>Stipiturus ruficeps</i> | Rufous-crowned Emu-wren | | | | | P |
| <i>Amytornis striatus</i> | Striated Grasswren | | | | | P |
| Acanthizidae | | | | | | |
| <i>Calamanthus campestris</i> | Rufous Fieldwren | | | | | P |
| <i>Pyrrholaemus brunneus</i> | Redthroat | | | | | P |
| <i>Smicrornis brevirostris</i> | Weebill | | | | X | P |
| <i>Gerygone levigaster</i> | Mangrove Gerygone | | X | | | P (M) |
| <i>Gerygone tenebrosa</i> | Dusky Gerygone | | X | | X | |
| Pardalotidae | | | | | | |
| <i>Pardalotus rubricatus</i> | Red-browed Pardalote | | | | X | P |
| <i>Pardalotus striatus</i> | Striated Pardalote | | | | | P |
| Meliphagidae | | | | | | |
| <i>Certhionyx variegatus</i> | Pied Honeyeater | | | | X | P |
| <i>Lichenostomus virescens</i> | Singing Honeyeater | | X | X | X | R |
| <i>Lichenostomus keartlandi</i> | Grey-headed Honeyeater | | X | | | P |
| <i>Lichenostomus plumulus</i> | Grey-fronted Honeyeater | | | | | P |
| <i>Lichenostomus penicillatus</i> | White-plumed Honeyeater | | | | X | R |
| <i>Manorina flavigula</i> | Yellow-throated Miner | | | | X | R |
| <i>Epthianura tricolor</i> | Crimson Chat | | | X | X | R |
| <i>Epthianura aurifrons</i> | Orange Chat | | | | X | P |
| <i>Sugomel niger</i> | Black Honeyeater | | X | | X | P |
| <i>Lichmera indistincta</i> | Brown Honeyeater | | X | X | X | P |
| <i>Melithreptus gularis</i> | Black-chinned Honeyeater | | | | | P |
| Pomatostomidae | | | | | | |
| <i>Pomatostomus temporalis</i> | Grey-crowned Babbler | | | | X | R |
| Eupetidae | | | | | | |
| <i>Psophodes occidentalis</i> | Chiming Wedgebill | | X | | X | R |
| Neosittidae | | | | | | |
| <i>Daphoenositta chrysoptera</i> | Varied Sittella | | | | | P |
| Campephagidae | | | | | | |
| <i>Coracina novaehollandiae</i> | Black-faced Cuckoo-shrike | | X | X | X | R |
| <i>Lalage sueurii</i> | White-winged Triller | | | X | X | P |
| Pachycephalidae | | | | | | |
| <i>Pachycephala melanura</i> | Mangrove Golden Whistler | | | | | P (M) |
| <i>Pachycephala rufiventris</i> | Rufous Whistler | | | | | P |
| <i>Pachycephala laniodes</i> | White-breasted Whistler | | | | | P (M) |
| <i>Colluricincla harmonica</i> | Grey Shrike-thrush | | | | X | P |
| <i>Oreoica gutturalis</i> | Crested Bellbird | | X | | X | R |
| Artamidae | | | | | | |
| <i>Artamus leucorhynchus</i> | White-breasted Woodswallow | | X | | X | P (M) |
| <i>Artamus personatus</i> | Masked Woodswallow | | | | X | R |
| <i>Artamus superciliosus</i> | White-browed Woodswallow | | | | | P |
| <i>Artamus cinereus</i> | Black-faced Woodswallow | | X | X | X | R |
| <i>Artamus cyanopterus</i> | Dusky Woodswallow | | X | | X | P |
| <i>Artamus minor</i> | Little Woodswallow | | | | | P |
| <i>Cracticus torquatus</i> | Grey Butcherbird | | | | X | P |
| <i>Cracticus nigrogularis</i> | Pied Butcherbird | | X | X | X | P |
| <i>Gymnorhina tibicen</i> | Australian Magpie | | | | X | R |
| Rhipiduridae | | | | | | |
| <i>Rhipidura albiscapa</i> | Grey Fantail | | | | | P |
| <i>Rhipidura phasiana</i> | Mangrove Grey Fantail | | | | | P (M) |
| <i>Rhipidura leucophrys</i> | Willie Wagtail | | X | X | X | P |
| Corvidae | | | | | | |
| <i>Corvus bennetti</i> | Little Crow | | X | X | X | P |
| <i>Corvus orru</i> | Torresian Crow | | X | X | X | R |
| Monarchidae | | | | | | |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

| BIRD SPECIES | | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|--|----------------------|--------|---------------|------------------|--------------|---------------|
| <i>Grallina cyanoleuca</i> | Magpie-lark | | X | | X | R |
| Petroicidae | | | | | | |
| <i>Melanodryas cucullata</i> | Hooded Robin | | | | | P |
| <i>Peneonanthe pulverulenta</i> | Mangrove Robin | | | | | P (M) |
| Alaudidae | | | | | | |
| <i>Mirafra javanica</i> | Singing Bushlark | | X | X | X | R |
| Megaluridae | | | | | | |
| <i>Cinclorhamphus mathewsi</i> | Rufous Songlark | | X | | X | P |
| <i>Cinclorhamphus cruralis</i> | Brown Songlark | | | X | X | R |
| <i>Eremiornis carteri</i> | Spinifexbird | | | X | | P |
| Timaliidae | | | | | | |
| <i>Zosterops lateralis</i> | Silvereeye | | | | | P |
| <i>Zosterops lutes</i> | Yellow White-eye | | X | | | P (M) |
| Hirundinidae | | | | | | |
| <i>Cheramoeca leucosternus</i> | White-backed Swallow | | X | X | X | P |
| <i>Hirundo rustica</i> | Barn Swallow | 1, 2 | | | | P |
| <i>Hirundo neoxena</i> | Welcome Swallow | | | X | X | P |
| <i>Petrocheilidon ariel</i> | Fairy Martin | | X | X | X | P |
| <i>Petrochelidon nigricans</i> | Tree Martin | | X | X | X | P |
| Nectariniidae | | | | | | |
| <i>Dicaeum hirundinaceum</i> | Mistletoebird | | | | | P |
| Estrildidae | | | | | | |
| <i>Taeniopygia guttata</i> | Zebra Finch | | X | X | X | R |
| <i>Neochmia ruficauda</i> | Star Finch | | | | X | P |
| <i>Emblema pictum</i> | Painted Finch | | X | | X | P |
| Motacillidae | | | | | | |
| <i>Anthus novaeseelandiae</i> | Australian Pipit | | X | X | X | R |
| No. of Species Predicted/Recorded | | | 62 | 37 | 84 | 87/54 |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

Appendix 3 List of native mammal species recorded or expected to occur within the proposed CS 2 to Tubridgi Gas Pipeline route.

Key

- Biota 2010: Wheatstone Project Terrestrial Fauna Survey.
 Biota 2005a & b: Yannarie Salt Project Fauna Survey; Onslow Solar Salt Field Report.
 DEC NMap: NatureMap search results
 Ninox 2013: Field study results.
 R: Recorded during the field survey
 P: Predicted to occur within the habitats of the proposed pipeline route.
 X: Recorded in literature/data searches.

Status

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

| NATIVE MAMMALS | | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|--|-------------------------------|--------|------------|---------------|-----------|------------|
| Tachyglossidae | | | | | | |
| <i>Tachyglossus aculeatus</i> | Echidna | | | X | X | R |
| Dasyuridae | | | | | | |
| <i>Dasykaluta rosamondae</i> | Little Red Kaluta | | | X | X | P |
| <i>Dasyurus hallucatus</i> | Northern Quoll | 1, 2 | | | X | |
| <i>Planigale ingrami</i> | Long-tailed Planigale | | X | X | X | P |
| <i>Planigale maculata</i> | Common Planigale | | | X | | P |
| <i>Ningauai timealeyi</i> | Pilbara Ningauai | | X | X | X | P |
| <i>Sminthopsis macroura</i> | Stripe-faced Dunnart | | X | X | | P |
| <i>Sminthopsis youngsoni</i> | Lesser Hairy-footed Dunnart | | | X | X | P |
| Macropodidae | | | | | | |
| <i>Macropus robustus</i> | Euro | | X | X | X | R |
| <i>Macropus rufus</i> | Red Kangaroo | | X | X | X | R |
| Emballonuridae | | | | | | |
| <i>Saccolaimus flaviventris</i> | Yellow-bellied Sheathtail-bat | | X | | | P |
| <i>Taphozous georgianus</i> | Common Sheathtail-bat | | | | | P |
| Molossidae | | | | | | |
| <i>Austronomus australis</i> | White-striped Freetail-bat | | | | | P |
| <i>Chaerephon jobensis</i> | Northern Freetail-bat | | | | X | P |
| <i>Mormopterus beccarii</i> | Beccari's Freetail-bat | | | | | P |
| <i>Mormopterus cobourgiana</i> | Mangrove Freetail-bat | 3 | X? | | | |
| Vespertilionidae | | | | | | |
| <i>Nyctophilus arnhemensis</i> | Arnhem Long-eared Bat | | | | | P |
| <i>Nyctophilus geoffroyi</i> | Lesser Long-eared Bat | | | | | P |
| <i>Chalinolobus gouldii</i> | Gould's Wattled Bat | | X | | X | P |
| <i>Scotorepens greyii</i> | Little Broad-nosed Bat | | X | | | P |
| <i>Vespadelus finlaysoni</i> | Finlayson's Cave Bat | | X | | | P |
| Muridae | | | | | | |
| <i>Leggadina lakedownensis</i> | Lakeland Downs Mouse | 3 | | X | X | P |
| <i>Notomys alexis</i> | Spinifex Hopping-mouse | | X | X | X | P |
| <i>Pseudomys chapmani</i> | Western Pebble-mound Mouse | 3 | X | | X | |
| <i>Pseudomys desertor</i> | Desert Mouse | | X | | X | P |
| <i>Pseudomys hermannsburgensis</i> | Sandy Inland Mouse | | X | X | X | P |
| <i>Zyomys argurus</i> | Common Rock-rat | | | | | |
| Canidae | | | | | | |
| <i>Canis lupus dingo</i> | Dingo | | | X | X | ?R |
| No. of Species Predicted/Recorded | | | 14 | 13 | 16 | 24 |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

Appendix 4 List of amphibian species recorded or expected to occur within the proposed CS 2 to Tubridgi Gas Pipeline route.

Key

- Biota 2010: Wheatstone Project Terrestrial Fauna Survey.
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 DEC NMap: NatureMap search results
 Ninox 2013: Field study results.
 R: Recorded during the field survey
 P: Predicted to occur within the habitats of the proposed pipeline route.
 X: Recorded in literature/data searches.

Status

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 2 = Listed under the *WC Act*
 3 = Listed on DEC's priority Fauna listing

| AMPHIBIANS | | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|--|-------|--------|------------|---------------|-----------|------------|
| Hylidae | Frogs | | | | | |
| <i>Cyclorana maini</i> | | | X | | X | P |
| <i>Litoria caerulea</i> | | | | | X | |
| <i>Litoria rubella</i> | | | X | | X | P |
| Lymnodynastidae | Frogs | | | | | |
| <i>Neobatrachus aquilonius</i> | | | X | | X | P |
| <i>Neobatrachus fulvus</i> | | | | X | X | P |
| <i>Notaden nichollsi</i> | | | X | X | X | P |
| <i>Limnodynastes spenceri</i> | | | | | | P |
| No. of Species Predicted/Recorded | | | 4 | 2 | 6 | 6 |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

Appendix 5 List of reptile species recorded or expected to occur within the proposed CS 2 to Tubridgi Gas Pipeline route.

Key

- Biota 2010: Wheatstone Project Terrestrial Fauna Survey.
 Biota 2005a & b: Yannarie Salt Project Fauna Survey; Onslow Solar Salt Field Report.
 DEC NMap: NatureMap search results
 Ninox 2013: Field study results.
 R: Recorded during the field survey
 P: Predicted to occur within the habitats of the proposed pipeline route.
 X: Recorded in literature/data searches.

Status

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

| REPTILES | | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|---------------------------------------|-----------------|--------|------------|---------------|-----------|------------|
| Carphodactylidae | Geckos | | | | | |
| <i>Nephrurus levis occidentalis</i> | | | X | X | X | R |
| Diplodactylidae | Geckos | | | | | |
| <i>Crenadactylus ocellatus</i> | | | | | | P |
| <i>Diplodactylus conspicillatus</i> | | | X | X | X | P |
| <i>Diplodactylus galaxius</i> | | | | | | P |
| <i>Diplodactylus mitchelli</i> | | | | | | P |
| <i>Diplodactylus pulcher</i> | | | | | X | P |
| <i>Lucasium stenodactylus</i> | | | X | X | X | R |
| <i>Lucasium wombeyi</i> | | | | | | P |
| <i>Rhynchoedura ornata</i> | | | | | X | P |
| <i>Strophurus ciliaris aberrans</i> | | | | | | P |
| <i>Strophurus elderi</i> | | | | | | P |
| <i>Strophurus jeanae</i> | | | X | | X | P |
| <i>Strophurus rankini</i> | | | | | X | P |
| <i>Strophurus strophurus</i> | | | X | X | X | R |
| Gekkonidae | Geckos | | | | | |
| <i>Gehyra pilbara</i> | | | X | X | X | R |
| <i>Gehyra punctata</i> | | | X | | X | P |
| <i>Gehyra purpurascens</i> | | | | | | P |
| <i>Gehyra variegata</i> | | | X | X | X | R |
| <i>Heteronotia binoei</i> | | | X | X | X | R |
| Pygopodidae | Legless Lizards | | | | | |
| <i>Delma haroldi</i> | | | | X | X | P |
| <i>Delma nasuta</i> | | | X | | X | P |
| <i>Delma pax</i> | | | | | | P |
| <i>Delma tinctoria</i> | | | X | X | X | P |
| <i>Lialis burtonis</i> | | | X | X | X | P |
| <i>Pygopus nigriceps</i> | | | X | X | X | P |
| Scincidae | Skinks | | | | | |
| <i>Carlia munda</i> | | | | | | P |
| <i>Cryptoblepharus plagiocephalus</i> | | | | | | P |
| <i>Ctenotus calurus</i> | | | X | | | P |
| <i>Ctenotus duricola</i> | | | | | | P |
| <i>Ctenotus grandis titan</i> | | | X | X | X | P |
| <i>Ctenotus hanloni</i> | | | X | X | X | P |
| <i>Ctenotus helenae</i> | | | | | X | P |
| <i>Ctenotus iapetus</i> | | | X | X | X | P |
| <i>Ctenotus maryani</i> | | | | X | X | P |
| <i>Ctenotus pantherinus ocellifer</i> | | | X | X | X | P |
| <i>Ctenotus quattuordecimlineatus</i> | | | | | X | P |
| <i>Ctenotus piankai</i> | | | | | | P |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

| REPTILES | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|--|-----------------|------------|---------------|-----------|------------|
| <i>Ctenotus</i> affin. <i>robustus</i> | | | | | P |
| <i>Ctenotus rufescens</i> | | X | X | X | P |
| <i>Ctenotus saxatilis</i> | | X | X | X | P |
| <i>Ctenotus schomburgkii</i> | | X | | X | P |
| <i>Cyclodomorphus m. melanops</i> | | | | | P |
| <i>Eremiascincus fasciolatus</i> | | X | X | X | P |
| <i>Eremiascincus isolepis</i> | | | X | | P |
| <i>Lerista bipes</i> | | X | X | X | P |
| <i>Lerista clara</i> | | X | X | X | P |
| <i>Lerista elegans</i> | | | X | X | P |
| <i>Lerista muelleri</i> | | | | | P |
| <i>Lerista onslowiana</i> | | X | X | X | P |
| <i>Lerista petersoni</i> | | | | | P |
| <i>Lerista planiventralis maryani</i> | | | | | P |
| <i>Lerista rolfei</i> | | | | | P |
| <i>Lerista uniduo</i> | | | | X | P |
| <i>Lerista verhmens</i> | | | | | P |
| <i>Menetia greyii</i> | | X | X | X | P |
| <i>Menetia surda</i> | | | | | P |
| <i>Morethia ruficauda exquisita</i> | | | | X | P |
| <i>Notoscincus o. ornatus</i> | | | | | P |
| <i>Tiliqua multifasciata</i> | | X | X | X | P |
| Agamidae | Dragons | | | | |
| <i>Amphibolurus gilberti</i> | | X | | | P (M) |
| <i>Amphibolurus longirostris</i> | | | | X | R |
| <i>Ctenophorus c. caudicinctus</i> | | X | | X | P |
| <i>Ctenophorus femoralis</i> | | | X | X | P |
| <i>Ctenophorus i. isolepis</i> | | X | | X | P |
| <i>Ctenophorus nuchalis</i> | | X | X | X | R |
| <i>Ctenophorus reticulatus</i> | | | | X | P |
| <i>Ctenophorus rubens</i> | | | X | X | R |
| <i>Ctenophorus rufescens</i> | | | | X | |
| <i>Diporiphora adductus</i> | | X | X | X | P |
| <i>Pogona m. minor</i> | | X | X | X | R |
| <i>Tympanocryptis cephalus</i> | | | | | P |
| Varanidae | Monitors | | | | |
| <i>Varanus acanthurus</i> | | | | X | P |
| <i>Varanus breviceauda</i> | | X | X | X | P |
| <i>Varanus bushi</i> | | | | | P |
| <i>Varanus caudolineatus</i> | | X | | X | P |
| <i>Varanus eremius</i> | | X | X | X | P |
| <i>Varanus giganteus</i> | | | | | P |
| <i>Varanus gouldii flavirufus</i> | | | X | X | R |
| <i>Varanus panoptes rubidus</i> | | | X | X | R |
| <i>Varanus t. tristis</i> | | | | X | P |
| Typhlopidae | Blind Snakes | | | | |
| <i>Ramphotyphlops ammodytes</i> | | X | X | X | P |
| <i>Ramphotyphlops grypus</i> | | X | X | X | P |
| <i>Ramphotyphlops hamatus</i> | | X | X | X | P |
| <i>Ramphotyphlops pilbarensis</i> | | | | X | P |
| Pythonidae | Pythons | | | | |
| <i>Antaresia perthensis</i> | | | | X | P |
| <i>Antaresia s. stimsoni</i> | | X | X | X | P |
| <i>Aspidites melanocephalus</i> | | X | | X | P |
| <i>Aspidites ramsayi</i> | | | | | P |
| <i>Liasis olivaceous barroni</i> | 1, 2 | | | X | |
| Homalopsidae | | | | | |
| <i>Fordonia leucobalia</i> | | | | | P (M) |
| Elapidae | Venomous Snakes | | | | |
| <i>Acanthophus pyrrhus</i> | | | | | P |
| <i>Brachyuropsis approximans</i> | | | | | P |
| <i>Demansia psammophis cupriceps</i> | | X | X | X | P |

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| REPTILES | Status | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|--|------------|---------------|------------------|--------------|---------------|
| <i>Demansia rufescens</i> | | | | | P |
| <i>Furina ornata</i> | | X | X | X | P |
| <i>Pseudechis australis</i> | | X | | X | P |
| <i>Pseudonaja mengdeni</i> | | X | X | X | P |
| <i>Pseudonaja modesta</i> | | X | X | X | P |
| <i>Simoselaps anomalus</i> | | X | X | X | P |
| <i>Suta fasciata</i> | | | | | P |
| <i>Suta punctata</i> | | X | X | X | P |
| <i>Acalyptophis peronii</i> | Sea Snakes | | | | P (M) |
| <i>Aipysurus apraefrontalis</i> | | | | | P (M) |
| <i>Aipysurus dubiosii</i> | | | | | P (M) |
| <i>Aipysurus eydouxii</i> | | | | | P (M) |
| <i>Aipysurus laevis</i> | | | | | P (M) |
| <i>Aipysurus tenuis</i> | | | | | P (M) |
| <i>Astrotia stokesii</i> | | | | | P (M) |
| <i>Disteria kingii</i> | | | | | P (M) |
| <i>Disteria major</i> | | | | | P (M) |
| <i>Emydocephalus annulatus</i> | | | | | P (M) |
| <i>Ephalophis greyae</i> | | X | | | P (M) |
| <i>Hydrelaps darwiniensis</i> | | X | | | P (M) |
| <i>Hydrophis elegans</i> | | | | | P (M) |
| <i>Hydrophis ocellatus</i> | | | | | P (M) |
| <i>Pelamis platurus</i> | | | | | P (M) |
| No. of Species Predicted/Recorded | | 49 | 45 | 68 | 113 |

CS 2 - Tubridgi to Wheatstone Gas Pipeline – Level 1 Vertebrate Fauna Assessment

Appendix 6 List of introduced species recorded or expected to occur within the proposed CS 2 to Tubridgi Gas Pipeline route.

Key

- Biota 2010: Wheatstone Project Terrestrial Fauna Survey.
 Biota 2005a & b: Yannarie Salt Project Fauna Survey; Onslow Solar Salt Field Report.
 DEC NMap: NatureMap search results
 Ninox 2013: Field study results.
 R: Recorded during the field survey
 P: Predicted to occur within the habitats of the proposed pipeline route.
 X: Recorded in literature/data searches.

| INTRODUCED MAMMALS | | Biota 2010 | Biota 2005a/b | DEC N'Map | Ninox 2013 |
|--|-------------------|------------|---------------|-----------|------------|
| Muridae | | | | | |
| <i>Mus musculus</i> | House Mouse | X | X | | P |
| Canidae | | | | | |
| <i>Canis f. familiaris</i> | Wild/Domestic Dog | | | | R? |
| <i>Vulpes vulpes</i> | Fox | | X | | P |
| Felidae | | | | | |
| <i>Felis catus</i> | Cat | X | X | X | R |
| Equidae | | | | | |
| <i>Equus caballus</i> | Horse | | X | | P |
| Bovidae | | | | | |
| <i>Bos taurus</i> | European Cattle | X | | X | R |
| <i>Capra hircus</i> | Goat | | X | | P |
| Leporidae | | | | | |
| <i>Oryctolagus cuniculus</i> | Rabbit | | | X | P |
| No. of Species Predicted/Recorded | | 3 | 5 | 3 | 8 |

Appendix 7 EPBC Database Protected Matters Report.



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

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: 15/03/13 12:27:09

[Summary](#)

[Details](#)

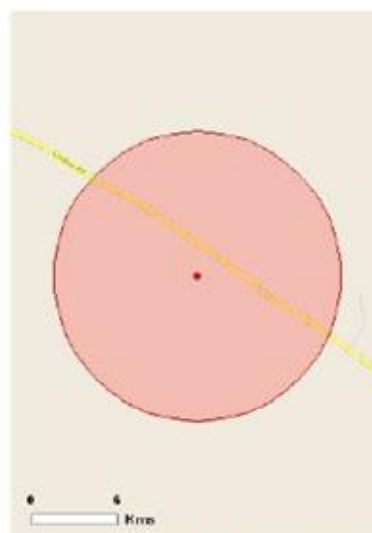
[Matters of NES](#)

[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](#).

| | |
|---|------|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Areas: | None |
| Listed Threatened Ecological Communities: | None |
| Listed Threatened Species: | 3 |
| Listed Migratory Species: | 8 |

Other Matters Protected by the EPBC Act

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

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

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

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

| | |
|---|------|
| Commonwealth Land: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 7 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves: | None |

Extra Information

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

| | |
|--|------|
| Place on the RNE: | None |
| State and Territory Reserves: | None |
| Regional Forest Agreements: | None |
| Invasive Species: | 6 |
| Nationally Important Wetlands: | None |
| Key Ecological Features (Marine) | None |

Details

Matters of National Environmental Significance

| Listed Threatened Species | | [Resource Information] |
|---|------------|--|
| Name | Status | Type of Presence |
| Mammals | | |
| Dasyurus hallucatus Northern Quoll [331] | Endangered | Species or species habitat likely to occur within area |
| Macrotis lagotis Greater Bilby [282] | Vulnerable | Species or species habitat may occur within area |
| Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790] | Vulnerable | Species or species habitat likely to occur within area |

| Listed Migratory Species | | [Resource Information] |
|--|------------|--|
| Name | Threatened | Type of Presence |
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Migratory Marine Birds | | |
| Apus pacificus Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea ibis Cattle Egret [59542] | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | |
| Haliaeetus leucogaster White-bellied Sea-Eagle [943] | | Species or species habitat may occur within area |
| Hirundo rustica Barn Swallow [662] | | Species or species habitat may occur within area |
| Merops ornatus Rainbow Bee-eater [670] | | Species or species habitat may occur within |

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| Name | Threatened | Type of Presence area |
|--|------------|--|
| Migratory Wetlands Species | | |
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat likely to occur within area |
| Charadrius veredus | | |
| Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area |
| Glareola maldivarum | | |
| Oriental Pratincole [840] | | 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 |
| Birds | | |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat likely to occur within area |
| Charadrius veredus | | |
| Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area |
| Glareola maldivarum | | |
| Oriental Pratincole [840] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster | | |
| White-bellied Sea-Eagle [943] | | Species or species habitat may occur within area |
| Hirundo rustica | | |
| Barn Swallow [662] | | Species or species habitat may occur within area |
| Merops ornatus | | |
| Rainbow Bee-eater [670] | | Species or species habitat may occur within area |

Extra Information

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 |
|---|--------|--|
| Mammals | | |
| Capra hircus Goat [2] | | Species or species habitat likely to occur within area |
| Felis catus Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Vulpes vulpes Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| Plants | | |
| Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213] | | Species or species habitat likely to occur within area |
| Prosopis spp. Mesquite, Algaroba [68407] | | Species or species habitat likely to occur within area |

Coordinates

-21.98815 115.33153

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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